Final

Environmental Impact Report for the Palms Groundwater Recovery Project

State Clearinghouse Number 2020060315

Prepared for:

Buena Vista Water Storage District

February 2022

Prepared by:
GEI Consultants, Inc.

GEI Consultants

Consulting Engineers and Scientists

[This page intentionally left blank.]

Final

Environmental Impact Report for the Palms Groundwater Recovery Project

Prepared for:

Buena Vista Water Storage District
525 North Main Street
Buttonwillow, CA 93206

Contact:

Tim Ashlock
Engineer-Manager
661-324-1101

Prepared by:

GEI Consultants
2868 Prospect Park Drive, Suite 400
Sacramento, CA 95670

Contact:

Ginger Gillin
Project Director
503-342-3777

February 2022

State Clearinghouse Number 2020060315

[This page intentionally left blank.]

Table of Contents

Executive Summary ..... **i**
ES.1. Introduction i
ES.2. Project Purpose and Objectives i
Project Benefits ii
Need for Project ii
ES.3. Proposed Project ii
ES.4. Project Alternatives iv
Alternatives Considered but Rejected from Detailed Analysis iv
Alternatives Evaluated in Detail v
ES.5. Summary of Environmental Impacts and Mitigation Measures vi
ES.6. Known Areas of Controversy and Issues of Concern xix
ES.7. Public Participation and Additional Steps in the CEQA Review Process xix

1.0 Introduction **1-1**
1.1 Purpose of this EIR 1-1
1.2 Project Background and Context 1-2
1.3 CEQA Environmental Review Process 1-3
1.3.1 CEQA Process Overview 1-3
1.3.2 Notice of Preparation and Public Scoping 1-3
1.3.3 Preparation of Draft EIR 1-4
1.3.4 Public Review of Draft EIR 1-4
1.3.5 Final EIR Publication and Certification 1-5
1.3.6 Mitigation Monitoring Reporting Program 1-5
1.4 Organization of this EIR 1-6
1.5 Known Areas of Controversy and Issues of Concern 1-7
1.6 Standard Terminology 1-7

2.0 Project Description **2-1**
2.1 Introduction 2-1
2.2 Goals and Objectives of the Project 2-5
2.2.1 Project Benefits 2-5
2.2.2 Need for Project 2-5
2.3 Project Description 2-6
2.3.1 Facilities 2-6
2.3.2 Operation 2-7
2.3.3 Memorandum of Understanding 2-7
2.4 Discretionary Permits and Approvals Required 2-8
2.5 Agencies Expected to Use This EIR 2-8

3.0 Environmental Setting, Impact Analysis, and Mitigation Measures **3-1**
3.1 Resources Dismissed from Further Analysis 3-1
3.1.1 Aesthetics 3-1
3.1.2 Agriculture and Forestry 3-2
3.1.3 Air Quality 3-2
3.1.4 Energy 3-5

3.1.5 Greenhouse Gas Emissions 3-5
3.1.6 Hazards and Hazardous Materials 3-5
3.1.7 Land Use and Planning 3-5
3.1.8 Mineral Resources 3-6
3.1.9 Noise 3-6
3.1.10 Population and Housing 3-6
3.1.11 Public Services 3-6
3.1.12 Recreation 3-6
3.1.13 Transportation 3-7
3.1.14 Utilities and Service Systems 3-7
3.1.15 Wildfire 3-7
3.2 Biological Resources 3-7
3.2.1 Environmental Setting 3-7
3.2.2 Regulatory Setting 3-28
3.2.3 Environmental Impacts and Mitigation Measures 3-31
3.3 Cultural Resources 3-41
3.3.1 Environmental Setting 3-41
3.3.2 Regulatory Framework 3-45
3.3.3 Environmental Impacts and Mitigation Measures 3-49
3.4 Hydrology and Water Quality 3-53
3.4.1 Environmental Setting 3-53
3.4.2 Regulatory Framework 3-64
3.4.3 Environmental Impacts and Mitigation Measures 3-70
3.5 Geological Resources 3-90
3.5.1 Environmental Setting 3-90
3.5.2 Regulatory Framework 3-95
3.5.3 Environmental Impacts and Mitigation Measures 3-97

4.0 Other CEQA Required Sections 4-1
4.1 Introduction 4-1
4.2 Growth Inducing Impacts 4-1
4.2.1 Direct Growth Inducement 4-2
4.3 Significant and Unavoidable Impacts 4-2
4.4 Irreversible and Irretrievable Commitment of Resources 4-2
4.5 Cumulative Impact Analysis 4-3
4.5.1 Geographic Scope of Cumulative Impact Analysis 4-3
4.5.2 Projects Considered in Cumulative Impact Analysis 4-3
4.5.3 Methods 4-4
4.6 Cumulative Impact Analysis by Resource Area 4-5
4.6.1 Biological Resources 4-5
4.6.2 Cultural Resources 4-6
4.6.3 Hydrology and Water Quantity 4-6
4.6.4 Geological Resources 4-14

5.0 Alternatives to the Proposed Project 5-1
5.1 CEQA Requirements 5-1
5.2 Overview of the Alternative Selection Process 5-2
5.3 Goals and Objectives of the Recovery Project 5-2

5.4 Potentially Significant Impacts of the Recovery Project 5-3
5.5 Alternatives Evaluation Criteria 5-3
5.6 Alternatives Considered but Rejected from Detailed Analysis 5-3
5.6.1 Landowner Recovery Alternative 5-3
5.6.2 Alternative Project Layouts 5-4
5.7 Alternatives Evaluated in Detail 5-6
5.7.1 No-Project Alternative 5-6
5.7.2 Reduced Recovery Alternative (also known as Scenario B) 5-6
5.8 Comparison of Impacts of the Alternatives 5-6
5.8.1 No-Project Alternative 5-6
5.8.2 Reduced Recovery Alternative 5-10
5.9 Environmentally Superior Alternative 5-17

6.0 Mitigation Summary 6-1
6.1 Introduction 6-1

7.0 Comment Letters Received on Draft EIR 7-1

8.0 Response to Comments 8-1
8.1 West Kern Water District 8-1
8.2 Kern County Water Agency 8-6
8.3 Kern Groundwater Authority 8-9
8.4 California Department of Fish and Wildlife 8-17
8.5 Kern Water Bank Authority 8-23
8.6 Kern Water Bank Authority, South Valley Biological Consulting 8-47
8.7 Kern Water Bank Authority, Environmental Defense Sciences 8-49
8.8 Kern Water Bank Authority, Wood Environment and Infrastructure 8-50

9.0 Master Responses to Comments 9-1
9.1 Master Response #1 – Suitability and validation of superposition model 9-1
9.1.1 Superposition Model Concept – Application for Numerical Models 9-1
9.1.2 Superposition Model Concept - Handling of Nonlinearities 9-2
9.1.3 Superposition Model Concept - Applicability 9-3
9.1.4 Superposition Model Development 9-3
9.1.5 Superposition Model Validation 9-4
9.1.6 Recovery Project Scenarios A and B 9-7
9.1.7 Summary and Opinion 9-7
9.2 Master Response #2 – GSA Jurisdiction 9-8
9.3 Master Response # 3 – Water Quality Data 9-9
9.4 Master Response # 4 – Water Quality Impact Analysis 9-11
9.5 Master Response #5 - SGMA 9-12
9.5.1 General SGMA Provisions 9-12
9.5.2 Projects and Management Actions 9-13
9.5.3 Monitoring and Mitigation 9-15
9.6 Master Response # 6 – Biology 9-15
9.7 Master Response #7 – Regional Groundwater Elevation Contour Mapping and Flow Analysis 9-17
9.7.1 Regional Groundwater Elevation Contour Mapping and Flow Analysis 9-18

9.7.2 Evaluation of Modeling Results in Context with Regional Groundwater Level Contour Maps 9-23
9.7.3 Comparison to Other Groundwater Elevation Maps 9-25
9.7.4 Hydrogeological Conceptual Model 9-28
9.7.5 Figures for Master Response #7 9-31
9.8 Master Response #8 – Beneficial Use of Recovered Groundwater 9-33
9.9 Master Response # 9 – Clarification of Recovery Project Description 9-35

10.0 Report Preparers and Reviewers 10-1

11.0 References 11-1

List of Tables

Table 3-1. Air Quality Small Project Analysis Level 3-3
Table 3-2. Special-status Plants Evaluated for Potential to Occur on or Adjacent to the Project Site 3-18
Table 3-3. Special-status Fish and Wildlife Evaluated for Potential to Occur on or Adjacent to the Project Site. 3-20
Table 3-4. Summary of Water Quality in Kern River and California Aqueduct (at Tupman) 3-54
Table 3-5. Water Quality Constituents of Concern in the Project Area 3-63
Table 3-6. Theoretical Blending Calculation of Project Water before Pump-In 3-87
Table 3-7. Comparison of Average Project Water and Aqueduct Water Quality 3-87
Table 3-8. Soils in the Recovery Project area 3-95
Table 4-1. Geographic Scope of Cumulative Impact and Method Evaluation 4-4
Table 4-2. List of Collective Past, Present, and Reasonably Anticipated Future Projects 4-4
Table 6-1. Summary of Project Impacts, Mitigation Program, and Residual Effect 6-2
Table 9-1. Comparison of Wells used in the DEIR and FEIR Water Quality Analysis and 2017 GEI Memo ... 9-11
Table 9-2. Water Quality of Surface Water Used for Recharge and Groundwater in the Recovery Project Area. .. 9-34

List of Figures

Figure 2-1. Regional Location of the Recovery Project 2-2
Figure 2-2. Recovery Project Location 2-3
Figure 2-3. Groundwater Sustainability Agencies in Recovery Project Area 2-4
Figure 3-1. Habitat and Land Cover Types in the Biological Study Area – Map 1 3-11
Figure 3-2. Habitat and Land Cover Types in the Biological Study Area – Map 2 3-12
Figure 3-3. Habitat and Land Cover Types in the Biological Study Area – Map 3 3-13
Figure 3-4. California Natural Diversity Database Occurrences of Special-status Plants within 3 Miles of the Project Site 3-16
Figure 3-5. California Natural Diversity Database Occurrences of Special-status Animals within 3 Miles of the Project Site 3-17
Figure 3-6. Regional Groundwater Trends near Recovery Project 3-58
Figure 3-7. Groundwater Elevation Map of the Buena Vista Water Storage District 3-59
Figure 3-8. Depth to Groundwater, Buena Vista Water Storage District 3-60
Figure 3-9. Map of Water Quality Data Sources 3-62
Figure 3-10. Location of Banking Operations Operated by Others, near the Recovery Project 3-73
Figure 3-11. Maximum Mounding After One Year of Recharge 3-77
Figure 3-12. Residual Mound Prior to Start of Pumping 3-78
Figure 3-13. Groundwater Level Change After One Year of Pumping 3-80

Figure 3-14. Groundwater Level Change After Four Years of Pumping and 100% Recovery of Recharged Water (Scenario A) 3-81
Figure 3-15. Groundwater Level Change at Recovery Wells, 100% Recovery of Recharged Water (Scenario A) 3-83
Figure 3-16. Groundwater Level Change at Simulated Monitoring Points, 100% Recovery of Recharged Water (Scenario A) 3-85
Figure 3-17. Historical Subsidence January 2007 to March 2011 3-94
Figure 5-1. Alternative Recovery Project Layout - Palms Area Only 5-5
Figure 5-2. Alternative Recovery Project Layout – Northeastern Area 5-8
Figure 5-3. Groundwater Level Change After Four Years of Pumping, Reduced Recovery Alternative (Scenario B) 5-11
Figure 5-4. Groundwater Level Change in Recovery Project Wells, Reduced Recovery Alternative (Scenario B) 5-12
Figure 5-5. Groundwater Level Change at Specified Simulation Points, Reduced Recovery Alternative (Scenario B). 5-13
Figure 5-6. Superposition Hydrographs at BVWSD Wells 5-15
Figure 5-7. Superposition Hydrographs at WKWD and Pioneer Wells 5-16
Figure 9-1 Location Map
Figure 9-2 General Distribution of Kern County Subbasin Principal Aquifers
Figure 9-3 Location of Upper Zone Wells Used in Contouring
Figure 9-4 Location of Lower Zone Wells Used in Contouring
Figure 9-5 Location Map of E-Clay Extent and Major Geologic Structures
Figure 9-6 Upper Zone Groundwater Elevation Contour Map – Spring 2015
Figure 9-7 Upper Zone Groundwater Elevation Contour Map – Fall 2016
Figure 9-8 Upper Zone Groundwater Elevation Contour Map – Spring 2017
Figure 9-9 Upper Zone Groundwater Elevation Contour Map – Spring 2018
Figure 9-10 Upper Zone Groundwater Elevation Contour Map – Spring 2019
Figure 9-11 Lower Zone Groundwater Elevation Contour Map – Spring 2015
Figure 9-12 Lower Zone Groundwater Elevation Contour Map – Fall 2016
Figure 9-13 Lower Zone Groundwater Elevation Contour Map – Spring 2017
Figure 9-14 Lower Zone Groundwater Elevation Contour Map – Spring 2018
Figure 9-15 Lower Zone Groundwater Elevation Contour Map – Spring 2019
Figure 9-16 Superposition Model Results Palms Recovery Project One-Year Drawdown
Figure 9-17 Simulated One Year Drawdown Added to Spring 2015 Groundwater Elevations
Figure 9-18 Simulated One Year Drawdown Added to Fall 2016 Groundwater Elevations
Figure 9-19 Simulated One Year Drawdown Added to Spring 2017 Groundwater Elevations
Figure 9-20 Simulated One Year Drawdown Added to Spring 2018 Groundwater Elevations
Figure 9-21 Simulated One Year Drawdown Added to Spring 2019 Groundwater Elevations
Figure 9-22 Simulated Four Year Drawdown Added to Fall 2016 Groundwater Elevations
Figure 9-23 BVWSD Upper Zone Groundwater Elevation Contour Map Spring 2013
Figure 9-24 BVWSD Upper Zone Groundwater Elevation Contour Map Spring 2014
Figure 9-25 BVWSD Upper Zone Groundwater Elevation Contour Map January 2015
Figure 9-26 BVWSD Upper Zone Groundwater Elevation Contour Map October 2019
Figure 9-27 BVWSD Upper Zone Groundwater Elevation Contour Map March 2020
Figure 9-28 SWSD Monitoring Report Upper Zone GW Elevations Spring 2017
Figure 9-29 SWSD Monitoring Report Upper Zone GW Elevations Spring 2018
Figure 9-30 SWSD Monitoring Report Upper Zone GW Elevations Spring 2019
Figure 9-31 SWSD Monitoring Report Lower Zone GW Elevations Spring 2017
Figure 9-32 SWSD Monitoring Report Lower Zone GW Elevations Spring 2018
Figure 9-33 SWSD Monitoring Report Lower Zone GW Elevations Spring 2019
Figure 9-34 KGA GSP - Upper Aquifer Groundwater Elevation Contour Map - Spring 2015

Figure 9-35 KGA GSP - Regional Aquifer Groundwater Elevation Contour Map - Spring 2015
Figure 9-36 Kern Fan Monitoring Committee Middle Zone GW Elevations Spring 2007
Figure 9-37 Kern Fan Monitoring Committee Middle Zone GW Elevations Spring 2008
Figure 9-38 Kern Fan Monitoring Committee Middle Zone GW Elevations Spring 2009
Figure 9-39 Kern Fan Monitoring Committee Middle Zone GW Elevations Spring 2010
Figure 9-40 Geologic Structure Map of the Base of the E-Clay or Equivalent
Figure 9-41 Hydrogeologic Zones with Kern County Subbasin GSA Boundaries
Figure 9-42 Kern County Coalition CV Salts Priority Areas

List of Appendices

Appendix A Notice of Preparation and Initial Study
Appendix B Comments received on the Notice of Preparation and Initial Study
Appendix C Sensitive Species List
Appendix D Groundwater Modeling Report
Appendix E Attachments to Comment Letter from Kern Water Banking Authority

Abbreviations and Acronyms

§	Section
AF	acre-feet
AFY	acre-feet per year
AGR	Agricultural Supply
Aqueduct	California Aqueduct
B.P.	before the present
Basin Plan	Water Quality Control Plan for the Tulare River Basin
bgs	below ground surface
BMPs	best management practices
BV8	Buena Vista Turnout #8
BVGSA	Buena Vista Groundwater Sustainability Agency
BVGSP	Groundwater Sustainability Plan
BVWSD	Buena Vista Water Storage District
C2VSimFG-Kern	California Central Valley Groundwater-Surface Water Simulation Model
cal B.P.	calibrated years before the present
cal A.D.	calibrated years before the anno Domini
CCR	California Code of Regulations
CCTS	Central California Taxonomic System
CESA	California Endangered Species Act
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CORS	Continuously Operating Reference Stations
County	Kern County
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CVHM	USGS Central Valley Hydrologic Model
CWA	Clean Water Act
District	Buena Vista Water Storage District
DEIR	Draft Environmental Impact Report
DWR	California Department of Water Resource
EIR	Environmental Impact Report
ESA	Endangered Species Act
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FGC	California Fish and Game Code
GAMAQI	Guidance for Assessing and Mitigating Air Quality Impacts
GHG	greenhouse gas
GNSS	Global Navigation Satellite System
GSA	Groundwater Sustainability Agencies

GSP	Groundwater Sustainability Plan
HCP	Habitat Conservation Plan
HCCP	Natural Community Conservation Plans
HUD	United States Department of Housing and Urban Development
IND	Industrial Supply
InSAR	Interferometric Synthetic Aperture Radar
IPaC	Information for Planning and Conservation
IS	Initial Study
JOC	Joint Operating Committee
JPA	Joint Powers Agreement
KCWA	Kern County Water Agency
KGA	Kern Groundwater Authority
KGAGSP	Kern Groundwater Authority Groundwater Sustainability Plan
KFMC	Kern Fan Monitoring Committee
KRGSA	Kern River Groundwater Sustainability Agency
KSA	Kenneth D. Schmidt and Associates
KWB	Kern Water Bank
KWBA	Kern Water Bank Authority
LAFCo	Local Agency Formation Commission
lead agency	Buena Vista Water Storage District
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
MLD	Most Likely Descendant
MMRP	Mitigation Monitoring and Reporting Program
msl	mean sea level
MOs	management objectives
MTs	minimum thresholds
MUN	Municipal and Domestic Supply
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEHRP	National Earthquake Hazards Reduction Program
NGS	National Geodetic Survey
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
N.P.D.E.S.	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
Palms Project	Palms Groundwater Banking Project
PCE	Primary constituent element
PIP	Pump-In Proposal
PM	particulate matter
PM10	particulate matter less than 10 microns in diameter
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
ppb	parts per billion
ppm	parts per million

PRC	Public Resources Code
Program	Worker Environmental Awareness Program
Recovery Project	Palms Groundwater Recovery Project
RRBMA	Rosedale Rio-Bravo Management Area
RRBWSD	Rosedale Rio-Bravo Water Storage District
RMW	representative monitoring well
RPA	Registered Professional Archeologist
RWQCBs	Regional Water Quality Control Boards
SCH	State Clearinghouse
SGMA	Sustainable Groundwater Management Act
S.J.V.A.P.C.D.	San Joaquin Valley Air Pollution Control District
SMC	Sustainable Management Criteria
SPAL	Small Project Analysis Level
S.S.J.V.I.C.	Southern San Joaquin Valley Information Center
State Water Board	State Water Resources Control Board
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Program
SWSD	Semitropic Water Storage District
TCP	1,2,3-Trichloropropane
TCRs	Tribal Cultural Resources
TDS	total dissolved solids
Tribe	Torres Martinez Desert Cahuilla Indians Tribe
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
Valley	San Joaquin Valley
WDRs	waste discharge requirements
WKWD	West Kern Water District

[This page intentionally left blank.]

Executive Summary

ES.1. Introduction

The California Environmental Quality Act (CEQA) specifies that a public agency must prepare an environmental impact report (EIR) on any project that it proposes to carry out or approve that may result in a significant effect on the environment (California Public Resources Code [PRC], Section [§] 21080[d]). Serving as the CEQA lead agency, the Buena Vista Water Storage District (BVWSD or District) has prepared this project-level EIR in accordance with CEQA and CEQA Guidelines (California Code of Regulations [CCR] [F], Title 14, Division 6, Chapter 3, § 15000 et seq.) to evaluate the potential environmental impacts associated with implementing the Palms Groundwater Recovery Project (Recovery Project). This EIR is an informational document which will inform public agency decision makers and the public generally of the significant environmental effect of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the Recovery Project (CEQA Guidelines, § 15121[a]).

The District published an Initial Study (IS) and a Notice of Preparation (NOP) of an EIR on June 16, 2020. A draft EIR was released on December 4, 2020. The draft EIR was revised in response to the comments received by the District. These minor revisions include edits to the draft EIR, which are included in this document. None of the revisions provide significant new information as no new environmental impacts are identified, there is no known increase to the severity of an impact, nor is a considerably different feasible alternative or mitigation measure identified. Rather, the revisions simply provide further clarification of the information already disclosed in the Draft EIR (DEIR). In addition, the comments letters received on the draft EIR are included in Chapter 7, and the District's response to those comments are included in Chapters 8 and 9.

ES.2. Project Purpose and Objectives

CEQA Guidelines (§ 15124[b]) require that the project description contain a clear statement of the project objectives, including the underlying purpose of the project. The statement of objectives is important under CEQA in helping the lead agency (the District) develop a range of reasonable alternatives for evaluation in the EIR. These objectives also define the underlying need for the project.

The overall purpose of the Recovery Project is to enhance groundwater management by increasing the District's ability to recharge groundwater in wet years and return that banked water in dry years. Additionally, enhanced groundwater management would benefit agriculture by providing irrigation water supplies in years with limited surface water supplies.

The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County (County) by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies

- Improve conveyance of previously stored water throughout the District to neighboring districts
- Install recovery facilities to attract new banking partners in order to increase groundwater in the Kern Subbasin for District use
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the California Aqueduct (Aqueduct)

These objectives were important for the identification, development, selection, and consideration of the CEQA alternatives evaluated in this FEIR (Chapter 5 – Alternatives to the Proposed Project)

Project Benefits

The Recovery Project will provide up to 25,000 acre-feet (AF) of banked groundwater to the District's water customers in dry years, while meeting the requirements of the Sustainable Groundwater Management Act (SGMA).

Need for Project

The District has a gross irrigable acreage of about 49,000 acres. Currently about half the District lands are planted with permanent crops with growers migrating away from row crops. The conversion to permanent crops may increase the water demand by 1 acre-foot per acre. In the short term, this conversion typically reduces demand, as a pistachio tree will not reach full demand for water until about the 12th year, with the 1st year being as low as 0.25 AF per acre. The Recovery Project will allow for the highs and lows of the District's water supply to be managed in a manner that ensures full production of permanent crops regardless of the current year's water supply.

With the District's Kern River water supply, as well as its State Water Project (SWP) water supply, the District should be able to meet future demands. This Recovery Project will help in meeting those demands as well as being available to partner with others to help meet their water supply needs.

ES.3. Proposed Project

The Recovery Project will extract water banked within the District. For this purpose, the District would utilize a suite of 14 wells: nine proposed new wells and five replacement wells.

Conveyance pipes would be installed to connect new and replacement wells for the Recovery Project water delivery system. Construction activities would include excavation and trenching to install the wells, and approximately 11.9 miles of conveyance pipe. The total area of disturbance would be approximately 72 acres. The new and replacement wells would be drilled to a depth of up to 500 feet and include an 18-inch casing. Trench depths would be 5 feet for pipes up to 24 inches in diameter and 6 feet for larger pipes. Trench widths would be 3 feet for pipes up to 24 inches in diameter and 6 feet for larger pipes.

Anticipated construction activities for pipelines would begin 2023 and could be completed within 11 months. Wells will be installed as the need arises. Staging areas for the construction equipment and materials would be adjacent to the Recovery Project on previously disturbed land. Construction vehicles for the pipeline would consist of a front wheel loader, three excavators, two water trucks, backhoe, and

three pickup trucks. Equipment needed for well construction would consist of a drilling rig, engine and gear drive, air compressor, backhoe, and pipe trailer.

The water pipelines will connect to the California Aqueduct at Buena Vista Turnout #8 (BV8). BV8 will be modified to convey water both to and from the Aqueduct.

The District has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Conjunctive management within the District begins with deliveries of surface water from the Kern River and the Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands. Thus, during years when supplies are above average, surface water is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the District takes place through seepage in District-owned facilities, including canals, laterals and recharge basins. In January 2016, the District approved construction of the Palms Project in the southern portion of the Buttonwillow Service Area. The existing Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge. Available water supply will continue to be recharged at the Palms Groundwater Recharge Project (Palms Project) during wet years. As stated in the Palms Project 2016 IS / Mitigated Negative Declaration (State Clearinghouse [SCH] # 2015121030), the District anticipates recharging up to 100,000 acre-feet per year (AFY) through the Palms Project when water supply is available.

This Recovery Project seeks to supplement existing landowner recovery facilities for the recovery of water banked in the District in existing facilities/projects. The District manages recovery so that no more than 90 percent of water banked is recovered. Water recovered by the District will be distributed to District water users or exchanged with other districts or sold to other industrial or municipal users. This Recovery Project may also discharge into the Aqueduct to satisfy existing and future water contracts between the District and other public water agencies.

The Recovery Project will be managed so that groundwater elevations will, in the long term, improve from those observed historically. Annual water recovery will be limited to no more than 25,000 AF. Wells will be pumped at a rate of no more than 5 cubic feet per second, and the wells selected for recovery will be selected to optimize groundwater recovery and minimize impacts to groundwater levels.

For the District to use the Aqueduct to convey the recovered groundwater, approval from the California Department of Water Resources (DWR) is required. It is DWR's policy to assist with the conveyance of water to provide a reliable water supply and to protect the SWP's water quality within the Aqueduct. In order to facilitate this policy, DWR provides an implementation process to accept non-SWP water into the Aqueduct. To do so, the District is required to submit a Pump-In Proposal (PIP) to DWR which identifies the water sources, planned operation, inflow water quality, and any anticipated impacts to SWP water quality and/or operations. The PIP will also include a water quality monitoring plan to assure that the quality of water delivered by the Recovery Project meets the requirements of the PIP.

ES.4. Project Alternatives

CEQA requires that an EIR describe and evaluate a range of reasonable alternatives to a project or to the location of a project that would feasibly attain most of the basic project objectives and avoid or substantially lessen significant project impacts (CEQA Guidelines § 15126.6). The alternatives to the Recovery Project considered in this DEIR were developed based on information gathered during the development of the proposed project and during the EIR scoping process (*see* Chapter 5 – Alternatives to the Proposed Project).

The District intends to implement the environmentally preferred alternative, the Reduced Recovery Alternative.

Alternatives Considered but Rejected from Detailed Analysis

This number of alternatives analyzed in detail was constrained in part due to the fact that alternative design elements and configurations have already been incorporated by the District as a result of findings and recommendations of technical studies conducted during the planning processes for the Recovery Project, with a goal to limit environmental impacts of the Recovery Project. The design elements and configurations initially considered are summarized below.

Landowner Recovery Alternative

The District considered an alternative groundwater recovery option to provide flexibility by allowing private pumping in lieu of surface water deliveries. Under this alternative, landowners would have the option of continuing to receive surface water deliveries through the District's canals and pipelines or to utilize on-farm wells to pump water for irrigation needs.

This delivery option would not meet the Recovery Project objectives to improve conveyance of previously stored water throughout the District and to neighboring districts. Therefore, this alternative was not evaluated in detail because it cannot feasibly attain most of the Recovery Project's objectives.

Palms Area-Only Layout

An alternative to extract banked water from wells located solely within the boundaries of the Palms Groundwater Bank was evaluated by the District. This alternative would utilize a suite of 31 wells: seven proposed, new wells; 17 existing private wells; two currently inactive wells on District property (to be rehabilitated); and five wells within the neighboring West Kern Water District (WKWD). No more than 25 of these wells would have been used for groundwater recovery in any given year. Conveyance pipes (90,000 feet) would connect new and existing wells for the Recovery Project water delivery system.

The evaluation of water quality data for wells in the Palms area found that it may not be possible to meet water quality standards for pump-in to the Aqueduct without treatment. Therefore, this alternative was not evaluated in detail because it cannot feasibly attain the Recovery Project's objective of meeting water quality standards for pump-in to the California Aqueduct by blending, if necessary.

In addition, potential impacts to groundwater levels would be greater with this alternative because groundwater recovery would be concentrated within a smaller project footprint. Therefore, this alternative

was not evaluated in detail because it did not avoid or substantially lessen an identified significant adverse environmental impact of the Recovery Project.

Alternative Northeastern Area Layout

The original layout in the northeastern area of the Recovery Project included wells and pipelines immediately adjacent to bush seepweed scrub habitat that could support sensitive biological resources. In addition, the original pipeline alignment may impact a previously documented archaeological resource.

The location of wells and pipeline in the northeastern area was revised in response to these survey results. The revised project layout, which is now the proposed Recovery Project, provides a minimum buffer of 50 feet between the anticipated construction disturbance corridor and bush seepweed scrub habitat. In addition, the pipeline route was adjusted to avoid the archeological resource. Therefore, the alternative northeastern project layout was not evaluated in detail, because it did not avoid or substantially lessen an identified significant adverse environmental impact of the Recovery Project.

Alternatives Evaluated in Detail

No-Project Alternative

Under the no project alternative, the District would not construct a groundwater recovery system to recover water banked at the Palms. The District would not recover banked groundwater except with existing wells and would not have a conveyance system to deliver recovered water.

Reduced Recovery Alternative (also known as Scenario B)

As described in Chapter 3.4.3.3 – Groundwater Level Impact Analysis, two operational scenarios were simulated using the Superposition Model to assess changes in groundwater conditions. The original project description (also known as Scenario A) included an assumption of 100 percent recovery of the recharged water as a worst-case scenario with respect to groundwater level impacts. The recovery pumping occurs at a rate of 25,000 AFY over a 6-month period over 4 consecutive years. This scenario was modeled as a worst-case scenario for impact analysis purposes, actual recovery would likely extend over a longer time period.

In the Reduced Recovery Alternative (also known as Scenario B), the Recovery Project includes a leave-behind requirement that would restrict the project to recovering 90 percent of the recharged water. The simulated recovery pumping would occur at a rate of 25,000 AFY over a 6-month period over 3 consecutive years. During Year 4, the recovery pumping would occur at a rate of 15,000 AFY. The same pumping rate occurs during the first 3 months, reduced pumping occurs in the 4th month, and no pumping during the final 2 months of Year 4 of the extraction period. As described for Scenario A, this recovery schedule is anticipated to be the worst-case scenario, with actual recovery extending over a longer time period, with less impact to groundwater levels.

This is the environmentally preferred alternative and the alternative the District intends to implement.

ES.5. Summary of Environmental Impacts and Mitigation Measures

CEQA requires that the environmental analysis contained in the DEIR also include a summary of the proposed project and its consequences, including an identification of each potentially significant effect of the proposed project, the level of effect the proposed project may have, as well as any proposed mitigation measures. A full description of each of the proposed impacts and mitigation measures is found in Chapter 3.0 – Environmental Setting, Impacts, and Mitigation Measures and summarized in Chapter 6.0 – Mitigation Summary. **Table ES-1** presents a summary of environmental impacts, then presents the level of significance of each impact before mitigation, mitigation measures for significant and potentially significant impacts, and the level of significance of each impact after mitigation.

Table ES-1. Summary of Project Impacts, Mitigation Program, and Residual Effect

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Air Quality – Project construction of more than 5 acres will generate dust and particulate emissions.	Less-than-significant	**Mitigation Measure AQ-1: District Regulation VIII Fugitive PM_{10} (particulate matter less than 10 microns in diameter) Prohibitions Best Management Practices** All projects are subject to San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.) rules and regulations in effect at the time of construction. Control of fugitive dust is required by S.J.V.A.P.C.D. Regulation VIII. The District shall implement or require its contractor to implement all of the following measures as identified by S.J.V.A.P.C.D.: • Apply water to unpaved surfaces and areas • Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas • Limit or reduce vehicle speed on unpaved roads and traffic areas • Maintain areas in a stabilized condition by restricting vehicle access • Install wind barriers • During high winds, cease outdoor activities that disturb the soil • Keep bulk materials sufficiently wet when handling • Store and hand material in a three-sided structure • When storing bulk material, apply water to the surface or cover the stage pile with a tarp • Don't overload haul trucks. Overlanded trucks are likely to spill bulk materials • Cover haul trucks with a tarp or other suitable cover. Or, wet the top of the load enough to limit visible dust emissions • Clean the interior of cargo compartments on emptied haul trucks prior to leaving the site • Prevent track-out by installing a track-out control device • Clean up track-out at least once a day. If along a busy road or highway, clean up track-out immediately	Less-than-significant	During construction	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		• Monitor dust-generating actives and implement appropriate measures for maximum dust control			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-1: Implement Measures to Educate On-site Construction Personnel and Maintain a Minimum 50-foot No-disturbance Buffer from Blunt-nosed Leopard Lizard Habitat during Project Construction**. The District will implement the following measures to minimize potential effects on blunt-nosed leopard lizard during project construction. • Before project activities begin, all on-site project personnel shall attend a Worker Environmental Awareness Program conducted by a qualified biologist. The program shall address special-status species that could occur in the project area and include a discussion of species identification, life history, general behavior, habitat, distribution and sensitivity to human activities; state and federal legal protections; and required avoidance and minimization measures. A handout containing the information provided in the training shall be provided to all personnel. Upon completion of the training, all personnel in attendance shall sign a form stating they received the training and understand all topics discussed. • Before project activities begin east of Morris Road, temporary fencing shall be installed to create and maintain a minimum 50-foot no disturbance buffer between the construction area and bush seepweed scrub habitat that supports burrows suitable for blunt-nose leopard lizard. The fencing shall be installed at least 50 feet from suitable blunt-nose leopard lizard habitat. • A qualified biologist shall determine where fencing will be installed, conduct a pre-installation survey of the fence alignment to confirm no suitable burrows for blunt-nose leopard lizard are present in or within 50 feet of the fence alignment, and be present during all fence installation and removal to ensure that no special-status species are harmed. • All project-related construction activities, construction personnel, and vehicles shall be prohibited from the bush seepweed and	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		50-foot no-disturbance buffer. Fencing shall be inspected and repaired, as necessary, each day before work begins adjacent to the fencing. Fencing shall be removed after all construction activities adjacent to the bush seepweed habitat are complete.			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-2a: Conduct Focused Surveys for Burrowing Owls and Avoid Loss of Occupied Burrows and Failure of Active Nests**. To minimize potential effects of project construction on burrowing owl, the District will ensure that the following measures are implemented, consistent with the Staff Report on Burrowing Owl Mitigation (California Department of Fish and Game [CDFG] 2012). • A burrowing owl take avoidance survey shall be conducted within 14 days before project activities begin. • If any occupied burrows are observed, protective buffers shall be established and implemented. A qualified biologist shall monitor the occupied burrows during project activities to confirm effectiveness of the buffers. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the owls to disturbance. If it is not feasible to implement a buffer of adequate size and it is determined, in consultation with CDFW, that passive exclusion of owls from the project site is an appropriate means of minimizing impacts, an exclusion and relocation plan shall be developed and implemented in coordination with CDFW. However, passive exclusion cannot be conducted during the breeding season (February 1–August 31), unless a qualified biologist verifies through noninvasive means that either (1) the birds have not begun egg laying or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.	Less than significant	Before and during construction	The District and its contractors
Impact BIO-1: Cause a substantial adverse effect, either directly	Potentially significant	**Mitigation Measure BIO-2b: Conduct Focused Surveys for Other Nesting Special-status Birds and Implement Buffers Around Active Nests**.	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
or through habitat modifications, on special-status species		To minimize potential effects of project construction on special-status birds other than burrowing owl, the District will ensure that the following measures are implemented: • A qualified biologist shall conduct surveys of potential Swainson's hawk nesting trees within 0.25 mile of the project site. To the extent practicable, depending on timing of project initiation, surveys will be conducted in accordance with the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000). At a minimum, a survey shall be conducted within 14 days before project activities begin near suitable nest trees during the nesting season (April-August). • A qualified biologist shall conduct surveys of suitable nesting habitat for tricolored blackbird, white-tailed kite, northern harrier, and loggerhead shrike within 500 feet of project activities. Surveys shall be conducted within 14 days before project activities begin near suitable nesting habitat during the nesting season (February-August). • If any active nests are observed, protective buffers shall be established and implemented until the nests are no longer active. A qualified biologist shall monitor the nest during project activities to confirm effectiveness of the buffer. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the nest to disturbance.			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications,	Potentially significant	**Mitigation Measure BIO-3: Conduct Pre-Construction Surveys and Implement Measures during Construction to Minimize Potential Impacts on American Badger and San Joaquin Kit Fox**. To minimize potential effects of project construction on American badger and San Joaquin kit fix, the District will ensure that the following measures are implemented, consistent with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011):	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
on special-status species		• No more than 30 days before project activities begin in a given area, a qualified biologist will conduct a pre-construction survey to determine the potential for American badger or San Joaquin kit fox to occur in the area. If potential or known dens for either species are found, exclusion zones will be established and maintained, in accordance with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011). • If project activity would occur within 50 feet of a potential den (i.e., a den that is not known to be occupied), monitoring will be conducted at the potential den for 4 consecutive days. If no badger or kit fox activity is documented, project activities can proceed. If San Joaquin kit fox activity is documented, the appropriate exclusion zone will be established and maintained, in accordance with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011). If it is infeasible to implement the prescribed exclusion zone, USFWS will be consulted and alternative measures will be implemented to ensure impacts are adequately minimized. If American badger activity is documented during the natal denning season, an appropriate buffer shall be established by a qualified biologist and maintained until the kits are no longer dependent on the den. • To prevent entrapment during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered with plywood or similar material at the end of each workday. If the trenches cannot be closed, one or more escape ramps of no more than a 45-degree slope will be constructed of earthen fill or created with wooden planks. All covered or uncovered excavations will be inspected at the beginning, middle, and end of each day. Before trenches are filled, they will be inspected for trapped animals. If a trapped badger or kit fox is discovered, project activities will stop, and escape ramps or structures will be installed immediately to allow the animal to escape. • All construction pipes or similar structures with a diameter of 4 inches or greater that are stored on the ground at a construction			

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		site for one or more overnight periods will be thoroughly inspected for wildlife before the pipe is buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight will be capped. If a potential San Joaquin kit fox is discovered inside a pipe, all project activities that could result in take will stop, a qualified biologist will be summoned to identify the species, and USFWS will be notified. If a San Joaquin kit fox is unable to escape voluntarily, USFWS will be contacted immediately to determine what actions should be taken to adequately minimize potential impacts. • All food-related trash items such as wrappers, cans, bottles or food scraps generated during project activities will be disposed of in closed containers and removed daily from the project site. No deliberate feeding of wildlife will be allowed, and no pets associated with project personnel will be permitted on the project site.			
Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5	Potentially significant	**Mitigation Measure CUL-1: Implement a Worker Environmental Awareness Program** (Program) Prior to project-related, ground-disturbing activities, the Program will be implemented which will include all construction personnel. Once the project begins, any new personnel will undergo the Program prior to beginning work. The Program will include information regarding what constitutes cultural resources, what procedures to follow if there is an inadvertent cultural resources find, who to contact if there is an inadvertent find, brief description of applicable laws, and all participants will receive a brochure summarizing the Program with appropriate contact information. The Program may be delivered either in person, remotely *via* teleconferencing, or electronic format.	Less than significant	Prior to construction activities	District
Impact CUL-1: Cause a substantial adverse change in the significance of a historical	Potentially significant	**Mitigation Measure CUL-2: Address Previously Undiscovered Historical, Archaeological, and Tribal Cultural Resources** BVWSD shall implement measures to reduce or avoid impacts on undiscovered historic properties, archaeological resources, and tribal cultural resources. If buried or previously unidentified historic properties or archaeological resources are discovered during project construction, all work within a 100-foot-radius of the find shall cease. BVWSD shall retain	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
resource or an archaeological resource pursuant to CCR Section 15064.5		a professional archaeologist meeting the Secretary of the Interior's Professional Standards for Archaeologists to assess the discovery and recommend what, if any, further treatment or investigation is necessary for the find. Interested Native American Tribes will also be contacted. Avoidance is the preferred CEQA treatment for cultural resources. If avoidance is not possible, any necessary treatment/investigation shall be developed in coordination with interested Native American Tribes providing recommendations to BVWSD and shall be completed before project activities continue in the vicinity of the find.			
Impact CUL-2: Disturb any human remains, including remains interred outside of dedicated cemeteries	Potentially significant	**Mitigation Measure CUL-3: Avoid potential effects on undiscovered burials.** If human remains are found, BVWSD will be immediately notified. The California Health and Safety Code requires that excavation be halted in the immediate area and that the county coroner be notified to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code, § 7050.5[b]). If the coroner determines that the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) by telephone within 24 hours of making that determination (Health and Safety Code, § 7050.5[c]). Once notified by the coroner, the NAHC shall identify the person determined to be the Most Likely Descendant (MLD) of the Native American remains. With permission of the legal landowner(s), the MLD may visit the site and make recommendations regarding the treatment and disposition of the human remains and any associated grave goods. This visit should be conducted within 24 hours of the MLD's notification by the NAHC (PRC § 5097.98[a]). If a satisfactory agreement for treatment of the remains cannot be reached, any of the parties may request mediation by the NAHC (PRC § 5097.94[k]). Should mediation fail, the landowner or the landowner's representative must reinter the remains and associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance (PRC § 5097.98[b]).	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Impact CUL-3: Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5 in project areas that have not been analyzed		**Mitigation Measure CUL-4: Investigate for the presence of historical resource or an archaeological resource pursuant to CCR § 15064.5 and for the presence of human remains, including remains interred outside of dedicated cemeteries.** Prior to commencement of ground-disturbing, project-related activities, a cultural resources pedestrian survey will be conducted in all project areas that could not be accessed earlier. The records search that was originally conducted for the project covers the un-accessed areas, therefore an additional records search is not necessary. If cultural resources or human remains are identified during the pedestrian survey, then Mitigation Measures CUL-2 and CUL-3 will be implemented, as appropriate.			
Impact HYDRO-2: Violate any water quality standards or waste discharge requirements (WDRs) or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-1: Isolation aquifer zone testing or installation of nested monitoring wells will be conducted to identify aquifers with poor quality water prior to new well construction until the aquifers and water quality is better understood and then may be discontinued**.	Less than significant	During construction activities	District
Impact HYDRO-2: Violate any water quality	Potentially significant	**Mitigation Measure HYDRO-2: If needed, patches will be installed into a constructed well to improve water quality from the well.** The depth of the pump may also be modified to improve water quality.	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
standards or WDRs or otherwise substantially degrade surface or ground water quality					
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-3: To develop the Pump-In Proposal, the District will conduct water quality sampling of all the wells quarterly for 1 year.** Sampling will include Division of Drinking Water's Title 22 constituents along with DWR's "Constituents of Concern" that are not included in Title 22.	Less than significant	During construction activities	District
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-4: When water quality data becomes available on the Recovery Project's production wells (both existing and new wells), blending calculations will be updated.** The final blending scenario will be selected to ensure that the final, blended water quality, meets DWR requirements.	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-5: The District will follow the water quality monitoring and reporting requirements in the Pump-In Agreement with DWR.**	Less than significant	During project operations	District
Impact GEO-2: Possible Damage to or Destruction of Previously Unknown Unique Paleontological Resources during Construction-Related Activities	Potentially significant	**Mitigation Measure GEO-1: Avoid Potential Effects on Paleontological Resources.** In the event that a paleontological resource is uncovered during Recovery Project implementation, all ground-disturbing work within 165 feet of the discovery shall be halted. A qualified paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts will occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, a qualified paleontologist shall evaluate the resource and determine whether it is “unique” under CEQA, Appendix G, part VII. The determination and associated plan for protection of the resource shall be provided to the District for review and approval. If the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the paleontologist shall consult with the District staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation in place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources and shall be required unless there are other equally effective methods. Other methods may be used but must ensure that the fossils are recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of a qualified paleontologist. All recovered fossils	Less than significant	During construction	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology standard guidelines; typically, the Natural History Museum of Los Angeles County and University of California, Berkeley accept paleontological collections at no cost to the donor. Work may commence upon completion of treatment, as approved by the District.			
Impact CUM-1: Have an impact that is individually limited, but cumulatively considerable for groundwater levels	Potentially significant	**Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their minimum thresholds (MTs) at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD.** Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90% of the recharged amount.	Less than significant	During project operation	District
Impact CUM-2: Have an impact that is individually limited, but cumulatively considerable for subsidence		**Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD.** Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90% of the recharged amount.	Less than significant	During project operation	District

[This page intentionally left blank.]

ES.6. Known Areas of Controversy and Issues of Concern

Pursuant to § 15123(b)(2) of the CEQA Guidelines, a lead agency is required to include areas of controversies raised by agencies and the public during the public scoping process. Based on comments made during the 30-day public review period in response to information published in the NOP and IS, the following areas of controversy and issues of concern have been identified for the proposed project:

- Impacts of pumping on water levels and water quality to neighboring water district's wells
- Water quality of recharged water
- Water quality of recovered groundwater
- Risk of Project-induced subsidence
- Impacts to Sustainable Groundwater Management Act sustainability goals
- Long-term water-supply considerations

ES.7. Public Participation and Additional Steps in the CEQA Review Process

As specified in the California Code Section 21092.5(a),

> At least 10 days prior to certifying an EIR, the lead agency shall provide a written proposed response to a public agency on comments made by that agency which conform with the requirements of this division. Proposed responses shall conform with the legal standards established for responses to comments on draft EIRs. Copies of responses or the environmental document in which they are contained, prepared in conformance with other requirements of this division and the guidelines adopted pursuant to Section 21083, may be used to meet the requirements imposed by this section.

This FEIR is being distributed to the public agencies who commented on the DEIR (WKWD, Kern County Water Agency, Kern Groundwater Authority, California Department of Fish and Wildlife, and Kern Water Bank Authority) at least 10 days prior to the District's Board of Directors meeting to make a decision whether or not to approve the Project.

Copies of the FEIR can be downloaded from the District's website http://www.bvh2o.com or from the state of California's CEQANet database https://ceqanet.opr.ca.gov/Search/Advanced (SCH # 2020060315).

[This page intentionally left blank.]

1.0 Introduction

In 2016, the Buena Vista Water Storage District (BVWSD or District) constructed the Palms Groundwater Recharge Project (Palms Project), approximately 1,150 acres of groundwater recharge basins. These groundwater recharge basins have allowed for high-quality surface water to be recharged at the Palms Project during wet years when available surface water supply exceeds demand.

The District is now proposing to construct and operate the Palms Groundwater Recovery Project (Recovery Project). The Recovery Project involves the construction and replacement of a suite of 14 wells: nine proposed new wells and five replacement wells. Additionally, conveyance pipelines would be installed to connect these wells to a water delivery system. Water recovered by the District from the Recovery Project would be distributed to District water users, exchanged with other districts, and sold to industrial or municipal users.

1.1 Purpose of this EIR

The California Environmental Quality Act (CEQA) of 1970 (as amended) requires that an Environmental Impact Report (EIR) be prepared for any project to be undertaken or approved by a state or local agency that has the potential to have a direct or indirect physical change in the environment. The purpose of this Final EIR (FEIR) is to present information relevant to the regulatory settings for federal, state, and local environmental policies, describe the existing physical conditions, evaluate potential environmental impacts, and recommend a mitigation program designed to reduce or avoid identified significant adverse environmental effects that could result from implementation of the Recovery Project. An EIR is an informational document used to inform public agency decision makers and the general public of the significant environmental impacts of a project, identify possible ways to minimize the significant impacts, and describe reasonable alternatives to the Recovery Project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project.

CEQA requires that state, regional, and local government agencies consider the environmental impacts of projects over which they have discretionary authority before taking action on those projects (California Public Resources Code [PRC] § 21000 et seq.). CEQA also requires that each public agency avoid or reduce to less-than-significant levels, wherever feasible, the significant environmental impacts of projects it approves or implements. If a project would result in significant and unavoidable environmental impacts that cannot be fully and feasibly reduced to less-than-significant levels, the Recovery Project can still be approved, but the lead agency's decision makers must issue a "statement of overriding considerations," explaining in writing the specific economic, social, or other considerations that they believe make those significant impacts acceptable.

The CEQA Guidelines (§ 15367) identify the lead agency as the public agency that is responsible for approving and implementing a project. As both the lead agency and the project proponent, the District

intends to use this FEIR to fulfill the requirements of CEQA. The EIR also can be used as an informational document by responsible and trustee agencies that may have permitting or approval authority over aspects of the Recovery Project.

In summary, the FEIR is expected to be used for the following purposes:

- To inform the public, decision-makers, elected officials and other stakeholders regarding the Recovery Project
- To disclose to the public, decision-makers, elected officials and other stakeholders the potential environmental effects associated with short-term construction and long-term operation of the Recovery Project, and to solicit input on the potential environmental effects
- To identify ways to avoid or minimize potential environmental effects of the Recovery Project and evaluate alternatives to the proposed action(s)
- To provide responsible and trustee regulatory agencies with information necessary to evaluate Recovery Project permitting requirements.

1.2 Project Background and Context

The District has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Conjunctive management within the District begins with deliveries of surface water from the Kern River and the California Aqueduct (Aqueduct) with these two sources generating an average annual supply sufficient to meet District-wide demands. During years when supplies are above-average, surface water is recharged; during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the District takes place through seepage in District-owned facilities, including canals, laterals and recharge basins. In January 2016, the District approved construction of the Palms Project in the southern portion of the Buttonwillow Service Area. The Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge and recovery of recharged water.

An Initial Study (IS) / Mitigated Negative Declaration (SCH # 2015121030) was prepared for the Palms Project in 2015, and the Notice of Determination was filed in January 2016. Initial construction of the Palms Project was completed in 2016. The recharge ponds were subsequently enlarged and today are located within an area of approximately 1,150 acres. To date, the District has recharged approximately 27,166 AF of water in the Palms Project; 14,164 AF in 2017 and 13,002 AF in 2019. High quality water recharged at the Palms Project flows to aquifers that are sources for domestic and municipal wells providing water to residents of Taft, Tupman, and to the disadvantaged community of Buttonwillow, and replenishes groundwater under the Tule Elk Reserve.

1.3 CEQA Environmental Review Process

1.3.1 CEQA Process Overview

The basic purposes of CEQA are to: (1) inform decision makers and the public about the potential, significant adverse environmental effects of proposed governmental decisions and activities; (2) identify the ways those environmental effects can be avoided or significantly reduced; (3) prevent significant, avoidable and adverse environmental effects by requiring changes in projects through the use of alternatives or mitigation measures when feasible; and (4) disclose to the public the reasons why an implementing agency may approve a project even if significant unavoidable environmental effects are involved.

An EIR uses a multidisciplinary approach, applying social and natural sciences to make a qualitative and quantitative analysis of all the foreseeable environmental impacts that a proposed project would exert on the project site and surrounding area. As stated in CEQA Guidelines § 15151:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible.

1.3.2 Notice of Preparation and Public Scoping

On June 16, 2020, the District issued a Notice of Preparation (NOP) and IS for the Recovery Project (**Appendix A** of this FEIR). Under CEQA, a Lead Agency (in this case, the District) shall conduct an IS to determine if a project may have a significant effect on the environment (CEQA Guidelines § 15063[a]). If the Lead Agency determines there is substantial evidence that any aspect of the Recovery Project may cause a significant effect on the environment, the Lead Agency shall prepare an EIR, or one of the other options listed in CEQA Guidelines § 15063(b)(1). The District's IS made a determination that the Recovery Project may cause a significant effect on the environment and that an EIR would be prepared.

The NOP invited comments on the scope and content of the document and participation at a public scoping meeting. The NOP was published in the SCH of the Governor's Office of Planning and Research and was mailed to agencies and members of the public. It was also posted on the District's website (http://www.bvh2o.com). The NOP was circulated for 30 days, as mandated by CEQA. The public comment period for the NOP closed on July 17, 2020.

The District held a scoping meeting to solicit input from the community and public agencies to be considered in the selection and design of project alternatives and on the scope and content of the EIR. The meeting was held on July 2, 2020, online due to COVID-19 restrictions, from 11:00 a.m. to 12:30 p.m. Notice of the scoping meeting was provided in the NOP, which was distributed in accordance with the CEQA Guidelines (§ 15092[c]), including mailing to all potentially affected landowners and the planning departments of the counties and cities bordering Kern County (County).

Six comments letters on the NOP/IS were received by the District. **Appendix B** of this FEIR contains copies of the comments that were received on the NOP.

1.3.3 Preparation of Draft EIR

The IS found that the Recovery Project may have "potentially significant impacts" to several environmental resources. Potential impacts to aesthetics, air quality, agriculture and forestry resources, energy, hazards and hazardous materials, land use/planning, population and housing, public services, mineral resources, noise, recreation, transportation, utilities and services, and wildfire are less-than-significant, or less-than-significant with mitigation incorporated, and therefore will not be discussed in detail in this FEIR.

The following describes the environmental issues that were addressed in detail in the DEIR:

- Biological Resources – The Recovery Project area contains natural lands with native habitat that may be suitable for special-status species. The DEIR evaluated potential impacts of the Recovery Project on terrestrial special-status plant and wildlife species, sensitive habitats, mature native trees, and migratory birds.
- Cultural Resources – Based on archival records search, background studies, and pedestrian surface cultural resources survey, one prehistoric archaeological site has been recorded in the Recovery Project's vicinity. The DEIR included an evaluation of whether the site will be impacted and provides mitigation to reduce impacts.
- Geological Resources – The DEIR identified geologic conditions in the Recovery Project area and evaluates potential impacts to subsidence and paleontological resources.
- Hydrology and Water Quality – Through the use of groundwater modeling and hydrogeologic analyses, the DEIR evaluated changes in local groundwater quality, storage, and levels within the groundwater basin as a whole and their subbasins, as appropriate. The DEIR described potential impacts of recovery activities and evaluates compliance with the Groundwater Sustainability Plan (GSP) under the Sustainable Groundwater Management Act (SGMA).
- Tribal Cultural Resources – Concurrently with release of the NOP/IS, the District extended invitations to consult with Native American tribes that are traditionally and culturally affiliated with the geographic area of the Recovery Project and that have filed written request to be notified of opportunities to consult. The DEIR included a discussion of potential impacts and mitigation to these resources.
- Mandatory Findings of Significance – The Recovery Project has the potential to substantially degrade the quality of the environment, have cumulative impacts to the environment, and/or have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly. The DEIR disclosed these potential impacts and mitigation.

1.3.4 Public Review of Draft EIR

A Notice of Completion for the DEIR was filed with the SCH of the Governor's Office of Planning and Research on June 16, 2020, in accordance with the CEQA Guidelines (§ 15085) and was noticed in accordance with the CEQA Guidelines (§ 15087).

The DEIR was distributed to responsible and other potentially interested agencies, stakeholder organizations, and individuals. This distribution ensured that interested parties had an opportunity to

express their views regarding the environmental impacts of the Recovery Project and ensured that information pertinent to permits and approvals is provided to decision makers and CEQA responsible and trustee agencies by the lead agency. This document was available for public review during normal business hours in the District's office, located at 525 N Main St, Buttonwillow, CA 93206 and at https://www.bvh2o.com/Projects.html.

This DEIR was distributed for a 45-day public review period that ended at (5 p.m.) on Monday, January 18, 2021.

1.3.5 Final EIR Publication and Certification

Following the close of the DEIR public review period, this FEIR was prepared. This document contains comments received on the DEIR (Chapter 7), responses to significant environmental points raised in those comments (Chapters 8 and 9), and this FEIR incorporating minor revisions to the DEIR. None of the revisions provide significant new information as no new environmental impacts are identified, there is no known increase to the severity of an impact, nor is a considerably different feasible alternative or mitigation measure identified.

As specified in the California Code Section 21092.5(a),

> At least 10 days prior to certifying an EIR, the lead agency shall provide a written proposed response to a public agency on comments made by that agency which conform with the requirements of this division. Proposed responses shall conform with the legal standards established for responses to comments on draft EIRs. Copies of responses or the environmental document in which they are contained, prepared in conformance with other requirements of this division and the guidelines adopted pursuant to Section 21083, may be used to meet the requirements imposed by this section.

This FEIR is being distributed to the public agencies who commented on the DEIR (West Kern Water District, Kern County Water Agency [KCWA], Kern Groundwater Authority [KGA], California Department of Fish and Wildlife [CDFW], and Kern Water Bank Authority [KWBA]) at least 10 days prior to the District's Board of Directors meeting to make a decision whether or not to approve the Recovery Project.

1.3.6 Mitigation Monitoring Reporting Program

CEQA requires lead agencies to, "adopt a reporting and mitigation monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment" (CEQA Guidelines § 15097). The mitigation measures, if any, adopted as part of the FEIR will be included in the Final Mitigation Monitoring and Reporting Program (MMRP) and implemented by the District.

1.4 Organization of this EIR

This FEIR is organized as follows:

- Executive Summary. Summarizes the findings and conclusions of this DEIR.
- Chapter 1 – Introduction. Provides an overview of the background of the Recovery Project, the CEQA and EIR review processes, and the organization of this FEIR.
- Chapter 2 – Project Description. Describes the project location and details of the Recovery Project, including specific features, construction methods, and operations; and summarizes the regulatory requirements, permits, and approvals that will be required to implement the Recovery Project; and lists the lead, responsible, and trustee agencies.
- Chapter 3 – Environmental Setting, Impacts, and Mitigation Measures. Includes topical sections pertinent to the Recovery Project, each of which presents a discussion of the environmental setting; regulatory background; thresholds of significance, issues not discussed further in the DEIR, and analysis methodology; environmental impact analysis (identifying beneficial impacts, no impacts, less-than-significant impacts, potentially significant impacts, and significant impacts); mitigation for potentially significant and significant impacts; impacts remaining significant after the implementation of mitigation.
- Chapter 4 – Other CEQA-Required Sections. This chapter discusses potentially significant irreversible effects and irretrievable commitments of resources, the potential for growth inducing impacts, and cumulative impacts. Additionally, this chapter considers the effects of the Recovery Project that would result in a commitment of resources and uses of the environment that could not be recovered if the Recovery Project were constructed, as well as describing the potential for unavoidable adverse impacts from the Recovery Project. Cumulative impacts are those impacts that are individually less than significant but, when considered together with related impacts of other projects in the affected area, could result in a combined effect that is significant.
- Chapter 5 – Alternatives to the Proposed Project. The purpose of the alternatives analysis is to identify ways to mitigate or avoid the significant effects a project may have on the environment; as such, this chapter begins by providing an overview of the alternative selection process. This chapter describes the alternatives to the Recovery Project and compares their relative impacts to those of the Recovery Project while considering the Project objectives and specific evaluation criteria. This chapter also provides a description of alternatives considered but rejected from further analysis, as well as, the determination of the environmentally superior alternative.
- Chapter 6 – Mitigation Summary. This chapter presents a comprehensive matrix of the mitigation program recommended within the FEIR which catalogs the potential environmental impact, level of significance, related mitigation program, and residual impact after implementation of the mitigation program along with the implementation timing and responsible party.
- Chapter 7 – Comments Received on the DEIR. This chapter includes the comment letters received by the District, with comments numbered to aid the reader in finding the response to the comments.

- Chapter 8 – Responses to Comments. This chapter includes the District's response to the comments received on the DEIR in the form of individually numbered responses.
- Chapter 9 – Master Responses to Comments. These responses are Master Responses, which address comments made by multiple parties on the same or similar topic.
- Chapter 10 – Report Preparers and Reviewers. Names the individuals who have contributed to preparation or review of this FEIR.
- Chapter 11 – References. Lists the sources of information cited throughout this FEIR.
- The appendices provide background and technical information.

1.5 Known Areas of Controversy and Issues of Concern

Pursuant to § 15123(b)(2) of the CEQA Guidelines, a lead agency is required to include areas of controversies raised by agencies and the public during the public scoping process. Based on comments made during the 30-day public review period in response to information published in the NOP/IS, the following areas of controversy and issues of concern have been identified for the proposed project:

- Impacts of pumping on water levels and water quality to neighboring districts' wells
- Protective measures for neighboring districts
- Water quality of recovered water
- Risk of Project-induced subsidence
- Impacts to SGMA sustainability goals
- Long-term water-supply considerations

1.6 Standard Terminology

This FEIR uses several standard terms as follows:

- "Recovery Project site" refers to the area of potential impact of a particular project alternative.
- "Recovery Project area" refers to the areas where the Recovery Project will be constructed, as shown in pink on **Figure 2-2**.
- The "Palms Project area" is the area where the existing Palms Recharge Project has been constructed, as shown in the hatching on **Figure 2-2**.
- "Project vicinity" generally refers to an area that is broader than the project area, encompassing all the lands that would be represented on a map depicting the project sites for any particular environmental topic (e.g., visual resources, biological resources).
- A "no impact" conclusion means no change would occur from existing conditions.
- A "less-than-significant impact" conclusion means no substantial adverse change in the physical environment would occur. (No mitigation is required.)

- A “potentially significant impact” conclusion means a substantial adverse change in the physical environment might occur. (Feasible mitigation is required if available because potentially significant impacts are treated as if they were significant impacts.)
- A “significant impact” conclusion means a substantial adverse change in the physical environment would occur. (Feasible mitigation is required if available.)
- A “significant and unavoidable impact” conclusion means a substantial adverse change in the physical environment would occur and could not feasibly be avoided or reduced to a less-than-significant level even with the implementation of all available and feasible mitigation.

2.0 Project Description

2.1 Introduction

The District is located in Kern County in the southern San Joaquin Valley (Valley), approximately 16 miles west of the city of Bakersfield and encompassing the town of Buttonwillow (**Figure 2-1**). The District has a gross area of approximately 49,000 acres and lies within a portion of the lower Kern River Watershed characterized by heavy clay soils originating from former swamp and overflow lands.

The District is divided into two distinct service areas. The principal service area, known as the Buttonwillow Service Area, is situated north of the historic Buena Vista Lake. The smaller service area, lying east of the historic Buena Vista Lake, is known as the Maples Service Area.

The District has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Conjunctive management within the District begins with deliveries of surface water from the Kern River and the Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands. Thus, during years when supplies are above average, surface water is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the District takes place through seepage in District-owned facilities, including canals, laterals and recharge basins. In January 2016, the District approved construction of the Palms Project in the southern portion of the Buttonwillow Service Area. The Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge (**Figure 2-2**). The general location of the Groundwater Sustainability Agencies (GSA) in the Project vicinity are shown in **Figure 2-3**.

Figure 2-1. Regional Location of the Recovery Project

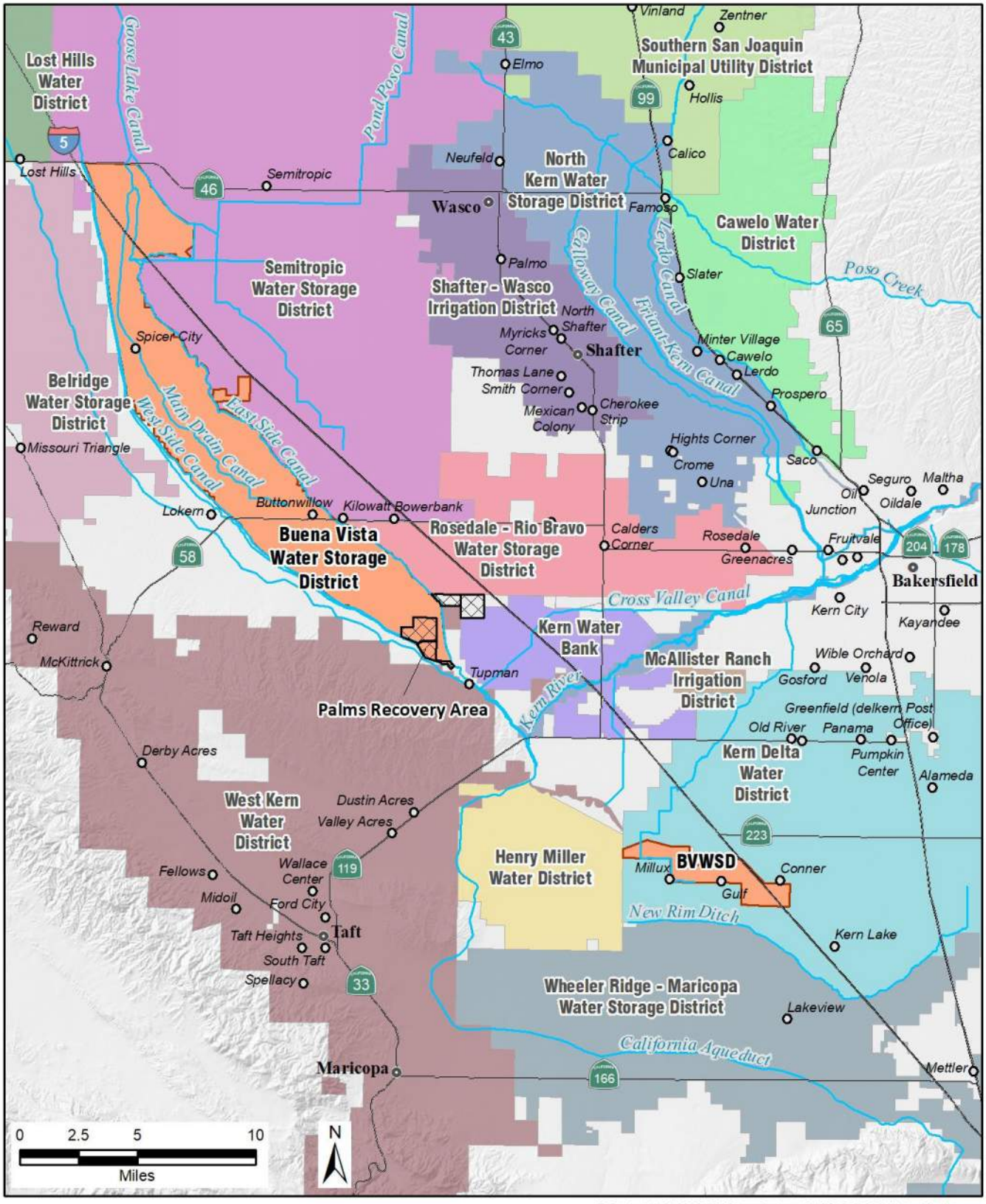


Figure 2-2. Recovery Project Location

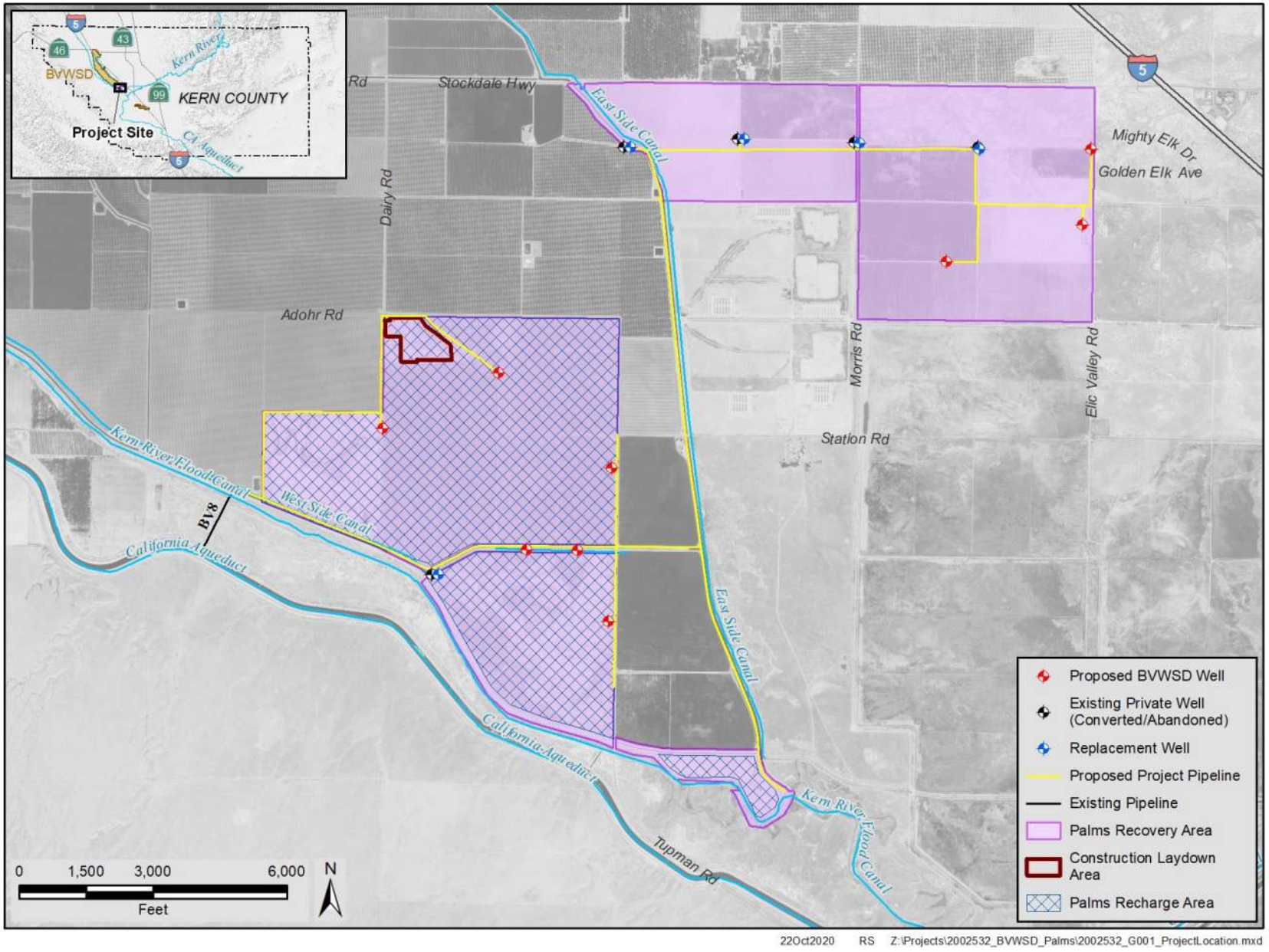
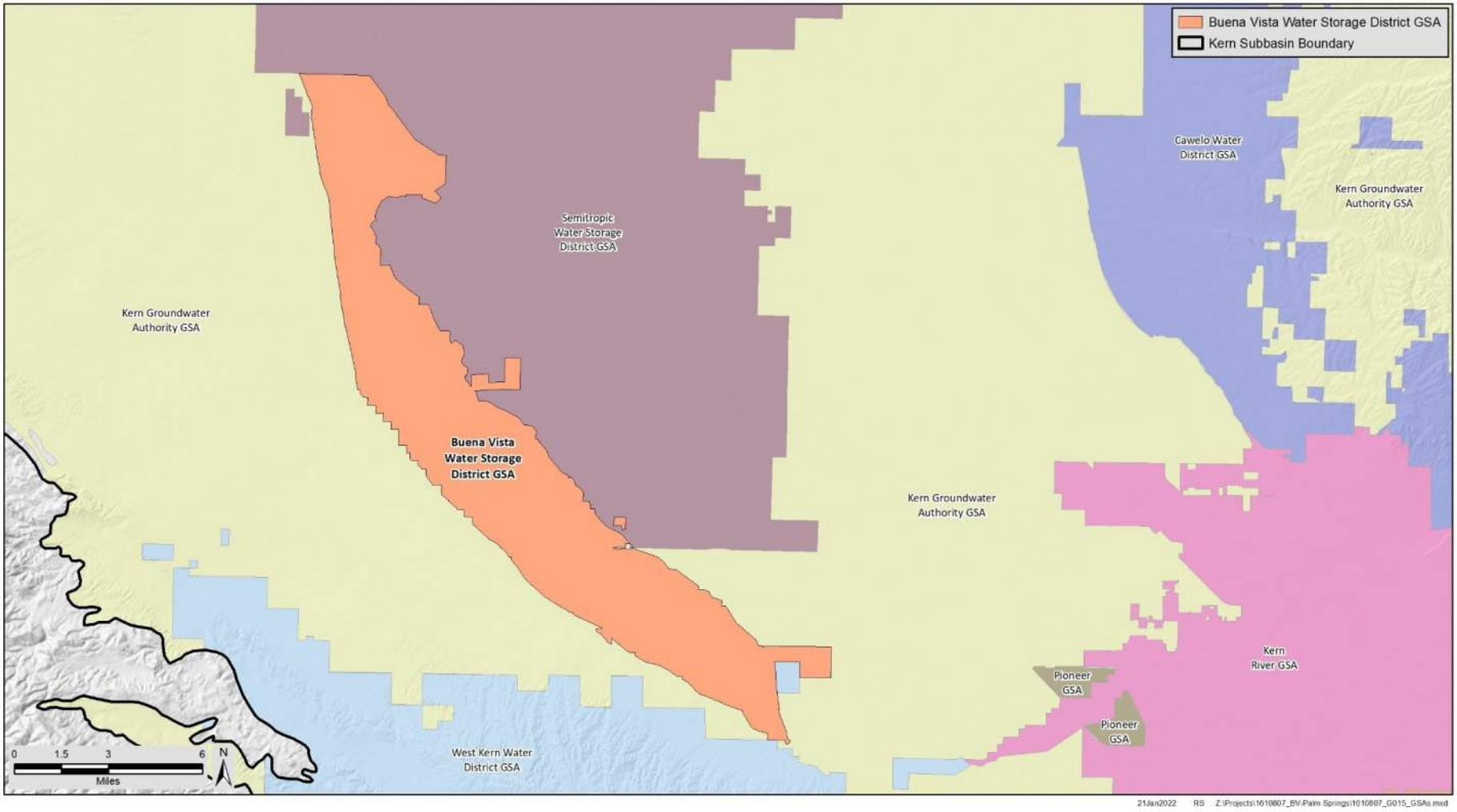


Figure 2-3. Groundwater Sustainability Agencies in Recovery Project Area



2.2 Goals and Objectives of the Project

CEQA Guidelines (§ 15124[b]) require that the project description contain a clear statement of the project objectives, including the underlying purpose of the project. The statement of objectives is important under CEQA in helping the lead agency (the District) to develop a range of reasonable alternatives for evaluation in the EIR. These objectives also define the underlying need for the project.

The overall purpose of the Recovery Project is to enhance groundwater management by increasing the District's ability to recover groundwater recharged in wet years and return that banked water in dry years. Additionally, enhanced groundwater management would benefit agriculture by providing irrigation water supplies in years with limited surface water supplies.

The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of the County by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies
- Improve conveyance of previously stored water throughout the District and to neighboring districts
- Install recovery facilities to attract new banking partners in order to increase groundwater in the Kern Subbasin for District use
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the Aqueduct

These objectives were important for the identification, development, selection, and consideration of the CEQA alternatives evaluated in this FEIR (*see* Chapter 5 – Alternatives to the Proposed Project).

2.2.1 Project Benefits

The Recovery Project will provide up to 25,000 AF of banked groundwater to the District's water customers in dry years, while meeting the requirements of SGMA.

2.2.2 Need for Project

The District has a gross irrigable acreage of about 50,000 acres. Currently about half the District lands are planted with permanent crops, as growers migrate away from row crops. The conversion to permanent crops may increase the water demand by 1 AF per acre. In the short term, this conversion typically reduces demand, as a pistachio tree will not reach full demand for water until about the 12th year, with the 1st year being as low as 0.25 AF per acre. The Recovery Project will allow for the highs and lows of the District's water supply to be managed in a manner that ensures full production of permanent crops regardless of the current years water supply.

With the District's Kern River Water Supply as well as its State Water Project (SWP) water supply, the District should be able to meet future demands. This Recovery Project will help in meeting those demands, as well as being available to partner with others to help meet their water supply needs.

2.3 Project Description

2.3.1 Facilities

In order to extract water banked within the District, the District would utilize a suite of 14 wells: nine proposed new wells and five replacement wells (*refer to* **Figure 2-2**).

The grouping of recovery wells is purposeful. Seven of the proposed 14 recovery wells lie within the footprint of the Palms Groundwater Recharge Project. Although this is the area where recovery activity is expected to begin, clustering all of the project's recovery capacity within this footprint would create a localized cone of depression that would jeopardize the efficiency and flexibility of the recovery program, risk violation of minimum thresholds (MTs) established by the Buena Vista Groundwater Sustainability Agency (BVGSA) and adjacent GSAs and have the potential to impact other well owners in the area.

The second group of seven recovery wells is located to the northeast of the recharge facilities. Locating half of the recovery wells in this area, not only captures the recharge water naturally moving in that direction, but also achieves the spacing between wells needed to allow efficient operation of the Recovery Project and to minimize impacts to other wells owners within the Recovery Project area and vicinity.

From an operational perspective the division of recovery facilities into the two areas, each within the same hydrological zone, enables the Recovery Project to meet its recovery objectives while minimizing impacts to other well owners. In addition, access to water of varying qualities enables the recovery project to pump from wells in the recharge area to meet the needs of uses such as agriculture. The data suggest that that wells from each section will meet the quality for pump back into the SWP. However, there are mutually exclusive characteristics of potential water quality issues, and the ability to blend the water recovered from both recovery areas provides flexibility which may be required in the future.

Conveyance pipes would be installed to connect new and replacement wells for the Recovery Project water delivery system. Construction activities would include excavation and trenching to install the wells, and approximately 11.9 miles of conveyance pipe. The total area of disturbance would be approximately 72 acres. The new and replacement wells would be drilled to a depth of up to 500 feet and include an 18-inch-diameter casing. Trench depths would be 5 feet for pipes up to 24 inches in diameter and 6 feet for larger pipes. Trench widths would be 3 feet for pipes up to 24 inches in diameter and 6 feet for larger.

Anticipated construction activities for the pipelines would begin 2023 and could be completed within 11 months. Wells will be constructed as needed. Staging areas for the construction equipment and materials would be adjacent to the Recovery Project area on previously disturbed land. Construction vehicles for the pipeline would consist of a front wheel loader, two excavators, two water trucks, backhoe, and three pickup trucks. Equipment required for well construction would consist of a drilling rig, air compressor, backhoe, and pipe trailer.

The water pipelines will connect to the California Aqueduct at the existing Buena Vista Turnout #8 (BV8). The District will work with DWR to develop a new construction, operation and maintenance agreement to convert BV8 to a bi-directional facility, that can be used to discharge water to, or withdraw water from, the Aqueduct. If needed, this work will include a hydraulic analysis to determine the potential impacts to water surface elevations in the Aqueduct.

2.3.2 Operation

Available water supply will continue to be recharged through seepage in District-owned facilities in wet years. This includes the existing Palms Project where it is anticipated that up to 100,000 AFY can be recharged. The District will also continue to recharge surface water through their canal system, a District practice for many decades.

As is the current practice, water recovered by the District is distributed to District water users, exchanged with other districts, or sold to industrial or municipal users. Recovery does not exceed 90 percent of the volume recharged. The Recovery Project will provide additional facilities to continue this practice and will also discharge into the Aqueduct to satisfy existing and future water contracts between the District and other public water agencies.

The Recovery Project will be managed so that groundwater elevations will, in the long term, improve from those observed historically without the project. Annual water recovery will be limited to no more than 25,000 AF. Wells will be pumped at a rate of no more than 5 cubic feet per second, and the wells selected for recovery will be selected to optimize groundwater recovery and minimize impacts to groundwater levels. The project recovery rate and the location of wells that will be operated at any given time will be adjusted in response to groundwater levels and other conditions and to conform with operational constraints described in the BVGSP and the mitigation measures in the Mitigation Monitoring Reporting Program.

Groundwater monitoring protocols for the District are specified in the BVGSA's Groundwater Sustainability Plan (BVGSP), Section 4.4.3.6 Monitoring Protocols, 2020. The District groundwater monitoring will include the Recovery Project wells in the groundwater monitoring program. The District intends to join the Joint Operating Committee (JOC), then those monitoring standards would be controlling for the Palms Project. The management objectives (MOs) and MTs in the recovery area are those agreed to in SGMA planning sessions with West Kern Water District [WKWD], Rosedale-Rio Bravo Water Storage District (RRBWSD), the KWBA, and the District.

For the District to use the Aqueduct to convey the recovered groundwater, approval from the California Department of Water Resources (DWR) is required. It is DWR's policy to assist with the conveyance of water to provide a reliable water supply, and to protect the SWP's water quality within the Aqueduct. In order to facilitate this policy, DWR provides an implementation process to accept non-SWP water into the Aqueduct. To do so, the District is required to submit a Pump-In Proposal (PIP) to DWR which identifies the water sources, planned operation, inflow water quality, and any anticipated impacts to SWP water quality and/or operations. The PIP will also include a water quality monitoring plan to continuously demonstrate that the water quality produced by the Project for delivery to the Aqueduct meets the standards set in the PIP.

2.3.3 Memorandum of Understanding

On October 26, 1995, the KWBA and its Member Entities (including BVWSD, RRBWSD Kern Delta Water District, Henry Miller Water District, and WKWD, as the "Adjoining Entities," entered into a Memorandum of Understanding (MOU), which provides that "…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…" In subsequent years, a JOC has been formed among these parties, which utilizes multiple groundwater models to assess impacts to groundwater from banking and recovery operations. Therefore, the District will either amend the existing MOU, develop a new MOU, or join the JOC, to address the operation and monitoring of the Recovery Project.

2.4 Discretionary Permits and Approvals Required

The District is required to apply for approvals from DWR to modify BV8 to a bi-directional turnout and to pump into the Aqueduct. It was built with the bi-directional concept in mind, so changes, if any, would be nominal. If necessary, the District will work with DWR to conduct a hydraulic study to determine the potential impacts to water surface elevations in the Aqueduct. If the results of that hydraulic analysis should trigger a need for additional environmental documentation, the additional environmental documents will be completed. The appropriate level of analysis will be determined at that time.

KCWA will be consulted for approval of agreements to modify BV8 and for approval of the agreements authorizing use of the Aqueduct to deliver, exchange and convey water.

2.5 Agencies Expected to Use This EIR

The CDFW is a Trustee Agency. DWR will be required to approve use of the Aqueduct as a conveyance.

3.0 Environmental Setting, Impact Analysis, and Mitigation Measures

The analysis in the June 2020 IS (**Appendix A**) concluded the Recovery Project would result in either no impact or impacts that are less-than-significant or less-than-significant with mitigation incorporated for the following topics: aesthetics, air quality, agriculture and forestry resources, energy, geology, hazards and hazardous materials, land use/planning, population and housing, public services, mineral resources, noise, recreation, transportation, utilities and services, and wildfire and therefore will not be discussed in detail in this FEIR. The analysis in the June 2020 IS (**Appendix A**) concluded the Recovery Project would result in potentially significant impacts to biological resources, cultural resources, hydrology and water quality, and cumulative impacts. These resources are discussed in detail in the following chapters. In addition, comments were received on the NOP (**Appendix B**) and on the DEIR (Section 7) expressing concern about water quality and subsidence risk. In response to those comments, water quality and geology are discussed in more detail in this FEIR.

Comments were received on the DEIR expressing concerns about air quality. The air quality analysis is updated in this FEIR Chapter 3.1.3 to utilize the Small Project Analysis Level (SPAL) for Ambient Air Quality Analysis – Combustion Exhaust Emissions published by the San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.). This update did not result in a change in the impact assessment conclusion in the DEIR.

This chapter describes the regulatory and environmental setting, impacts, and any mitigation measures identified, if necessary, for, Biological Resources (Chapter 3.2), Cultural Resources (Chapter 3.3), Hydrology and Water Quality (Chapter 3.4), and Geological Resources (Chapter 3.5).

3.1 Resources Dismissed from Further Analysis

Impacts dismissed in an analysis as clearly insignificant and unlikely to occur need not be discussed further in the EIR unless the Lead Agency subsequently receives information inconsistent with the finding (California Code of Regulations [CCR] § 15143). The following sections were addressed in the NOP/IS and were dismissed from further analysis in the EIR due to having less-than-significant or no impacts to the resource identified from construction of the Recovery Project. A summary of impact conclusions for each resource section dismissed from further analysis can be found below.

3.1.1 Aesthetics

There are no significant view-sheds, scenic vistas, or scenic highways located in the vicinity of the Recovery Project. The Recovery Project would be constructed in agricultural land and would consist of buried pipelines for conveying recovered water, and new well structures in an area that already contains wells. There would be little change to the visual character of the site and surrounding area. Construction equipment used onsite would not be substantially different that normal agricultural operations and would

be removed from the site following construction activities. All construction activities would occur during daylight hours. There would be no impact to aesthetics.

3.1.2 Agriculture and Forestry

The Recovery Project would be implemented on the outer edges of agricultural parcels, along the established dirt roads which are primarily barren. Implementation of the Recovery Project would not convert farmland to non-farmland. The land will continue to be fallow open space, so would not conflict with existing Williamson Act contracts[1]. The Recovery Project's purpose is to benefit agriculture by providing irrigation water supplies in years with limited surface water supplies. The Recovery Project area is not forest land, timberland, or timberland zoned as Timberland Production, therefore, no loss or conversion of forest land to non-forest land would be necessary. There would be no impact to agricultural and forestry resources.

3.1.3 Air Quality

The Recovery Project is located in a predominately agricultural area; however, a residential property resides approximately 300 feet from the Recovery Project area. The Recovery Project would generate criteria pollutants from the use of gasoline and diesel-powered vehicles and equipment, and earthmoving activities. The S.J.V.A.P.C.D. has developed a screening tool, the SPAL for Ambient Air Quality Analysis – Combustion Exhaust Emissions, to assist in determining if constructing a project in S.J.V.A.P.C.D. would exceed the construction significance threshold for criteria pollutants. The screening tool uses Project type and size, and S.J.V.A.P.C.D. pre-quantified emissions to determine a size below which it is reasonable to conclude that a Project would not exceed applicable thresholds of significance for criteria pollutants (S.J.V.A.P.C.D. 2012).

SPAL levels are based on NOx emissions since NOx is the predominant combustion exhaust pollutant and would be the first pollutant to exceed the 100 pounds per day trigger for conducting an Ambient Air Quality Analysis. Projects in which total combined horsepower hours for all equipment operated on site, within a 24-hour period, is less than 18,278 horsepower hours are determined to not require an ambient air quality analysis. The proposed Recovery Project would result in a maximum of 15,920 horsepower hours within a 24-hour period, during the construction of the proposed project, which is significantly lower than the SPAL threshold (**Table 3-1**).

[1] As defined by the Kern County Agricultural Preserve Standard Uniform Rules (Form 505), compatible use on Williamson Act properties includes, "The erection, construction, alteration, operation, and maintenance of gas, electric, water, and communication utility facilities and similar public service facilities by corporations and companies under the jurisdiction of the Public Utilities Commission of the State of California and by public agencies." Because the District is a public agency that would construct, operate, and maintain the Palms Recovery Project, which is a water facility, the proposed Project is a compatible use consistent with the Williamson Act.

Table 3-1. Air Quality Small Project Analysis Level[2]

Equipment Type	Units	Estimated Hours of Use per Day for Phase	HP	Working Days Per Activity	Total Equipment Hours	hp-hr	hp-hr/ construction day
Phase 1 Mobilization							
Semi truck (equipment delivery)	5	8	402	4	160	64,320	16,080
Total Mobilization					0	**64,320**	**16,080**
Phase 2 Construction of Pipeline							
Front wheel loader	1	4	97	220	880	85,36	388
Excavator	2	6	158	220	2640	417,120	1,896
Water truck	2	4	330	220	1760	580,800	2,640
Backhoe	1	6	97	220	1320	128,040	582
Pick-up trucks	3	1	350	220	660	231,000	1,050
Pick-up trucks (worker commute)	7	0.5	350	220	770	269,500	1,225
Total Phase 2 Construction of Pipeline					0	**1,711,820**	**7,781**
Phase 2 Construction of Wells							
Engine & Gear Drive	1	8	500	42	336	168,000	4,000
Drill rig	1	8	221	140	1120	247,520	1,768
Air compressor	1	3.2	78	182	582.4	45,427	250
Backhoe	1	3.2	97	182	582.4	56,493	310
Pipe trailer	1	3.2	402	182	582.4	234,125	1,286
Pick-up trucks (worker commute)	3	0.5	350	182	273	95,550	525
Total Phase 2 Construction of Wells						**847,115**	**8,139**
Total for overlapping phases (construction of pipeline and construction of wells)						**2,558,935**	**15,920**

Notes: hp-hr = horsepower per hour

Neither the mobilization phase nor the construction phase of the Recovery Project would exceed the construction significance threshold; therefore, it would have a **less than significant** impact. Although this

[2] Horsepower was taken from California Emissions Estimator Model® or were provided by the District. Estimated hours of use per day were calculated by multiplying the usage factor (taken from the Federal Highway Administration Roadway Construction Noise Model) by the estimate hours of construction activities per day provided by the District.

impact is less than significant, mitigation measure AQ-1 is proposed to lessen any potential air quality impact during construction.

The Recovery Project would generate particulate matter (PM) from the use of construction equipment and ground disturbing activities. The Recovery Project would disturb more than 1 acre of soil, therefore, the District would be required to prepare a State Water Resources Control Board (State Water Board) National Pollutant Discharge Elimination System (N.P.D.E.S.) for general construction activity (Order 2009-0009 DWQ as amended by Order 2012-0006-DWQ), and Stormwater Pollution Prevention Program (SWPPP). Additionally, the District would need to submit a Dust Control Prevention Plan to S.J.V.A.P.C.D. Impacts related to the generation of PM are considered to be **less-than-significant** due to the relatively short duration of construction work, implementation of a Dust Control Plan, and complying with all best management practices (BMPs) established in the above-mentioned permits. However, S.J.V.A.P.C.D has established BMPs to further reduce impacts related to the generation of PM. Even though this impact is considered to be less than significant, the following mitigation measure would be implemented to incorporate S.J.V.A.P.C.D. BMPs into the Recovery Project.

Mitigation Measure AQ-1: District Regulation VIII Fugitive PM_{10} Prohibitions Best Management Practices

All projects are subject to S.J.V.A.P.C.D. rules and regulations in effect at the time of construction. Control of fugitive dust is required by S.J.V.A.P.C.D. Regulation VIII. The District shall implement or require its contractor to implement all of the following measures as identified by S.J.V.A.P.C.D.:

- Apply water to unpaved surfaces and areas
- Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas
- Limit or reduce vehicle speed on unpaved roads and traffic areas
- Maintain areas in a stabilized condition by restricting vehicle access
- Install wind barriers
- During high winds, cease outdoor activities that disturb the soil
- Keep bulk materials sufficiently wet when handling
- Store and hand material in a three-sided structure
- When storing bulk material, apply water to the surface or cover the stage pile with a tarp
- Don’t overload haul trucks; overlanded trucks are likely to spill bulk materials
- Cover haul trucks with a tarp or other suitable cover or wet the top of the load enough to limit visible dust emissions
- Clean the interior of cargo compartments on emptied haul trucks prior to leaving the site
- Prevent track-out by installing a track-out control device
- Clean up track-out at least once a day. If along a busy road or highway, clean up track-out immediately
- Monitor dust-generating actives and implement appropriate measures for maximum dust control

Implementation of the above-mentioned mitigation measure would ensure that the Recovery Project would comply with all S.J.V.A.P.C.D. rules and regulations to reduce ambient concentrations of PM less than 10 microns in diameter (PM_{10}).

Additionally, during construction, the Recovery Project would generate odor from the use of diesel fuels that could affect the nearby residence, though this impact would be short-term and nonsignificant. During operation, the Recovery Project would consist of the operation of electrically powered pump. No odors would be generated by this use. Potential odor effects would be **less-than-significant**.

3.1.4 Energy

The Recovery Project would involve the use of diesel-fueled vehicles during constructions; however, use of these vehicles would be temporary and nonsignificant. The Recovery Project involves the installation of new, energy-efficient 250 horsepower pump motors in all proposed new wells, and replacement wells. The Recovery Project would be limited to the recovery of previously banked water at generally higher groundwater levels which would result in lower energy usage. Additionally, the County does not have a local plan for renewable energy or energy efficiency. Impacts related to energy would be **less-than-significant**.

3.1.5 Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions would be generated during the construction phase of the Recovery Project. Temporary GHG emissions, primarily for the use of diesel-powered vehicles, would occur during construction. The County does not have an adopted local GHG reduction plan. Therefore, there is no conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG. Impacts to GHG emissions would be **less-than-significant**.

3.1.6 Hazards and Hazardous Materials

The Recovery Project is located away from population centers, does not utilize hazardous materials, and would rely on electric power rather than liquid fuels. The nearest school is the Elk Hills Elementary School located approximately 1 mile southeast of the Recovery Project. The Recovery Project would not expose people to increased risks from wildland fire as the site is comprised entirely of farmland and are not located within a high severity fire zone. The Recovery Project would not affect emergency response plans as facilities would not interfere with traffic routes or response vehicle transport. The Elk Hills – Buttonwillow Airport is located approximately 3 miles west of the Recovery Project. The Recovery Project is not within the Elk Hills – Buttonwillow Airport Influence Area. There would be **no impact** to hazards and hazardous materials.

3.1.7 Land Use and Planning

The Recovery Project is located outside of existing communities and is consistent with existing zoning. There are no adopted Habitat Conservation Plans (HCPs), Natural Community Conservation Plans (NCCPs), other local, regional, or state habitat conservation plans within the site or vicinity. There would be **no impact** on land use and planning.

3.1.8 Mineral Resources

The Recovery Project is located in a Surface Mining Control and Reclamation Act study area. The Recovery Project is not located in areas of known significant mineral deposits. Although unlikely, there is potential for the temporary loss of access to a small amount of mineral resources, however, the amount that could be lost would be minimal and would not affect the overall availability of mineral resources in the County. The Recovery Project is not located within the vicinity of a locally important mineral resource recovery site. Impacts to mineral resources would be **less-than-significant**.

3.1.9 Noise

Construction of the Recovery Project would temporarily increase the ambient noise levels within the Recovery Project vicinity due to the use of heavy machinery during construction activities. Increase ambient noise would occur intermittently during the construction of the well. All work at the Recovery Project area would be limited to the hours identified in the County's Noise Ordinance. Ground vibration would only be caused during construction activities and would primarily occur during well drilling. Construction activities associated with the installation of all the proposed well would be short-term. No adverse levels of vibration would be generated during project operations. The Recovery Project is not within the Elk Hills – Buttonwillow Airport Influence Area, therefore, the Recovery Project would not expose people residing or working in the area to excessive noise levels. Impacts related to noise would be **less-than-significant**.

3.1.10 Population and Housing

The Recovery Project would increase the amount of water available for domestic and municipal wells that provide water to residences located within the District boundaries and the surrounding towns, as well as replenish groundwater under the Tule Elk Reserve. The Recovery Project is located in a primarily agricultural area away from population centers; therefore, the Recovery Project would not be growth inducing. The Recovery Project would not result in the development of new housing, nor would it displace people or housing. The Recovery Project would not require additional employees to operate. There would be **no impact** related to population and housing.

3.1.11 Public Services

The Recovery Project would not require new or altered government facilities, as the Recovery Project would not increase the need for public services from the existing conditions. There would be **no impact** to public services.

3.1.12 Recreation

The Recovery Project is not growth inducing and would not increase the use of existing parks or recreational facilities or require the construction or expansion of recreational facilities. There would be **no impact** to recreation.

3.1.13 Transportation

The Recovery Project would not conflict with any program plan, ordinance, or policies. Construction traffic would utilize existing public roads to deliver equipment, supplies, and workers to and from the site. The Recovery Project would not require any road closures or result in inadequate emergency access. Since no new roads are being developed, there would be no increase hazards due to a geometric design feature or incompatible uses. Therefore, impacts to transportation would be **less-than-significant**.

3.1.14 Utilities and Service Systems

No utility services would need to be constructed or expanded as a result of the Recovery Project. Additionally, the Recovery Project would not require a water supply nor would it result in a significant amount of wastewater. The Recovery Project would not create substantial amounts of solid waste, and as such would not exceed the capacity of local infrastructure. Minimal waste would be generated during construction and no increase in waste production would occur during the operation of the Recovery Project. The Recovery Project would comply with federal, state, and local management and reduction statues and regulations related to solid waste. There would be **no impact** to utilities and service systems.

3.1.15 Wildfire

The Recovery Project is located in a high severity fire zone; however, implementation of the Recovery Project would not increase the fire risk. There would not be an increase in the number of users at the site that could impair emergency response or evacuation. The Recovery Project would not require any infrastructure that would exacerbate fire risk or the risk of flooding, slope instability, or drainage changes. There would be **no impact** to wildfire.

3.2 Biological Resources

3.2.1 Environmental Setting

The discussion presented in this section is based on information from a variety of sources that address biological resources in the Recovery Project vicinity and larger region. Several biological resource databases were queried, including CDFW's California Natural Diversity Database (CNDDB) (CDFW 2020a) and the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2020). A list of resources under jurisdiction of the United States Fish and Wildlife Service (USFWS) that could occur in the Recovery Project vicinity was obtained from the Information for Planning and Conservation (IPaC) (USFWS 2020a), and the USFWS online map of critical habitat for federally threatened and endangered species (USFWS 2020b) was reviewed. The Kern County General Plan (Kern County 2009) and associated Recirculated Draft Program EIR (Kern County Planning Department 2004), the First Public Draft of the Kern County Valley Floor HCP (Kern County Planning Department 2006), and Annual Wildlife Reports for the Kern Water Bank (KWB) were reviewed for information on biological resources that occur in the project vicinity and policies protecting such resources that could be applicable to the Recovery Project. Numerous additional sources of information on individual plant and wildlife species were also reviewed.

Information relating directly to the Recovery Project is based primarily on results of field surveys conducted by a GEI biologist in May 2019 and January 2020 and by McCormick Biological, Inc. in

September 2020. As recommended in the CDFW comment letter regarding the NOP, habitat suitability assessments and/or focused species surveys were conducted for special-status plants and animals in the anticipated project footprint and suitable habitat within 50 to 500 feet, depending on the species, habitat conditions, and access.

The most recent and intensive survey effort occurred in early September 2020 and included walking transects in remnant native habitat within 500 feet of the northeast portion of the Recovery Project site anticipated at the time these surveys were conducted (i.e., the Alternative Northeastern Area Layout shown in Chapter 5.6.2 – Alternative Project Layouts). Qualified biologists searched for San Joaquin (Nelson's) antelope squirrels (*Ammospermophilus nelsoni*) and physical sign (e.g., suitable burrows/dens, tail drag, tracks, scat, etc.) indicating potential presence of blunt-nosed leopard lizard (*Gambelia sila*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*), and American badger (*Taxidea taxus*). Vehicle-based surveys were conducted in the remaining portions of the Recovery Project area and adjacent areas, which are dominated by existing roadways and other disturbed land cover, agricultural crops, and existing recharge areas. These surveys were conducted by slowly driving the pipeline alignments and searching for potential features (e.g., burrows and dens) associated with special-status wildlife such as San Joaquin kit fox and western burrowing owl (*Athene cunicularia*), which can occur in human-altered habitats.

The Biological Study Area discussed in this section includes the construction corridor for all pipeline routes and well sites, as well as areas within 200 feet of this anticipated disturbance footprint.

3.2.1.1 Habitats and Cover Types

Figures 3-1 through **3-3** show habitat and cover types in the Biological Study Area. These maps were developed based on field survey observations and review of Google Earth® aerial imagery.

No native vegetation assemblages occur in the anticipated areas of ground disturbance for pipeline installation or well installation, conversion, or abandonment. However, remnant areas of bush seepweed scrub occur adjacent to pipeline routes and well locations in the northeast corner of the Recovery Project site. Bush seepweed (*Suaeda moquinii*) is typically the dominant or codominant species in the shrub layer of this vegetative community. Other shrub species present include allscale (*Atriplex polycarpa*), quailbush (*Atriplex lentiformis*), spinescale (*Atriplex spinifera*) and narrowleaf goldenbush (*Ericameria linearifolia*). Herbaceous species include alkali heath (*Frankenia salina*), salt grass (*Distichlis spicata*), alkali mallow (*Malvella leprosa*), narrowleaf plantain (*Plantago lanceolata*), and Mediterranean grass (*Schismus* spp.). The Biological Study Area also includes grassland on the north side of the Kern River Flood Canal and grassland and seasonal wetland habitat in the west and south portions of the Tule Elk Reserve, including seasonally flooded portions of the Kern River Flood Canal and the Outlet Canal.

The remainder of the Biological Study Area is comprised of the Palms Project area and agricultural land actively cultivated or maintained for agricultural production. The recharge area is a mosaic of ponds and wide channels interspersed amongst mounded areas of higher ground. Vegetation is limited to nonnative ground cover in portions that are not regularly inundated. Areas in active agricultural production include orchards (pistachio and almond) and row and field crops (e.g., cotton, alfalfa, grain). Several agricultural fields were fallow when the most recent biological surveys were conducted. The Palms Project area and agricultural areas also include developed areas, such as paved and dirt roadways, agricultural buildings,

rural residences, irrigation canals, and tailwater ponds. Occasional ornamental trees and shrubs are present near structures. Road shoulders, irrigation canals, and ponds are compacted, regularly maintained, and typically barren of vegetation.

3.2.1.2 Wildlife

The agricultural lands that dominate the Biological Study Area and vicinity support a relatively low diversity of wildlife species that are adapted to these managed environments. Wildlife in active agricultural areas is likely limited to common birds, reptiles, and mammals tolerant of high disturbance levels. Fallow agricultural land and recharge areas may support a slightly higher species diversity due to the reduced disturbance levels. The northeast portion of the Biological Study Area and the Tule Elk Reserve and Kern River Flood Canal in the south portion provide higher quality wildlife habitat and support a higher diversity of species, including some sensitive species, as discussed below.

3.2.1.3 Sensitive Biological Resources

Sensitive biological resources addressed in this section include those that are afforded consideration or protection under CEQA, the California Fish and Game Code (FGC), federal Endangered Species Act (ESA), California Endangered Species Act (CESA), Clean Water Act (CWA), and/or Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

Special-status Species

Plants and animals addressed as special-status species in this analysis include taxa (distinct taxonomic categories or groups) that fall into any of the following categories:

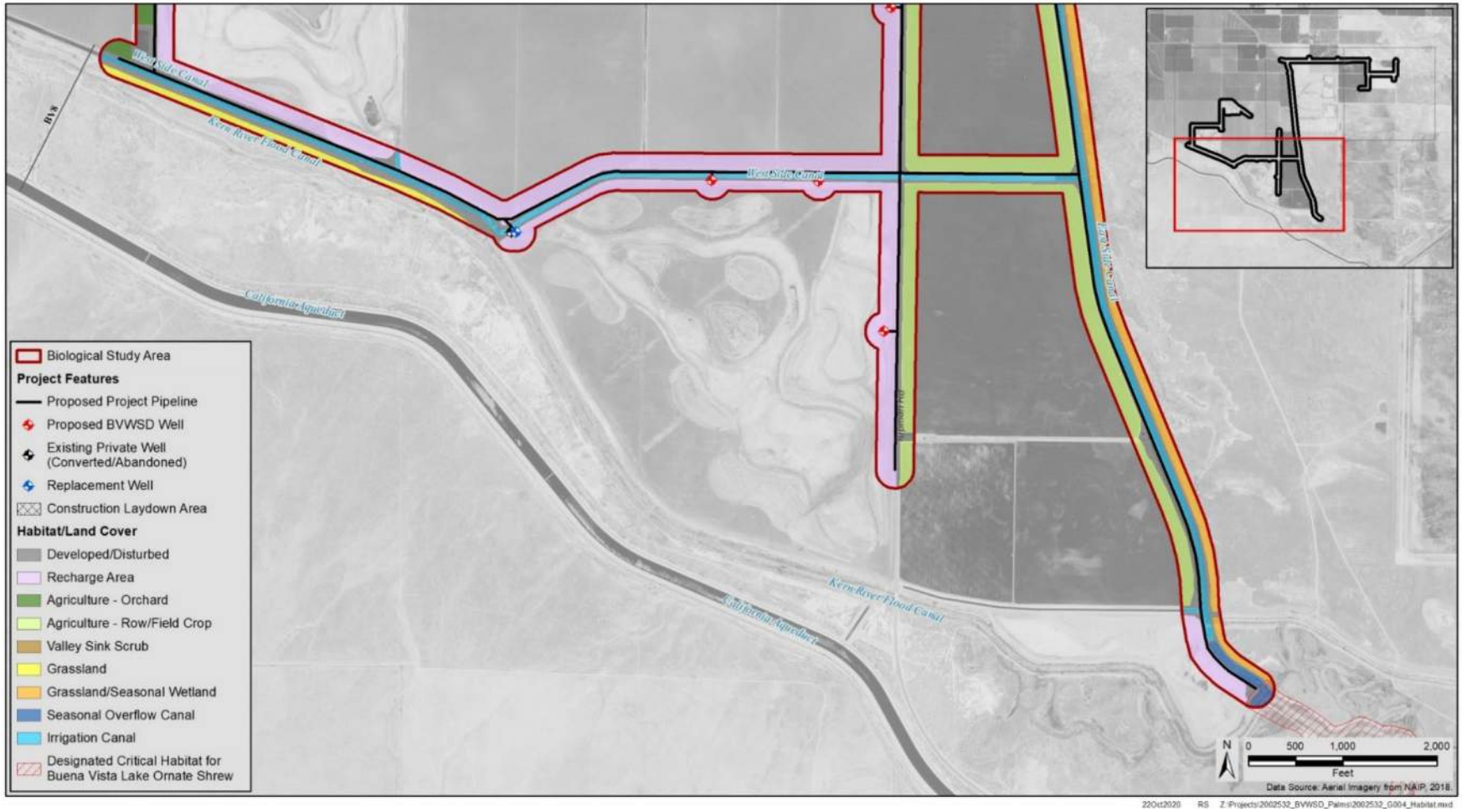
- Taxa officially listed, candidates for listing, or proposed for listing by the federal government or the state of California as endangered, threatened, or rare
- Taxa that meet the criteria for listing
- Wildlife identified by CDFW as species of special concern and plant taxa considered by CDFW to be "rare, threatened, or endangered in California"
- Species listed as Fully Protected under the FGC
- Species afforded protection under local or regional planning documents

Plant taxa are assigned by CDFW to one of the following six California Rare Plant Ranks (CRPRs):

- CRPR 1A – Plants presumed to be extinct in California
- CRPR 1B – Plants that are rare, threatened, or endangered in California and elsewhere
- CRPR 2A – Plants that are presumed extirpated in California, but are more common elsewhere
- CRPR 2B – Plants that are rare, threatened, or endangered in California but more common elsewhere
- CRPR 3 – Plants about which more information is needed (a review list)
- CRPR 4 – Plants of limited distribution (a watch list)

[This page intentionally left blank.]

Figure 3-1. Habitat and Land Cover Types in the Biological Study Area – Map 1



Source: GEI Consultants, Inc. 2019 and 2020; file data from McCormick Biological, Inc. 2020

Figure 3-2. Habitat and Land Cover Types in the Biological Study Area – Map 2

Source: GEI Consultants, Inc. 2019 and 2020; McCormick Biological, Inc. 2020

Figure 3-3. Habitat and Land Cover Types in the Biological Study Area – Map 3

Source: GEI Consultants, Inc. 2019 and 2020; McCormick Biological, Inc. 2020

[This page intentionally left blank.]

All CRPR plants are considered "special plants" which is a broad term used by CDFW to refer to all plant taxa inventoried in the CNDDB, regardless of their legal or protection status. Plants ranked as CRPR 1 or 2 may qualify as endangered, rare, or threatened species within the definition presented in Section 15380 of the CEQA Guidelines. CDFW recommends, and local governments may require, that CRPR 1 and 2 plants be addressed in CEQA projects. In general, plants ranked as CRPR 3 and 4 do not meet the definition of endangered, rare, or threatened pursuant to CEQA Guidelines § 15380; however, these plants may be evaluated by the lead agency on a case-by-case basis when developing significance criteria under CEQA. For purposes of this analysis, special-status plants include those with a CRPR of 1 or 2.

CDFW applies the term "California species of special concern" to wildlife species that are not listed under the ESA or CESA but that are nonetheless declining at a rate that could result in listing, or that historically occurred in low numbers and are subject to current known threats to their persistence.

The CNDDB and CNPS inventory queries included the U.S. Geological Survey (USGS) East Elk Hills 7.5-minute quadrangle, within which the Recovery Project site is located, and the surrounding eight quadrangles (Lokern, Buttonwillow, Rio Bravo, West Elk Hills, Tupman, Fellows, Taft, and Mouth of Kern). Results of the CNDDB and CNPS inventory queries and the IPaC list are provided in **Appendix C**. (Note: Not all species tracked in the CNDDB and CNPS inventory and included on species lists meet the definitions of special-status species described above.)

Results of the CNDDB USGS 9-quadrangle search yielded occurrences of 18 special-status plant taxa and 19 special-status animal taxa. Twenty-two of these (7 plants; 15 animals) have been documented within 3 miles of the Recovery Project area, as shown in **Figures 3-4** and **3-5**.

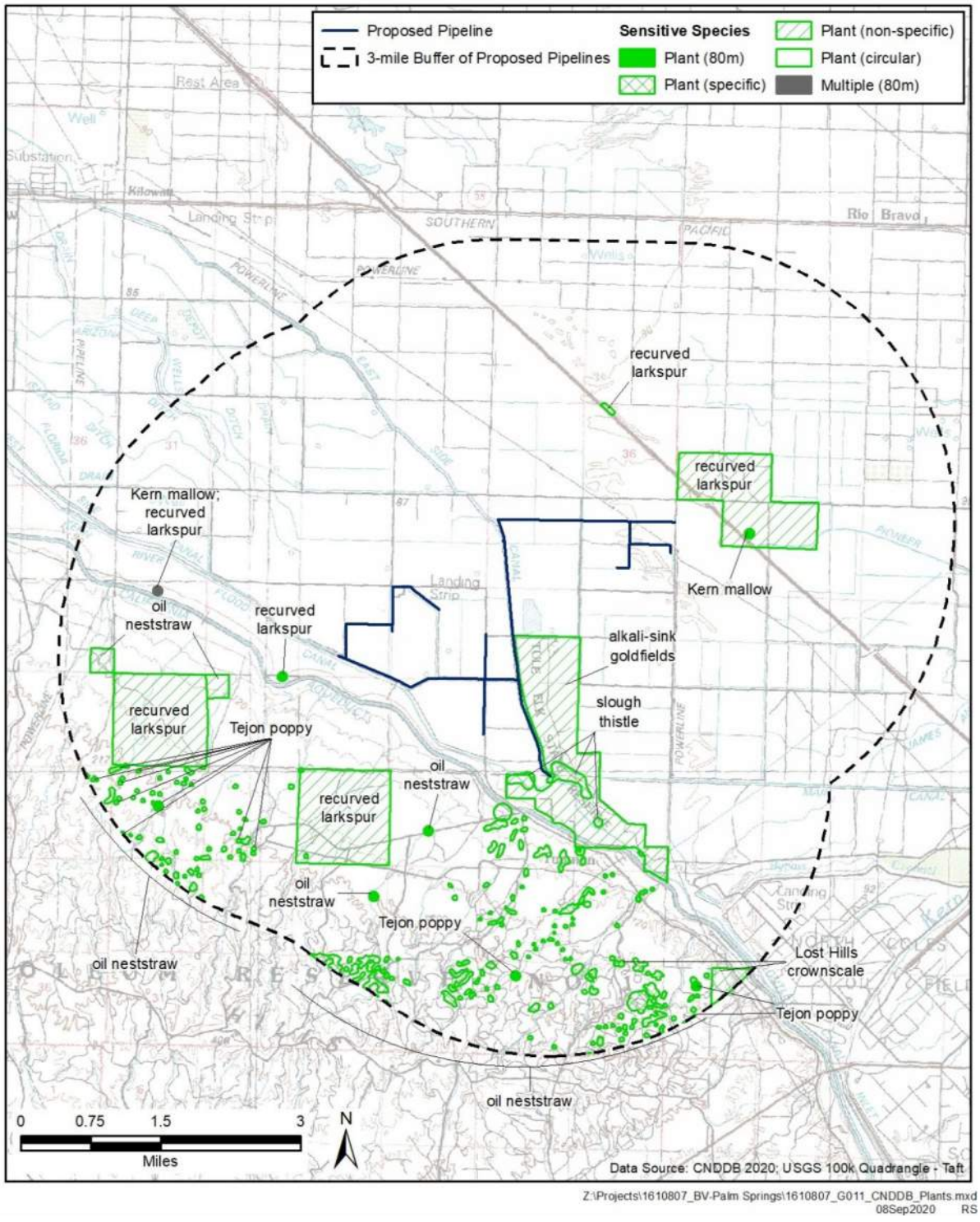
Special-Status Plants

Table 3-2 provides information on each special-status plant that was included in the CNDDB or CNPS search results and/or on the IPaC resource list. Based on observations made during field surveys, no suitable habitat for special-status plants occurs on the Recovery Project site. However, 10 special-status plant taxa were determined to have at least low potential to occur adjacent to the project site: Horn's milkvetch (*Astragalus hornii var.* hornii), heartscale (*Atriplex cordulata var. cordulata*), Earlimart orache (*Atriplex cordulata var. erecticaulis*), Lost Hills crownscale (*Atriplex cordulata var. vallicola*), lesser saltscale (*Atriplex minuscula*), subtle orache (*Atriplex subtilis*), recurved larkspur (Delphinium recurvatum), Kern mallow (*Eremalche parryi ssp. kernensis*), slough thistle (*Cirsium crassicaule*), and San Joaquin woollythreads (*Monolopia congdonii*). None of these taxa were observed during field surveys, but surveys were conducted very late in the blooming season.

All of the special-status plants determined to have potential to occur on or adjacent to the Recovery Project site are CRPR 1B plants (rare, threatened, or endangered in California and elsewhere). Slough thistle is associated with aquatic areas, such as rivers, sloughs, and marshes that support wetland and/or riparian vegetation. No such habitat occurs on the Recovery Project site, but the species has been documented in the Outlet Canal and other periodically flooded areas adjacent to the southeast end of the Recovery Project site. Horn's milkvetch also has been documented in the Outlet Canal and could occur in bush seepweed scrub adjacent to the northeast portion of the Recovery Project site. The remaining plants also could occur in bush seepweed scrub adjacent to the northeast portion of the Recovery Project site, and Horn's milkvetch, recurved larkspur, and Kern mallow have been documented at the nearby KWB. Although the

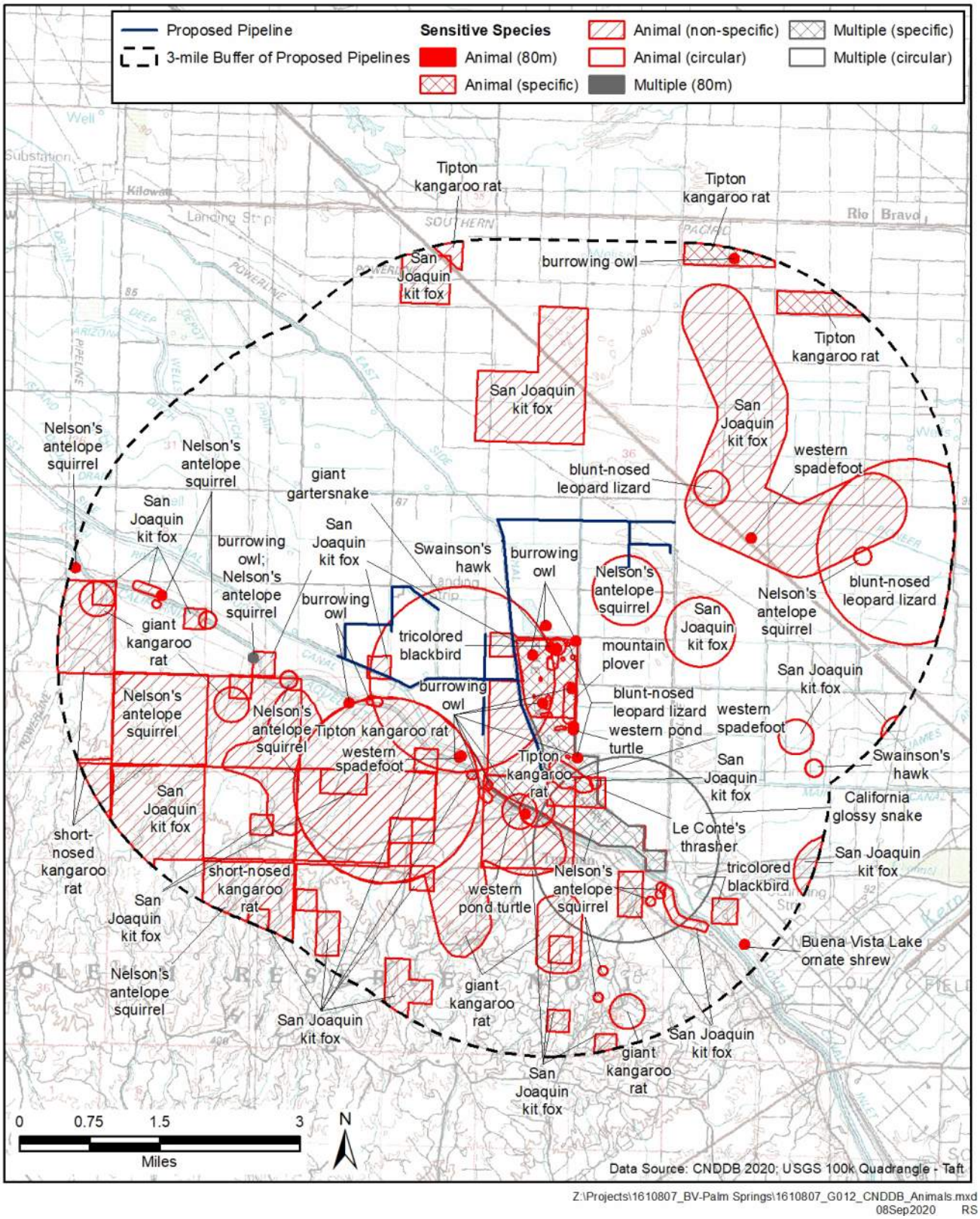
CNDDB includes an occurrence of alkali-sink goldfields (*Lasthenia chrysantha*) from the Tule Elk Reserve (CDFW 2020a), no specific information about the occurrence is available, and the Tule Elk Reserve is separated from the Recovery Project site by a maintained farm road and an irrigation canal.

Figure 3-4. California Natural Diversity Database Occurrences of Special-status Plants within 3 Miles of the Project Site



Source: CDFW 2020a

Figure 3-5. California Natural Diversity Database Occurrences of Special-status Animals within 3 Miles of the Project Site



Source: CDFW 2020a, adapted by GEI Consultants, Inc. 2020

Table 3-2. Special-status Plants Evaluated for Potential to Occur on or Adjacent to the Project Site

Species	Blooming Period	Federal Status[1]	State Status[1]	Habitat Associations	Potential to Occur on or Adjacent to the Project Site
Horn's milkvetch *Astragalus hornii var. hornii*	May–October	Federal: No Status	State Status: 1B.1	Alkaline soils along lake margins, in meadows, seeps, and playas	Moderate; bush seepweed scrub adjacent to northeast portion of project site and the Outlet Canal and other periodically flooded areas adjacent to the south end of project site provide suitable habitat.
Heartscale *Atriplex cordulata* var. *cordulata*	April–October	Federal: No Status	State Status: 1B.2	Sandy saline or alkaline soils in chenopod scrub and valley and foothill grassland	Moderate; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.
Earlimart orache *Atriplex cordulata* var. *erecticaulis*	August–November	Federal: No Status	State Status: 1B.2	Valley and foothill grassland	Low; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat, but the site is south of all other known populations.
Lost Hills crownscale *Atriplex coronata* var. *vallicola*	April–September	Federal: No Status	State Status: 1B.2	Sandy saline or alkaline soils in chenopod scrub, valley and foothill grassland, and vernal pools	Moderate; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.
Lesser saltscale *Atriplex minuscula*	May–October	Federal: No Status	State Status: 1B.1	Alkaline sandy soils in chenopod scrub, valley and foothill grassland, and playas	High; known to occur in bush seepweed scrub adjacent to northeast portion of project site.
Subtle orache *Atriplex subtilis*	June–September	Federal: No Status	State Status: 1B.1	Alkaline soils in valley and foothill grassland	Moderate; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.
California jewelflower *Caulanthus californicus*	February–May	Federal Status: E	State Status: E/1B.1	Sandy soil in chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland	None; bush seepweed scrub adjacent to northeast portion of project site provides marginal habitat, but the species is considered extirpated from the San Joaquin Valley floor.
Slough thistle *Cirsium crassicaule*	February–May	Federal: No Status	State Status: 1B.1	Sloughs, riverbanks, and marshy areas in chenopod scrub, riparian scrub, and marshes and swamps	Low; Outlet Canal and other periodically flooded areas adjacent to the south end of project site provide marginally suitable habitat.
Recurved larkspur *Delphinium recurvatum*	March–June	Federal: No Status	State Status: 1B.2	Alkaline soils in chenopod scrub, cismontaine woodland, and valley and foothill grassland	Moderate; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.

Kern mallow *Eremalche parryi* ssp. *kernensis*	January–May	Federal Status: E	State Status: 1B.2	Open sandy and clay soils, often at edge of clearings in chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland	High; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.
Temblor buckwheat *Eriogonum temblorense*	May–September	Federal: No Status	State Status: 1B.2	Valley or foothill grassland on clay or sandstone substrate	None; no suitable habitat occurs on or adjacent to the project site.
Tejon poppy *Eschscholzia lemmonii* ssp. *kernensis*	February–April	Federal: No Status	State Status: 1B.1	Chenopod scrub and valley and foothill grassland	None; project site is below the known elevation for this taxon.
Alkali-sink goldfields *Lasthenia chrysantha*	February–April	Federal: No Status	State Status: 1B.1	Alkaline soils in vernal pools and wet saline flats	None; no suitable habitat occurs on or adjacent to the project site.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	February–June	Federal: No Status	State Status: 1B.1	Marshes and swamps, playas, and vernal pools	None; no suitable habitat occurs on or adjacent to the project site.
Showy golden madia *Madia radiata*	March–May	Federal: No Status	State Status: 1B.1	Cismontane woodland and valley and foothill grassland	None; no suitable habitat occurs on or adjacent to the project site.
San Joaquin woollythreads *Monolopia congdonii*	February–May	Federal Status: E	State Status: 1B.2	Sandy soils in chenopod scrub, and valley and foothill grassland	Moderate; bush seepweed scrub adjacent to northeast portion of project site provides suitable habitat.
California alkali grass *Puccinellia simplex*	March–May	Federal: No Status	State Status: 1B.2	Alkaline soils in wet areas, lake margins, meadows and seeps, vernal pools, chenopod scrub, and valley and foothill grassland	None; no suitable habitat occurs on or adjacent to the project site.
Oil neststraw *Stylocline citroleum*	March–April	Federal: No Status	State Status: 1B.1	Clay soils in chenopod scrub, coastal scrub, and valley and foothill grassland, often along drainage edges	None; no suitable habitat occurs on or adjacent to the project site.

Notes: CNDDB = California Natural Diversity Database; CRPR = California Rare Plant Rank

[1] **Status Definitions**

Legal Status

E = Listed as Endangered under the federal or state Endangered Species Act

California Rare Plant Ranks

1B = Plant species considered rare or endangered in California and elsewhere (but not legally protected under the ESA or CESA).

California Rare Plant Rank Extensions

.1 = Seriously endangered in California (greater than 80% of occurrences are threatened and/or have a high degree and immediacy of threat).

.2 = Fairly endangered in California (20-80% of occurrences are threatened and/or have a moderate degree and immediacy of threat).

Sources: CDFW 2020a; CNPS 2020; McCormick Biological, Inc. data collected in 2020; South Valley Biology Consulting 2021, USFWS 2020a

Special-Status Wildlife

Table 3-3 provides information on the special-status wildlife species that were included in the CNDDB search results or on the IPaC resource list. Several additional special-status bird species that are rarely documented in the CNDDB but whose range overlaps with the Recovery Project area were also considered. Based on observations made during field surveys and review of existing documentation,

16 special-status wildlife taxa were observed or determined to have low or moderate potential to occur on or adjacent to the Recovery Project site; these species and subspecies are discussed in more detail following the table.

Table 3-3. Special-status Fish and Wildlife Evaluated for Potential to Occur on or Adjacent to the Project Site

Species	Status		Habitat Associations	Potential to Occur on or Adjacent to the Project Site
	Federal	State		
Fish				
Delta smelt *Hypomesus transpacificus*	T	E	Semi-anadromous; typically restricted to the Sacramento-San Joaquin River Delta and the lower Sacramento River	None; Biological Study Area is outside the range of this species.
Invertebrates				
Vernal Pool fairy shrimp *Branchinecta lynchi*	T	–	Vernal pools and seasonal wetlands, including a wide range of sizes and depths.	None; no suitable habitat occurs on or adjacent to the project site.
Crotch bumble bee *Bombus crotchii*	–	CE	Open grasslands and scrublands	Very low; Potential food plant *Asclepias fascicularis* was spaced sporadically and in low numbers in a small portion of the adjacent bush seepweed scrub, and no other known food plants were observed; no known occurrences in the San Joaquin Valley since 1970.
Amphibians				
California red-legged frog *Rana draytonii*	T	SSC	Lowlands and foothill areas, in or near permanent deep water with dense, shrubby or emergent riparian vegetation	None; Biological Study Area is outside the range of this species.
Western spadefoot *Spea hammondii*	–	SSC	Vernal pools and seasonal wetlands in grasslands and open woodlands	None; no suitable habitat occurs on or adjacent to the project site.
Reptiles				
Temblor legless lizard *Anniella alexanderae*	–	SSC	Sandy soil at the southeast base of the Temblor Ranges; likely in sparsely vegetated areas	None; Biological Study Area is outside the range of this species.
Blunt-nosed leopard lizard *Gambelia sila*	E	E, FP	Sparsely vegetated and relatively flat grasslands and alkali and desert scrub habitats	Moderate; suitable habitat occurs adjacent to the northeast corner and south end of the project site; no individuals were observed during focused surveys.
Coast horned lizard *Phrynosoma blainvillii*	–	SSC	Woodland and grassland habitats, most commonly along sandy washes with scattered low bushes	Moderate; suitable habitat occurs adjacent to the northeast corner and south end of the project site.
California glossy snake *Arizona elegans occidentalis*	–	SSC	Wide variety of habitats, including grassland and scrub, often with loose or sandy soils	Moderate; suitable habitat occurs adjacent to the northeast corner and south end of the project site.
San Joaquin coachwhip *Masticophis flagellum ruddocki*	–	SSC	Open, dry habitats with little or no tree cover, including grasslands and saltbrush scrub	Moderate; suitable habitat occurs adjacent to the northeast corner and south end of the project site.

Species	Status		Habitat Associations	Potential to Occur on or Adjacent to the Project Site
	Federal	State		
Giant gartersnake *Thamnophis gigas*	T	T	Open water and emergent vegetation in marshes, sloughs, and other aquatic habitats; also requires open upland habitat	None; Biological Study Area is outside the range of this species.
Western pond turtle *Actinemys marmorata*	–	SSC	Permanent or nearly permanent water bodies; nests in sunny uplands near suitable aquatic habitat	Very low; canals and other seasonal aquatic features in the Biological Study Area provide poor-quality, intermittent aquatic habitat.
Birds				
Western snowy plover *Charadrius alexandrinus nivosus*	T	–	Sandy beaches, salt pond levees, and shores of alkali lakes	None; no suitable habitat occurs on or adjacent to the project site.
Mountain plover *Charadrius montanus*	–	SSC	Flat areas with short vegetation and bare ground, including short grasslands, freshly plowed and sprouting fields	Very low; potentially suitable habitat occurs in uncultivated or recently planted fields, but recently documented occurrences in the region are very rare.
Fulvous whistling-duck *Dendrocygna bicolor*	–	SSC	Tule/cattail freshwater marsh	None; no suitable habitat occurs on or adjacent to the project site, and typical range does not include the Central Valley.
Burrowing owl *Athene cunicularia*	–	SSC	Nests and forages in grasslands, agricultural lands, and other open habitats with natural or artificial burrows or friable soils	Known to occur; observed in northeast and southern portions of Biological Study Area during field surveys.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	T	E	Nests in riparian forest with developed understory; forages in riparian forest and scrub	None; no suitable habitat occurs on or adjacent to the project site.
White-tailed kite *Elanus leucurus*	–	FP	Nests in woodlands and isolated trees and forages in grasslands, pasture, and agricultural fields	Moderate; agricultural fields, recharge areas, and other uncultivated areas provide foraging habitat; ornamental trees at residences and agricultural facilities provide potential nest sites.
Swainson's hawk *Buteo swainsoni*	–	T	Nests in riparian forest and scattered trees; forages in grasslands and agricultural fields	Moderate; agricultural fields, recharge areas, and other uncultivated areas provide foraging habitat; ornamental trees at residences and agricultural facilities provide potential nest sites.
Northern harrier *Circus cyaneus*	–	SSC	Nests and forages in grasslands, field crops, and marshes; nests on the ground in patches of dense, often tall, vegetation	Moderate; agricultural fields, recharge areas, and uncultivated areas provide foraging habitat and may be suitable for nesting, depending on conditions.
Loggerhead shrike *Lanius ludovicianus*	–	SSC	Savannah, shrublands, and open woodlands with shrubs and small trees for nesting	Known to occur; observed during field surveys; potential nesting habitat occurs at residences and agricultural facilities and in northeast and southern portions of the Biological Study Area.

Species	Status		Habitat Associations	Potential to Occur on or Adjacent to the Project Site
	Federal	State		
Le Conte's thrasher *Toxostoma lecontei*	–	SSC	Dry, open scrub habitats with dense spiny vegetation	Very low; marginal quality habitat occurs in the northeast corner of Biological Study Area but lacks mature stands of common saltbush typical of this species.
Least Bell's vireo *Vireo bellii pusillus*	E	E	Structurally diverse riparian habitat with dense shrub layer	None; no suitable habitat occurs on or adjacent to the project site.
Tricolored blackbird *Agelaius tricolor*	–	T	Nests in dense cattails and tules, riparian scrub, grain crops, and other low dense vegetation; forages in grasslands and agricultural fields	Moderate; agricultural fields, recharge areas, and uncultivated areas provide foraging habitat, known to nest on Tule Elk ReserveK, but no suitable nesting habitat occurs on or adjacent to the project site.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–	SSC	Nests in freshwater marsh with tall emergent vegetation; forages in freshwater marsh and upland habitats	Low; agricultural fields, recharge areas, and uncultivated areas provide foraging habitat; known to nest at KWB, but no suitable nesting habitat occurs on or adjacent to the project site.
Mammals				
Buena Vista Lake ornate shrew *Sorex ornatus relictus*	E	SSC	Moist soils in marsh and riparian habitat, with stumps, logs and litter for cover	Very low; has been documented along the Outlet Canal, but habitat adjacent to the south end of the project site is of very poor quality for this species.
Tulare grasshopper mouse *Onychomys torridus tularensis*	–	SSC	Dry, open scrublands	Low; suitable habitat occurs in the northeast corner of Biological Study Area, but the nearest known occurrences are approximately 6 to 10 miles southeast of the project site, at the KWB.
Giant kangaroo rat *Dipodomys ingens*	E	E	Dry grasslands and alkali scrub with sandy loam soils	Low; suitable habitat occurs in the northeast corner of Biological Study Area, and haystacks and burrows of proper size and shape were observed in this area; however, this subspecies is not known to occur at the nearby Tule Elk Reserve or KWB.
Tipton kangaroo rat *Dipodomys nitratoides nitratoides*	E	E	Saltbrush and sink scrub vegetation with soft, friable soils	Moderate; suitable habitat occurs in the northeast corner of Biological Study Area, and burrows of proper size and shape were observed in this area; known to occur at the nearby KWB and Tule Elk Reserve.
Short-nosed kangaroo rat *Dipodomys nitratoides brevinasus*	–	SSC	Grassland and shrub habitats with friable alkali soils	None; range of this subspecies is limited to west of the California Aqueduct.
Nelson's antelope squirrel *Ammospermophilus nelsoni*	–	T	Grasslands and open shrubland with gullies and washes	Very low; suitable habitat occurs in the northeast corner of Biological Study Area, but no individuals were observed during focused surveys, despite optimal temperatures for observation.

Species	Status		Habitat Associations	Potential to Occur on or Adjacent to the Project Site
	Federal	State		
American badger *Taxidea taxus*	–	SSC	Dry, open areas in various habitats with friable soils and uncultivated ground	Low; suitable habitat occurs in the northeast corner of Biological Study Area; known to occur at nearby KWB, but no suitable burrows or evidence of individuals was observed during focused surveys.
San Joaquin kit fox *Vulpes macrotis mutica*	E	T	Primarily grasslands and sparsely vegetated shrublands with loose-textured soils; can also use open agricultural habitats	Moderate; suitable habitat and potential dens occur in the northeast corner of Biological Study Area; no evidence of individuals was observed during focused surveys but known to occur at the nearby KWB and Tule Elk Reserve.
Western mastiff bat *Eumops perotis californicus*	–	SSC	Various open, semi-arid to arid habitats; roosts in cliff crevices, high buildings, tunnels, and trees	Very low; potential artificial roost sites in Biological Study Area provide very poor-quality habitat.

Notes: CNDDB = California Natural Diversity Database

[1] **Status Definitions**

E = Listed as Endangered under the federal or state Endangered Species Act
T = Listed as Threatened under the federal or state Endangered Species Act
CE = Candidate for listing as Endangered under the state Endangered Species Act
FP = Fully Protected under the California Fish and Game Code
SSC = California Species of Special Concern

Sources: CDFW 2020a; GEI Consultants, Inc. data collected in 2019 and 2020; KWBA 2019; McCormick Biological, Inc. data collected in 2020; USFWS 2020a

Special-status Reptiles

Three special-status reptile taxa were determined to have potential to occur on the Recovery Project site, based on habitat conditions: blunt-nosed leopard lizard (*Gambelia sila*), California glossy snake (*Arizona elegans occidentalis*), and San Joaquin coachwhip (*Masticophis flagellum ruddocki*). Blunt-nosed leopard lizard is federally- and state-listed as endangered and is fully protected under FGC § 5050. The precise boundaries of the species' historic distribution are unknown, but it likely occupied most of the Valley and adjacent foothills. The current distribution, however, is limited to scattered undeveloped land on the Valley floor and in the foothills of the Coast Range, extending north into Merced County and south into Santa Barbara and Ventura counties (USFWS 2020c). Blunt-nosed leopard lizard occurs in sparsely vegetated alkali and desert scrub habitats and seeks cover in or under mammal burrows, shrubs, and artificial structures. The project site does not provide suitable habitat for blunt-nosed leopard lizard, but bush seepweed scrub adjacent to the northeast portion of the site and the Outlet Canal adjacent to the south end support suitable habitat. The Kern River Flood Canal and Tule Elk Reserve also provide suitable habitat, but these areas are separated from the Recovery Project site by irrigation canals and roadways. The other two special-status reptiles with potential to occur on or adjacent to the Recovery Project site are California species of special concern. These species can occur in a variety of habitats but are primarily associated with open, dry habitats including grasslands and open scrub. Suitable habitat for horned lizard, glossy snake, and coachwhip occurs adjacent to the northeast and south portions of the project site.

Special-status Birds

Six special-status bird species were observed during field surveys or have potential to occur on the Recovery Project site, based on habitat conditions: Swainson's hawk (*Buteo swainsoni*), burrowing owl (*Athene cunicularia*), northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus leucurus*), loggerhead

shrike (*Lanius ludovicianus*), tricolored blackbird (*Agelaius tricolor*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

Burrowing owl is a California species of special concern that prefers open, dry habitats. In California, the species occurs throughout the Central Valley, southwestern deserts, northeastern basin, and the Carrizo Plain and other western valleys. Burrowing owl is primarily a grassland species, but it can thrive in some landscapes that are highly altered by human activity, including agricultural lands, if suitable burrows for roosting and nesting and short vegetation are present. These owls typically nest and roost in burrow systems created by medium-sized mammals or is artificial features (e.g., drainpipes and culverts) (Gervais et al. 2008). Two burrowing owls were observed in bush seepweed scrub adjacent to the northeast portion of the Recovery Project site during all field surveys conducted for the project; breeding was not confirmed, but adults were observed in January, May, and September. One burrowing owl was also observed in the recharge area adjacent to the southwest portion of the project site in September 2020. No individuals were observed on the project site, but there is limited potential for them to occur at the project laydown area and along canal and agricultural field margins.

Swainson's hawk is state listed as threatened. This species primary breeding distribution in California is the Central Valley. Kern County is at the south end of the Central Valley breeding range, and Swainson's hawk nests sparsely in this region (California Department of Fish and Game [CDFG] 2007). The CNDDB includes only 22 presumed extant active Swainson's hawk nests or nesting pairs documented since 1990 in the Central Valley portion of the County (CDFW 2020a). However, one of these locations is at the north end of the Tule Elk Reserve, approximately 0.4 mile east of the Recovery Project site, and nests regularly occur at the KWB (Sterling Wildlife Biology 2019). Swainson's hawks require grassland or other open habitat with adequate prey, in association with suitable nest trees. Suitable foraging habitats include grasslands and lightly grazed pastures, alfalfa and other hay crops, and certain grain and row crops. Few potential nest sites for Swainson's hawk occur in the project vicinity, but large ornamental trees at the project laydown area and farm residences and facilities on and near the project site provide marginally suitable nest sites, as well as trees associated with the active nest site at the Tule Elk Reserve. Suitable agricultural crops, groundwater recharge areas, and other uncultivated areas on and adjacent to the project site provide foraging habitat.

White-tailed kite is fully protected under FGC § 3511. This species occurs in virtually all lowlands of California, west of the Sierra Nevada, and in the southeast desert. White-tailed kite nests in trees in lowland grasslands, agricultural areas, wetlands, oak woodland and savanna, and riparian areas with nearby open habitats (Moore 2000). They forage in grasslands, pasture, and some agricultural crops. As with Swainson's hawk, few potential nest sites for white-tailed kite occur in the Recovery Project vicinity, but trees at the project laydown area, several farm residences and facilities on and near the project site, and the Tule Elk Reserve provide marginally suitable nest sites. Suitable agricultural crops, groundwater recharge areas, and other uncultivated areas on and adjacent to the project site provide foraging habitat.

Northern harrier is a California species of special concern that occurs primarily in lowlands of the state. The Central Valley supports most of the state's breeding birds, which nest and forage in a variety of open habitats, including marsh, wet meadows, borders of lakes, rivers, and streams, grasslands, weedy fields, and some agricultural crops. Northern harriers' nest on the ground in dense, often tall vegetation in

relatively undisturbed areas (Davis and Niemla 2008). Grassland habitat adjacent to the project site in groundwater recharge areas, and near the site at the Tule Elk Reserve and the Kern River Flood Canal, provides potential nesting habitat; field crops and fallow agricultural fields also could be suitable for nesting. These areas, as well as bush seepweed scrub adjacent to the northeast portion of the project site, also provide suitable foraging habitat.

Loggerhead shrike is a California species of special concern that inhabits lowland and foothill areas with scattered shrubs and trees throughout most of California. In the Central Valley, loggerhead shrike nests in shrubs and small trees, primarily at the edges of riparian habitat (Humple 2008). Loggerhead shrike was observed in the southern portion of the Recovery Project site during field surveys. Few potential tree and shrub nest sites occur on the project site, but those at the project laydown area and farm residences and facilities on and near the project site, at the Tule Elk Reserve, along the Kern River Flood Canal, and in bush seepweed scrub provide suitable nest sites. Habitat throughout and adjacent to the project site is suitable for foraging.

Tricolored blackbird is state listed as threatened. This species is nearly endemic to California and occurs throughout the Central Valley and much of the coast south from the San Francisco Bay Area, and in isolated areas in the northeastern part of the state. Tricolored blackbirds nest colonially; they historically preferred freshwater marshes dominated by cattails or tules. However, an increasing number of colonies have been documented in Himalayan blackberry and thistles, with some of the largest recent colonies in silage and grain fields in the Valley. Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields (e.g., oats, wheat, silage), as well as annual grasslands, cattle feedlots, and dairies (Beedy 2008). Tricolored blackbirds have nested in recent years at Tule Elk Reserve (CNDDB 2021) and KWB (Sterling Wildlife Biology 2019), but no suitable nesting habitat for tricolored blackbird is currently present on or adjacent to the Recovery Project site; if grain crops are planted, these fields could provide suitable nesting habitat. Field crops and grassland habitat in recharge areas and adjacent to the project site provide suitable foraging habitat.

Yellow-headed blackbird is a California species of special concern that breeds in scattered areas throughout the state, almost exclusively in marshes with tall emergent vegetation. A substantial decline in the Valley population, compared to historic levels, has been attributed to agricultural expansion and loss of marsh habitat. Yellow-headed blackbirds are fairly numerous locally, where suitable habitat persists, but only three breeding areas are known from the County – KWB (South Valley Biology Consulting 2021), Lake Buena Vista Aquatic Recreation Area, and Kern National Wildlife Refuge (Jaramillo 2008). No suitable nesting habitat occurs on or adjacent to the Recovery Project site, but field crops and grassland habitat in recharge areas and adjacent to the project site provide suitable foraging habitat.

Special-status Mammals

Five special-status mammals were determined to have at least low potential to occur on the project site, based on survey observations and species range: Tulare grasshopper mouse (*Onychomys torridus tularensis*), giant kangaroo rat (*Dipodomys ingens*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), American badger (*Taxidea taxus*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

Tulare grasshopper mouse is a California species of special concern. Formerly more widespread, this subspecies is now limited to western Kern County and portions of San Luis Obispo, Fresno, and San

Benito counties. Tulare grasshopper mouse typically occurs in arid grassland and shrubland, including bush seepweed scrub (ESRP 2020). Bush seepweed scrub adjacent to the northeast portion of the Recovery Project site and grassland along the Kern River Flood Canal and at the Tule Elk Reserve provide suitable habitat. However, the species is not known to occur at the Tule Elk Reserve, and the nearest known occurrences are approximately 6 to 10 miles southeast of the Recovery Project site, at the KWB.

Giant kangaroo rat is federally- and state-listed as endangered. Historically, this species occurred on hundreds of thousands of acres over the western slopes of the Valley and in the Tulare Basin, Carrizo Basin, and Cuyama and Panoche valleys (USFWS 2020d). Optimal habitat for giant kangaroo rat is typically annual grassland with few or no shrubs, though populations also occur in shrub communities, in loamy or sandy loam soils that do not flood (USFWS 2020d). Haystacks potentially diagnostic of this species and burrows of proper size and shape were observed during surveys of bush seepweed scrub adjacent to the northeast portion of the Recovery Project site. Grassland along the Kern River Flood Canal and at the Tule Elk Reserve also provides potentially suitable habitat. However, the species is not known to occur at the Tule Elk Reserve.

Tipton kangaroo rat is federally- and state-listed as endangered. This subspecies historically occurred in the once extensive arid plant communities of the Tulare Lake Basin on the southern Valley floor. Extant populations are limited to scattered, isolated areas of Kings, Tulare, and Kern counties, primarily associated with federal and state protected areas (USFWS 2010). Bush seepweed scrub and valley sink scrub communities provide the primary habitat for Tipton kangaroo rat. The species can also occur in terrace grasslands without woody shrubs, but sparse to moderate shrub cover is associated with populations of high density (USFWS 2010). Burrows of proper size and shape for Tipton kangaroo rat were observed in bush seepweed scrub adjacent to the northeast portion of the project site, and grassland along the Kern River Flood Canal and at the Tule Elk Reserve provide suitable habitat. This species is known to occur at the Tule Elk Reserve and the nearby KWB.

San Joaquin kit fox is federally listed as endangered and state listed as threatened. The historic range of this kit fox is thought to have extended from Contra Costa and Alameda counties in the northwest and Stanislaus County in the northeast to Kern County in the south. Although current rangewide survey data are not available, scattered data indicate kit foxes were likely distributed throughout most of the historical range through the early 2000's. However, data from northern portions of the range suggest a recent absence from that area. CNDDB data from the past decade show a concentration of occurrences in the southwest Valley (mainly Kern and Kings counties), the Carrizo Plain (San Luis Obispo County), and urban Bakersfield (Kern County). Occurrences are also regularly reported from portions of San Benito, Fresno County, and Merced counties (USFWS 2020e). Kit fox is primarily found in arid scrub communities, including bush seepweed scrub, and grassland communities. Optimal habitat is sparsely vegetated communities on gentle slopes. Kit fox can also occur in human-altered habitats, such as grazed grasslands, petroleum fields, and urban areas, and they can survive adjacent to tilled or fallow fields (USFWS 2020e). All nearby occurrences of San Joaquin kit fox documented in the CNDDB from the past 25 years are from natural habitats west and south of the Kern River Flood Canal (CDFW 2020a). Though not recorded in the CNDDB, kit fox is also regularly documented in the eastern portion of the nearby KWB (South Valley Biology Consulting 2020). No evidence of kit fox presence in the Biological Study Area was observed during focused field surveys, but burrows that provide potential dens occur in bush

seepweed scrub adjacent to the northeast portion of the Recovery Project site. Potential dens also could occur in recharge areas, along the Kern River Flood Canal, and at the Tule Elk Reserve.

American badger is a California species of special concern that occurs in grassland and oak woodland. Badgers can be found in marginal habitat (e.g., agriculture, residential areas, roadsides) at the edge of intact habitat patches, but they do not appear to persist in fragmented habitat. Badger populations in California were substantially reduced in the 20th century, though they potentially continue to occur throughout most of California (Quinn 2008). Williams (1986) indicated they survive only in low numbers in peripheral parts of the Central Valley and adjacent lowlands, and a subsequent effort to compile reports of badger suggested the species range had contracted significantly and that populations may have been extirpated from the Central Valley (Quinn 2008). However, CNDDB occurrences since 1990 are scattered throughout the valley (CDFW 2020a). Most Kern County occurrences are from grassland hills west of the Aqueduct, but badger has been documented at the KWB. Potential for American badger to occur on the project site is low. No suitable burrows or sign of American badger were observed during field surveys, but bush seepweed scrub, recharge areas, the Kern River Flood Canal, and the Tule Elk Reserve adjacent to or near the project site provide suitable habitat.

Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration under state and federal regulations. Sensitive habitats may be of special concern for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat for special-status species.

Waters and Wetlands

Because canals and recharge areas in the Biological Study Area are used solely for irrigation delivery and groundwater recharge, respectively, and they do not have a significant connection to traditionally navigable waters, these features are not protected under the CWA. The Outlet Canal and Kern River Flood Canal are also not anticipated to qualify for protection under the CWA, because they do not meet the definition of a tributary under the Navigable Waters Protection Rule. The canals and recharge areas were excavated in uplands and do not coincide with historic rivers, streams, or lakes. However, CDFW sometimes claims jurisdiction over altered or artificial waterways, under FGC § 1602, based on the value of those waterways to fish and wildlife species. Canals and basins in the Biological Study Area also are likely to be protected under the Porter-Cologne Act.

Critical Habitat

ESA § 3(5)A defines "critical habitat" as the specific areas within the geographical area occupied by federally listed species on which are found physical or biological features essential to the conservation of the species and that may require special management considerations or protection. The northern end of Critical Habitat Unit 4 for Buena Vista Lake ornate shrew (*Sorex ornatus relictus*) is immediately adjacent to the pipeline at the southern end of the Recovery Project site.

Sensitive Natural Communities

CDFW maintains a list of sensitive natural communities (CDFW 2020b). Bush seepweed scrub, which occurs adjacent to the northeast portion of the project site, is identified as a sensitive natural community.

3.2.2 Regulatory Setting

Biological resources are subject to a variety of laws and regulations as part of the environmental review process. This section briefly describes the laws and regulations anticipated to apply to implementation of any of the project alternatives.

3.2.2.1 Federal Plans, Policies, Regulations, and Laws

Federal Endangered Species Act

Pursuant to the ESA (Title 16, § 1531 and following sections of the U.S. Code [16 USC 1531 et seq.]), USFWS and National Marine Fisheries Service have regulatory authority over species listed or proposed for federal listing as threatened or endangered and over projects that may result in take of federally listed species. In general, persons subject to the ESA (including private parties) are prohibited from "take" of endangered or threatened fish and wildlife species on private property, and from taking endangered or threatened plants in areas under federal jurisdiction or in violation of state law.

The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." "Harass" is further defined as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act which actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

ESA Section 7 outlines procedures for federal interagency cooperation to protect and conserve federally listed species and designated critical habitat. ESA Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species, or destroying or adversely modifying designated critical habitat. For projects where federal action is not involved and take of a listed species may occur, a project proponent may seek an incidental take permit under ESA Section 10(a). Section 10(a) allows USFWS to permit the incidental take of listed species if such take is accompanied by an HCP that ensures minimization and mitigation of impacts associated with the take.

Section 404 of the Clean Water Act

CWA Section 404 requires a project proponent to obtain a permit from U.S. Army Corps of Engineers (USACE) before engaging in any activity that involves discharge of dredged or fill material into waters of the U.S., including wetlands. Waters of the U.S., as codified in 33 USC 1251 et. seq. and defined in the Navigable Waters Protection Rule include: the territorial seas and waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide; tributaries; lakes, ponds, and impoundments of jurisdictional waters; and adjacent wetlands. Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. During review of a project, USACE must ensure compliance with applicable federal laws, including the U.S. Environmental Protection Agency's (EPA) Section 404(b)(1) Guidelines. USACE regulations require that

impacts on waters of the U.S., including wetlands, be avoided and minimized to the maximum extent practicable, and that unavoidable impacts be compensated (Title 33, § 320.4[r] of the Code of Federal Regulations [33 CFR 320.4[r]).

Section 401 Water Quality Certification

Under CWA Section 401, an applicant for a Section 404 permit must obtain a certificate from the appropriate state agency stating that the intended dredging or filling activity is consistent with the state's water quality standards and criteria. In California, the State Water Board delegates the authority to grant water quality certification to the nine Regional Water Quality Control Boards (RWQCBs); the Central Valley RWQCB has jurisdiction over the Valley.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC, Sec. 703, Supp. I, 1989) prohibits killing, possessing, or trading migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, bird nests, and eggs and applies to all persons and agencies in the U.S., including federal agencies. The MBTA is administered by the USFWS, but there is no process for obtaining project-related take authorization under the MBTA.

3.2.2.2 State Plans, Policies, Regulations, Laws

California Endangered Species Act

CESA (FGC 2050 et seq.) directs state agencies not to approve projects that would jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of a species. Furthermore, CESA states that CDFW, together with the Recovery Project proponent and any state lead agency, must develop reasonable and prudent alternatives consistent with conserving the species, while maintaining the project purpose to the greatest extent possible. Take of state-listed species incidental to otherwise lawful activities requires a permit, pursuant to Section 2081(b) of CESA. Project-related impacts of the authorized take must be minimized, and fully mitigated, and adequate funding must be in place to implement mitigation measures and monitor compliance and effectiveness. Mitigation can include land acquisition, permanent protection and management, and/or funding in perpetuity of compensatory lands.

As under federal law, listed plants have considerably less protection than fish and wildlife under state law. The California Native Plant Protection Act (FGC § 19000 et seq.) allows landowners to take listed plant species from, among other places, a canal, lateral ditch, building site, or road, or other right-of-way, provided that the owner first notifies CDFW and gives the agency at least 10 days to retrieve (and presumably replant) the plants before they are destroyed.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act (California Water Code § 13000 et seq.) requires that each of the state's nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to protect wetlands through the establishment of water quality objectives. RWQCB jurisdiction includes federally protected waters and areas that meet the definition of "waters of the state." Waters of the state is defined as any surface water or groundwater, including saline waters, within the state's boundaries. The RWQCB

has the discretion to take jurisdiction over areas not federally regulated under CWA Section 401, provided they meet the definition of waters of the state. Mitigation requiring no net loss of wetlands functions and values of waters of the state is typically required by the RWQCB.

California Fish and Game Code

Rivers, Lakes, and Streams

Under FGC Section 1602, it is unlawful for any entity to substantially divert or obstruct the natural flow of or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or to deposit or dispose of debris, waste, or other material where it may pass into any river, stream, or lake, without first notifying CDFW of such activity and obtaining an agreement authorizing the activity. In practice, CDFW may exert authority over any feature that holds water at least periodically or intermittently, and associated habitat (e.g., riparian vegetation), that supports fish, other aquatic life, or terrestrial wildlife.

Fully Protected Species

FGC Sections 3511, 4700, 5050, and 5515 provide protection from take for 37 fish and wildlife species referred to as fully protected species. Except for take related to scientific research or incidental take authorized as part of an approved NCCP, take of fully protected species is prohibited.

Protection of Birds

FGC Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs.

3.2.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

The Land Use, Open Space, and Conservation Element of the Kern County General Plan (2009) includes the goal and associated policies designed to preserve natural resources, primarily threatened and endangered species, listed below:

GOAL GP-1: Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.

- **Policy GP 1.10.5-27.** Threatened or endangered plant and wildlife species should be protected in accordance with state and federal laws.
- **Policy GP 1.10.5-28.** The County should work closely with state and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.
- **Policy GP 1.10.5-29.** The County will seek cooperative efforts with local, state, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.

- **Policy GP 1.10.5-30.** The County will promote public awareness of endangered species laws to help educate property owners and the development community of local, state, and federal programs concerning endangered species conservation issues.
- **Policy GP 1.10.5-32.** Riparian areas will be managed in accordance with USACE, and California Department of Fish and Game (now CDFW) rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.
- **Policy GP 1.10.10-65.** Oak woodlands and large oak trees shall be protected where possible and incorporated into project developments.
- **Policy GP 1.10.10-66.** Promote the conservation of oak tree woodlands for their environmental value and scenic beauty.

3.2.3 Environmental Impacts and Mitigation Measures

3.2.3.1 Thresholds of Significance

Significance criteria are based on Appendix G of the CEQA Guidelines. The proposed project would have a significant impact on biological resources if implementing the alternative would have one of the following:

- 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 CDFW or USFWS
- A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS
- A substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
- 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 nursery sites by native wildlife
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP
- 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

3.2.3.2 Issues Not Discussed Further

The Kern County General Plan (2009), which is currently being updated, includes several policies and implementation measures designed to protect and conserve threatened and endangered species and oak trees (Kern County Planning Department 2004). No oak trees are present onsite. The General Plan requires discretionary projects to consider effects to biological resources and wildlife agency comments during the CEQA process; this is consistent with the CEQA process being implemented by the District for the Recovery Project. Therefore, implementing the project would not conflict with any local policies or ordinances protecting biological resources and this topic is not discussed further in this analysis.

The Recovery Project is outside the plan areas for the adopted Metropolitan Bakersfield Habitat Conservation Plan area and the Bakersfield Habitat Conservation Plan, in the later stages of development, and would not impact successful implementation of either of these plans. The Recovery Project is, however, within the area intended to be covered by the Kern County Valley Floor Habitat Conservation Plan. A draft of this plan was issued more than a decade ago (Kern County Planning Department 2006), but a final plan has not been released. Because it has not been adopted, the Kern County Valley Floor HCP does not be evaluated under CEQA. However, it is described and considered here for informational purposes only. The majority of the Recovery Project is within the "White Zone" identified in the draft HCP; this zone is of lower conservation concern and not identified for acquisition of preserve areas. A small portion of the Recovery Project site is within the "Green Zone," which is defined as habitat of moderate importance for conservation purposes. Implementing the Recovery Project is unlikely to impact the conservation value of lands in the Green Zone and would not conflict with any provisions, guidelines, goals, or objectives related to biological resources anticipated to be included in a potential final and adopted version of this HCP. Therefore, issue is not discussed further in this analysis.

Chapter 3.2.1 – Environmental Setting, discusses the special-status plants and animals evaluated in this analysis, and **Tables 3-2** and **3-3** summarize the potential for each of them to occur in the Biological Study Area. Although a comprehensive list of special-status species was considered and evaluated, the impact analysis focuses on resources with reasonable potential to be impacted by the Recovery Project. Therefore, special-status species determined to be unlikely to occur in the Recovery Project area (because of marginal habitat suitability and/or lack of occurrence records in the project vicinity) are not addressed further in this analysis. Additionally, special-status birds that would not nest in the project study area, but could occur occasionally or seasonally, are not expected to be impacted by project implementation and are not discussed further in this analysis.

Implementing the Recovery Project could adversely impact birds, if construction occurs during the nesting season. Loss of active nests of species that are not considered to have special status would not substantially reduce their abundance or cause them to drop below self-sustaining levels. Therefore, potential impacts on common migratory birds would not alone constitute a significant impact under CEQA, and this issue is not discussed further in this analysis. However, the District acknowledges that it is responsible for ensuring project implementation does not violate the MBTA or FGC.

As indicated in Chapter 2 – Project Description, the Recovery Project would be managed to improve groundwater elevations in the long term by recharging more water than is recovered. Based on this management principal, and the location of project facilities within existing disturbed corridors and

agricultural lands, project operation is not anticipated to impact biological resources and is not discussed further in this analysis. Therefore, the impact analysis presented below focuses of project construction.

3.2.3.3 Analysis Methodology

The analysis of effects on biological resources from implementing the Recovery Project is based on current habitat types and conditions in the Biological Study Area and status of special-status species in the Recovery Project vicinity. The potential for loss of sensitive habitats, and effects on special-status species that could result from habitat loss, were evaluated based on observations made during fields surveys. Potential indirect effects on resources adjacent to the area of direct disturbance also were considered.

Impact significance was determined by evaluating the nature of the impact and characteristics of the habitat or species potentially affected, within the context of significance criteria listed above. It was assumed, for purposes of this analysis, that all habitats and cover types within the anticipated construction footprint could be directly removed. As indicated in Chapter 2 – Project Description, direct project disturbance would be limited to an approximately 50-foot-wide corridor along pipeline alignments and less than an acre at each well installation/conversion/abandonment location. In addition, disturbance corridors would be confined to existing roadways, roadway shoulders, agricultural lands, and other previously disturbed areas. Therefore, the previously undisturbed remnant area of bush seepweed scrub in the northeast corner of the Biological Study Area and portions of the Tule Elk Reserve, Kern River Flood Canal, and Outlet Canal near the project site boundaries would not be directly impacted.

3.2.3.4 Impact Analysis

Impact BIO-1: ***Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species:***

Suitable habitat for special-status plants would not be disturbed by project construction, and ***no impact*** *on special-status plants would occur. Special-status wildlife, including reptiles, birds, and mammals could be substantially adversely affected by construction activities. This would be a* ***potentially significant*** *impact.*

Special-status Plants

The Recovery Project area does not provide suitable habitat for special-status plants, but marginally suitable habitat for six special-status plants occurs adjacent to the site. Horn's milkvetch, heartscale, Lost Hills crownscale, lesser saltscale, recurved larkspur, and Kern mallow have some potential to occur in bush seepweed scrub adjacent to the northeast portion of the Recovery Project site; Horn's milkvetch and slough thistle could occur in seasonally flooded wetlands adjacent to the south portion of the site. However, the area of construction disturbance would be limited to agricultural fields, existing roadways, and other developed/disturbed areas. Pipelines and new and replacement wells in the northeast portion of the project site were placed specifically to provide a minimum 50-foot buffer between the disturbance area and nearby bush seepweed scrub habitat. Similarly, ground disturbance in the southern portion of the site would be limited to disturbed upland areas and is not anticipated to occur within 50 feet of potentially suitable habitat for slough thistle. Therefore, the proposed project would have no impact on special-status plants.

Mitigation Measure: No mitigation is required.

Special-status Reptiles

The Recovery Project area does not provide suitable habitat for special-status reptiles, but suitable habitat for blunt-nosed leopard lizard, coast horned lizard, California glossy snake, and San Joaquin coachwhip occurs adjacent to the northeast portion of the site. These species are unlikely to occur in the area of construction disturbance, which is at least 50 feet from areas of suitable habitat. However, because these species are mobile, potential for them to wander onto the project site cannot be entirely ruled out. If individuals occur in the construction area, they would be vulnerable to injury or death from project activities. Based on the distance between the disturbance area and suitable habitat, few, if any, individuals of these species would be affected. This is unlikely to have a substantial adverse effect on coast horned lizard, California glossy snake, or San Joaquin coachwhip populations. However, because of the endangered and fully protected status of blunt-nosed leopard lizard, injury or death of even one individual would be considered a substantial adverse effect. Therefore, this impact would be **potentially significant**.

Mitigation Measure BIO-1: Implement Measures to Educate On-site Construction Personnel and Maintain a Minimum 50-foot No-disturbance Buffer from Blunt-nosed Leopard Lizard Habitat during Project Construction.

The District will implement the following measures to minimize potential effects on blunt-nosed leopard lizard during project construction.

- Before project activities begin, all on-site project personnel shall attend a Worker Environmental Awareness Program (Program) conducted by a qualified biologist. The program shall address special-status species that could occur in the project area and include a discussion of species identification, life history, general behavior, habitat, distribution and sensitivity to human activities; state and federal legal protections; and required avoidance and minimization measures. A handout containing the information provided in the training shall be provided to all personnel. Upon completion of the training, all personnel in attendance shall sign a form stating they received the training and understand all topics discussed.
- Before project activities begin east of Morris Road, temporary fencing shall be installed to create and maintain a minimum 50-foot no-disturbance buffer between the construction area and bush seepweed scrub habitat that supports burrows suitable for blunt-nosed leopard lizard. The fencing shall be installed at least 50 feet from suitable blunt-nosed leopard lizard habitat.
- A qualified biologist shall determine where fencing will be installed, conduct a pre-installation survey of the fence alignment to confirm no suitable burrows for blunt-nosed leopard lizard are present in or within 50 feet of the fence alignment, and be present during all fence installation and removal to ensure that no special-status species are harmed.
- All project-related construction activities, construction personnel, and vehicles shall be prohibited from the bush seepweed scrub and 50-foot no-disturbance buffer area. Fencing shall be inspected and repaired, as necessary, each day before work begins adjacent to the fencing. Fencing shall be removed after all construction activities adjacent to the bush seepweed habitat are complete.

Timing: Before and during construction activities

Responsibility: Buena Vista Water Storage District and its contractors

Significance after Mitigation: Implementing Mitigation Measure BIO-1 would reduce the potentially significant impact on blunt-nosed leopard lizard to a less-than-significant level because it would minimize potential for individuals to enter the construction area and be injured or killed.

Special-status Birds

The project site and/or adjacent areas provide suitable nesting and foraging habitat for Swainson's hawk, burrowing owl, northern harrier, white-tailed kite, and loggerhead shrike. The site also provides suitable foraging habitat for tricolored blackbird and yellow-headed blackbird. No suitable nesting habitat for yellow-headed blackbird occurs on or adjacent to the site. Suitable nesting habitat for tricolored blackbird does not currently occur on or adjacent to the site, but grain crops could provide nesting habitat, if planted in the future. A very small amount of foraging habitat for special-status birds would be affected by project activities, because most pipelines and wells would be installed along existing roadways. Pipeline and wells in the northeast portion of the Recovery Project site would be installed in agricultural fields that currently provide suitable foraging habitat. Approximately 10 acres of foraging habitat would be disturbed during project construction. However, this disturbance would be temporary, and only a small proportion of the overall habitat would be disturbed at any one time. In addition, many hundreds of acres of similar habitat occur in the immediate vicinity. Therefore, foraging habitat disturbance would have a very minor impact on the potentially affected species.

The project site and adjacent areas currently provide marginal nesting habitat for burrowing owl, Swainson's hawk, white-tailed kite, and loggerhead shrike. Suitable nesting habitat for northern harrier and tricolored blackbird could also be present during project implementation, depending on crop types and habitat conditions at the time. Because nesting habitat is very limited and the project site is subject to regular disturbance from agricultural activities similar to disturbance levels anticipated during project construction, potential for project implementation to result in nest failure or burrow abandonment is low. However, if occupied burrows are present along the pipeline corridor or at the project laydown area, they could be destroyed, and burrowing owls could be injured or killed. In addition, if active nests are present in or very close to the construction area, project activities could result nest abandonment, reduced care of eggs or young, or premature fledging. Depending on the species and number of individuals that are affected, burrow destruction or nest failure could have a substantial adverse effect. Therefore, this impact would be **potentially significant**.

Mitigation Measure BIO-2a: Conduct Focused Surveys for Burrowing Owls and Avoid Loss of Occupied Burrows and Failure of Active Nests.

To minimize potential effects of project construction on burrowing owl, the District will ensure that the following measures are implemented, consistent with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012).

- A burrowing owl take avoidance survey shall be conducted within 14 days before project activities begin.

- If any occupied burrows are observed, protective buffers shall be established and implemented. A qualified biologist shall monitor the occupied burrows during project activities to confirm effectiveness of the buffers. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the owls to disturbance.
- If it is not feasible to implement a buffer of adequate size and it is determined, in consultation with CDFW, that passive exclusion of owls from the project site is an appropriate means of minimizing impacts, an exclusion and relocation plan shall be developed and implemented in coordination with CDFW. However, passive exclusion cannot be conducted during the breeding season (February 1–August 31), unless a qualified biologist verifies through noninvasive means that either (1) the birds have not begun egg laying or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.
- If passive exclusion is conducted, each occupied burrow that is destroyed will be replaced with at least one artificial burrow on a suitable portion of the project site or adjacent suitable habitat that would not be subject to inundation or project-related ground disturbance.

Timing: Before and during construction activities

Responsibility: Buena Vista Water Storage District and its contractors

Significance after Mitigation: Implementing Mitigation Measure BIO-2a would reduce the potentially significant impact on burrowing owl to a less-than-significant level because buffers would be implemented around occupied burrows to avoid disturbance and loss of owls and failure of active nests, and any potential passive relocation would be implemented in a manner that minimizes impact on affected individuals.

Mitigation Measure BIO-2b: Conduct Focused Surveys for Other Nesting Special-status Birds and Implement Buffers Around Active Nests.

To minimize potential effects of project construction on special-status birds other than burrowing owl, the District will ensure that the following measures are implemented:

- A qualified biologist shall conduct surveys of potential Swainson's hawk and white-tailed kite nesting trees within 0.5 mile of the Recovery Project site. To the extent practicable, depending on timing of project initiation, surveys will be conducted in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000). At a minimum, a survey shall be conducted within 10 days before project activities begin near suitable nest trees during the nesting season (April-August).
- A qualified biologist shall conduct surveys of suitable nesting habitat for tricolored blackbird, white-tailed kite, northern harrier, and loggerhead shrike within 500 feet of project activities. Surveys shall be conducted within 10 days before project activities begin near suitable nesting habitat during the nesting season (February-August).
- If any active nests are observed, a qualified biologist shall establish and confirm implementation of appropriate protective buffers around the nests until the nests are no

longer active. A qualified biologist shall monitor the nest during project activities to confirm effectiveness of the buffer. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the nest to disturbance. Minimum 300-foot no-disturbance buffers will be implemented around active tricolored blackbird nest colonies, in compliance with CDFW guidance regarding avoidance of impacts on tricolored blackbird nest colonies in agricultural fields (CDFW 2015).

Timing: Before and during construction activities

Responsibility: Buena Vista Water Storage District and its contractors

Significance after Mitigation: Implementing Mitigation Measure BIO-2b would reduce the potentially significant impact on Swainson's hawk, tricolored blackbird, white-tailed kite, northern harrier, and loggerhead shrike to a less-than-significant level, because buffers would be implemented to avoid project-related failure of active nests.

Special-status Mammals

The project site does not provide suitable habitat for Tulare grasshopper mouse, giant kangaroo rat, or Tipton kangaroo rat, but suitable habitat occurs adjacent to the northeast portion of the site. These species are unlikely to occur in the area of construction disturbance, which is at least 50 feet from areas of suitable habitat. However, because these species are mobile, potential for them to wander onto the Recovery Project site cannot be entirely ruled out. If individuals occur in the construction area, they would be vulnerable to injury or death from project activities. Based on the distance between the disturbance area and suitable habitat, few, if any, individuals of these species would be affected. This is unlikely to have a substantial adverse effect on the Tulare grasshopper mouse population, if present locally. However, because of the endangered status of giant and Tipton kangaroo rat injury or death of even one individual would be considered a substantial adverse effect. Therefore, this impact would be potentially significant.

Based on current habitat conditions and observations made during the field surveys, potential for American badger or San Joaquin kit fox to den on or adjacent to the project site is very low. However, if a den becomes established or transient individuals are present during project construction, the den could be abandoned, or individuals could be injured or killed if they come in contact with project equipment or become trapped in pipes or trenches. Potential impacts would be limited to an extremely small number of individuals, if any. However, because of the likely very low population densities of these medium-sized carnivores and the endangered and threatened status of San Joaquin kit fox, abandonment of a natal den or direct injury or death of even one individual would be considered a substantial adverse effect. Therefore, this impact would be **potentially significant**.

The southern end of the Recovery Project site is immediately adjacent to designated critical habitat for Buena Vista Lake ornate shrew. However, the Outlet Canal in this area does not currently provide the primary constituent elements (PCEs) required by this shrew, and the nearest know occurrence of the subspecies is from nearly 3 miles southeast of the project site. PCEs identified in the final critical habitat designation are permanent and intermittent riparian or wetland communities that contain a complex vegetative structure with a thick cover of leaf litter or dense mats of low-lying vegetation; suitable moisture supplied by a shallow water table, irrigation, or proximity to permanent or semi-permanent

water; and a consistent and diverse supply of prey. The portion of the Outlet Canal that is adjacent to the project site is typically dry and supports relatively sparse upland vegetation primarily limited to the top of the canal banks. Although this area has potential to support the PCEs under appropriate conditions, such conditions are not currently present. In addition, installing pipeline along the adjacent existing agricultural roadway would not affect habitat along the canal or potential for this habitat to support the PCEs in the future. Therefore, implementing the project would have **no impact** on designated critical habitat for Buena Vista Lake ornate shrew.

Mitigation Measure BIO-1: Implement Measures to Educate On-site Construction Personnel and Maintain a Minimum 50-foot No-disturbance Buffer from Blunt-nosed Leopard Lizard Habitat during Project Construction.

Please *refer to* Mitigation Measure BIO-1 above for the full text of this mitigation measure.

Significance after Mitigation: Implementing Mitigation Measure BIO-1 would reduce the potentially significant impact on giant kangaroo rat and Tipton kangaroo rat to a less-than-significant level because it would minimize potential for individuals to enter the construction area and be injured or killed.

Mitigation Measure BIO-3: Conduct Pre-Construction Surveys and Implement Measures during Construction to Minimize Potential Impacts on American Badger and San Joaquin Kit Fox.

To minimize potential effects of project construction on American badger and San Joaquin kit fix, the District will ensure that the following measures are implemented, consistent with the *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* (USFWS 2011):

- No more than 30 days before project activities begin in a given area, a qualified biologist will conduct a pre-construction survey to determine the potential for American badger or San Joaquin kit fox to occur in the area. If potential or known dens for either species are found, exclusion zones will be established and maintained, in accordance with *the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* (USFWS 2011).
- If project activity would occur within 50 feet of a potential den (i.e., a den that is not known to be occupied), monitoring will be conducted at the potential den for 4 consecutive days. If no badger or kit fox activity is documented, project activities can proceed. If San Joaquin kit fox activity is documented, the appropriate exclusion zone will be established and maintained, in accordance with the *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox* (USFWS 2011). If it is infeasible to implement the prescribed exclusion zone, CDFW and USFWS will be consulted, and alternative measures will be implemented before project activity begins in the vicinity of the den to ensure impacts are adequately minimized. If American badger activity is documented during the natal denning season, an appropriate buffer shall be established by a qualified biologist and maintained until the kits are no longer dependent on the den.
- To prevent entrapment during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered with plywood or similar material at the end of each workday.

If the trenches cannot be closed, one or more escape ramps of no more than a 45-degree slope will be constructed of earthen fill or created with wooden planks. All covered or uncovered excavations will be inspected at the beginning, middle, and end of each day. Before trenches are filled, they will be inspected for trapped animals. If a trapped badger or kit fox is discovered, project activities will stop, and escape ramps or structures will be installed immediately to allow the animal to escape.

- All construction pipes or similar structures with a diameter of 4 inches or greater that are stored on the ground at a construction site for one or more overnight periods will be thoroughly inspected for wildlife before the pipe is buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight will be capped. If a potential San Joaquin kit fox is discovered inside a pipe, all project activities that could result in take will stop, a qualified biologist will be summoned to identify the species, and USFWS will be notified. If a San Joaquin kit fox is unable to escape voluntarily, USFWS will be contacted immediately to determine what actions should be taken to adequately minimize potential impacts.
- All food-related trash items such as wrappers, cans, bottles or food scraps generated during project activities will be disposed of in closed containers and removed daily from the Recovery Project site. No deliberate feeding of wildlife will be allowed, and no pets associated with project personnel will be permitted on the project site.

  Implementing Mitigation Measures BIO-3 would reduce the potential impact related to San Joaquin kit fox to a less-than-significant level because destruction or disturbance of occupied dens and injury or death of individuals would be avoided.

Impact BIO-2: ***Cause a substantial adverse effect on any riparian habitat or other sensitive natural community:***

Riparian habitat does not occur on or adjacent to the project site. Bush seepweed scrub occurs adjacent to the project site but would be avoided during project construction. Therefore, ***no impact*** *would occur.*

The project site and immediately adjacent areas do not support any riparian habitat, and no riparian habitat would be removed by project activities. In addition, no riparian habitat would be indirectly impacted by project implementation. Therefore, implementing the Recovery Project would have no impact on riparian habitat.

Bush seepweed scrub, a sensitive natural community, occurs adjacent to the northeast portion of the project site. Because pipeline alignments and new and replacement wells in this area were sited specifically to provide a minimum 50-foot buffer between the construction disturbance area and bush seepweed scrub, there would be no impact on this sensitive natural community.

Mitigation Measure: No mitigation is required.

Impact BIO-3: ***Cause a substantial adverse effect on state- or federally protected wetlands through direct removal, filling, hydrological interruption, or other means:***

Federally protected waters, including wetlands, do not occur on or adjacent to the project site; therefore, ***no impact*** *on federally protected wetlands would occur. On-site irrigation canals are state-protected waters, but project construction would occur when the canals are dry. This would be a* ***less-than-significant*** *impact.*

Irrigation canals on the project site are used solely for irrigation delivery and do not have a significant nexus to traditionally navigable waters; therefore, they are not protected under the CWA. The canals are, however, protected as waters of the state under the Porter-Cologne Act. Canal impacts would be limited to installing pipeline crossings *via* open trench at seven locations. However, these pipeline segments would be installed when the canals are dry, and the canals would be restored to pre-installation conditions. Consequently, there would be no impact on water quality and no change to the ditch flow, bed, channel, or bank. Therefore, impacts on state-protected waters would be less than significant.

Mitigation Measure: No mitigation is required.

Impact BIO-4: ***Interfere substantially with the movement, use of migration corridors, or use of nursery sites for any native resident or migratory fish or wildlife species:***

The project site does not include established migration corridors or nursery sites. Wildlife may move through portions of the project site, and the nearby Kern River Flood Canal is a movement corridor for terrestrial wildlife, but project implementation would not substantially interfere with wildlife movement. This would be a ***less-than-significant*** *impact.*

The project site is part of a much larger extent of agricultural lands and does not serve as a migration corridor or other primary route for fish or wildlife movement. Other agricultural lands surrounding the Recovery Project site that would not be disturbed by project implementation provide equally suitable movement opportunities. Because the on-site canals are dry for much of the year and generally barren of vegetation, they do not provide migration or movement corridors for fish or wildlife. The project site also is not known or anticipated to serve as a nursery site for any wildlife species. Small numbers of terrestrial wildlife may occasionally move through the project site in transit between areas of more suitable habitat, but this does not occur along established routes. In addition, movement is more likely to occur along the Kern River Flood Canal, which is separated from the project site by a canal and maintenance road. Because the project site is subject to regular disturbance from agricultural activities similar to disturbance levels anticipated during project construction and work would only occur during daylight hours, potential for project implementation to disrupt wildlife movement is low. Therefore, the project would not substantially interfere 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; this impact would be less-than-significant.

Mitigation Measure: No mitigation is required.

3.3 Cultural Resources

This section addresses cultural resources known or with potential to occur within the Recovery Project site. *Cultural Resources* are defined in this section as prehistoric and historical archaeological resources, architectural/built-environment resources (historic resources), places important to Native Americans and other ethnic groups, and human remains. The analysis describes the cultural setting and the methods used for assessment. This section also provides a brief overview of federal, state, and local laws and regulations pertaining to the protection of cultural resources in the County.

3.3.1 Environmental Setting

3.3.1.1 Prehistoric Setting

The chronology used for the area, the Central California Taxonomic System (CCTS), divides the prehistoric past into Early, Middle, and Late horizons, each defined more by artifact types and frequency than chronological methods. The stylistic divisions of the CCTS were further defined and incorporated with updated temporal information by Fredrickson, who proposed the Paleo-Indian, Archaic, and Emergent periods, each with associated date ranges and diagnostic artifact and burial styles (Fredrickson 1974, 1994).

The Paleo-Indian Period (11,550-8550 cal B.P.[3])

There is little evidence for terminal Pleistocene-early Holocene habitation in the Valley. Changing climate at the end of the Pleistocene brought floods, which covered much of the Central Valley with layers of alluvial soils that buried evidence of human occupation. People living in the Valley during this time are thought to have been hunters and foragers, living in small groups and travelling often from camp to camp in response to seasonal availability of resources. Sites are expected to have been primarily located along lakesides (Fredrickson 1994).

The Lower Archaic (8550-5550 cal B.P.)

The ancient shores of Tulare Lake are the nearest location for discovery of Lower Archaic period sites. In this area, north of the Recovery Project, stemmed projectile points (e.g., Borax Lake, Lake Mojave, Silver Lake, and Pinto point styles), chipped stone crescents, and bi-pointed "humpies" have been discovered (Rosenthal et al. 2007). Lower Archaic period artifacts found within the Valley are often found as isolates, without associated faunal bone or food processing tools, such as milling equipment.

The Middle Archaic (5550-550 cal B.P.)

Settlement patterns became more stable, especially along river corridors, towards the end of the Middle Archaic period (Rosenthal et al. 2007). During the Middle and Upper Archaic periods, the Windmiller Pattern was common throughout the Valley, extending south as far as Buena Vista Lake (Rosenthal et al. 2007). This archaeological pattern is identified by burial style in which individuals were interred in extended positions, oriented towards the west, and often buried with artifacts such as quartz crystals, red

[3] calibrated years before the present

pigment (ochre or cinnabar), Olivella shell beads (particularly types A1a and L), abalone (Haliotis) beads (type M) and pendants, stone pipes, charmstones, large, leaf-shaped projectile points associated with the atlatl, bone tools (e.g., awls, needles, strigles), baked-clay net weights, and ground stone tools (mortars, pestles, millingstones, and manos) (Moratto 1984).

The Upper Archaic (550 cal B.P. to cal A.D.[4] 1100)

The Upper Archaic period began at roughly the same time as the Late Holocene, ushering in a period of cooler, wetter conditions. More alluvium was deposited over the earlier archaeological sites as rivers and lakes grew and flooded. Cultural diversity and complexity both developed during the Upper Archaic, and new variation is seen in burial contexts, artifact styles, bead types, and ground stone tool forms.

While many sites dating to the Upper Archaic have been recorded in the Sacramento Valley and northern Valley, very few have been found from the southern Valley where the Recovery Project is located (Rosenthal et al. 2007).

The Emergent Period (cal A.D. 1000 to the Historic Era)

The Emergent Period was a time of economic diversity, including the expansion of trade networks, the increased social inequity, and the introduction of clamshell disc beads as a kind of currency (Fredrickson 1994). The introduction of bow and arrow technology saw several new styles of small projectile points developed; in the southern Valley, the most common of the new types were Cottonwood style points.

3.3.1.2 Ethnographic Setting

The Recovery Project is situated in the ethnographic territory of the Southern Valley Yokuts, specifically the Chuxoxi, who occupied the channels of the Kern River Delta (Wallace 1978). Neighboring Southern Valley Yokuts tribes, all within the Tulare Lake Basin, included the Wowol, Yawelami, and Hometwali. Cook estimates the population of the Southern Valley at 6,900 before European contact (Cook, 1955).

The Yokuts economy in the area depended heavily on fishing, waterfowl, and gathering shellfish, roots, and seeds. Reflecting the importance of fish resources, fish were caught in different ways: fish were dragged to shore by individuals on a tule raft using long nets attached to a pole; individuals would dive with nets; use bottomless baskets; communal drives would steer fish into stick pens; a wide, flat tule boat with a fishing hole in the center was used to spear fish; fish were also speared through holes cut in natural tule mats formed on the lakeshore. Basket traps, poisons, the bow and arrow, and spearing scaffolds were also used (Gayton 1948:14-15; Wallace 1978).

Another important resource was waterfowl. Various techniques were employed: snares and nets; shooting waterfowl from tule rafts while camouflaged; spring poles with triggers; water skipping arrows; and stuffed decoys. Eggs of waterfowl were harvested (Gayton 1948:15; Wallace 1978). Mussels were

[4] Calibrated years before the anno Domini

gathered in large amounts and steamed on tule reeds. Turtles, which were roasted, provided meat (Wallace 1978).

Plant resources were vital components of the diet and a wide variety of plant foods were used. Wild seeds and roots were a large part of the diet; tule roots were gathered, dried, pounded, and used as a flour (Gayton 1948:15; Wallace 1978). Tule, grass, and flowering herb seeds were gathered by using a seed beater and basket. Grass nuts were roasted or made into a meal. Clover was an important food as was yellow mustard, fiddle-neck, and filaree (usually eaten with salt grass). Many plants were also used as medicines. Acorns, the staple food for much of ethnographic California, was generally only available to the Tachi (Gayton 1948:15-16; Wallace 1978).

Several types of structures were built by the Yokuts in the region. The most basic were single family houses with oval floors and tule mats on a wooden frame. Communities arranged homes in a single row. There were also long, steep-roofed communal houses used by the Southern Valley Yokuts, including the Wowol, that could house up to 10 families. Interior space was partitioned by mats for individual families. Domestic activities like cooking were done underneath a shaded porch at the front of the long house. There was little in terms of furnishing inside the house, with family belongings hanging from rafters (Gayton 1948:11-13; Wallace 1978).

Tule was an important resource for the Yokuts in the region. Tule was a necessary raw material in basket weaving. Baskets were made in numerous shapes and had several uses. Some of the most common forms were bowl shapes used as food containers, burden baskets, winnowing trays, seed beaters, water bottles, and cradles (Gayton 1948:17-18; Wallace 1978).

There was no political unity between the various Southern Yokuts tribes. Local groups of about 350 individuals in associated villages made up politically autonomous units. Exact composition was not standard, some groups made up of several villages, while others were only a single village. Villages were stable and members tended to live at a village throughout the year. Groups would break up during the spring, when smaller camps would be established, and move around the landscape to gather resources (Wallace 1978).

3.3.1.3 Historic Setting

Kern County

Kern County was established in 1866 and Bakersfield became the county seat in 1874. As early as the 1770s, Spanish explorers Don Pedro Fages and Father Francisco Garces passed through the region. Father Zalvidea and Lt. Francisco Ruiz were part of another survey expedition in the early 19th century. The first Americans to travel in the area were likely fur trappers Jedediah Strong Smith and Kit Carson who entered the region in the 1820s and 1830s. In the mid-1840s, John C. Fremont led numerous expeditions through the valley (Hoover et al. 1990).

In 1851, gold was discovered near the Kern River and gold mining became a dominant activity in the County, especially in the mountains and the desert. Although mining remained important to the local economy, many of the miners eventually settled in the flatlands and turned to agriculture as a more suitable means of sustaining a living. Sheep and cattle were initially introduced to the area as much of the terrain

was inhospitable for crop farming (Kern County Centennial Observance Committee 1966:21, 23). In time, the locals constructed small canals and ditches to allow for farming. With irrigation improvements in place, farmers planted crops such as wheat, alfalfa, and cotton, and agriculture soon became the primary driver of the economy. Later, settlers introduced additional crops such as apples, wine grapes, potatoes, and nuts (Kern County Centennial Observance Committee 1966:77; Morgan 1914:151).

By the 1860s, oil was discovered in the County. Small communities grew into the towns of Whiskey Flat, later Kernville, Buttonwillow, Bakersfield, Oil City, Oil Center, and Oildale were founded near the oil fields. Further settlement was encouraged by the passage of the Desert Land Act of 1877 that promoted the development of the arid lands of the west. The Southern Pacific Railroad laid tracks near Bakersfield in 1877 and a few years later the San Francisco and San Joaquin Valley Railroad, later Santa Fe Railroad arrived in the area. Starting in the 1930s, the County became home to thousands of settlers who fled the Dust Bowl in the Midwestern U.S. (Morgan 1914:35). Agriculture and oil remained a mainstay of the County through the 20th century. Presently, the economy of the County is largely based on agriculture and petroleum extraction (Kern County Centennial Observance Committee 1966:117–118).

Irrigation

Cattle ranching and wheat farming were the predominant agricultural pursuits in the Valley in California's early years of statehood as it required little irrigation. By 1880, surveys showed that the Valley accounted for nearly half of irrigated farming in the state. Irrigation systems were typically beyond the financial means of individual farmers and arrangements related to the development of irrigation features were often made with the community and local institutions. These generally fell into four categories, private water companies, land colonies, mutual water companies, and irrigation districts representing the largest acreage and the most critical to the successful development of large-scale irrigated agriculture in the state (Hoover et al. 1990).

To curb conflicts over California's complicated water laws, the state legislature passed the Wright Act in 1887. The new law was intended to promote community values, small family-owned farms, and a democratic control by water users (Hundley 1992:98). The Act authorized the creation of irrigation districts, which were defined as special units of local government consisting of more than 50 people, or a majority of the local landowners. The Act also provided the irrigation districts with the power of eminent domain, power to overcome riparian rights by condemnation suits, and the ability to sell bonds to finance the purchase of water rights and the construction of irrigation features (Hoover et al. 1990). Within 2 years, California was the nation's leader in irrigated agriculture. Nonetheless, irrigation districts faced considerable barriers from large, litigious landowners.

Irrigation in the San Joaquin Valley

The Valley contains the southern two-thirds of California's Central Valley. Irrigation transformed the Valley landscape and created one of the nation's most productive agricultural region. During the 1850s and 1870s, most settlers in the Valley were not interested in irrigated agricultural as they were concentrating on cattle ranching or dry wheat farming. Cattle barons Miller and Lux amassed a vast amount of land in the Valley for their cattle ranching empire that included large-scale irrigation of 150,000 of their 700,000 acres, for pasturage (Galloway and Riley 1999:23).

By the early 20th century, much of the flow of the Kern River was redirected through canals and ditches and by 1910 all the surface-water supplies in the Valley was diverted, which resulted in the development of ground-water resources. These wells gradually depleted the water levels, which then led to the requirement of pumps to bring the water to the surface. By 1955, nearly one-fourth of the total ground water obtained for irrigation in the U.S. was pumped in the Valley, a trend that continued into the 1960s. With the completion of federal and state projects, including the Delta-Mendota Canal, Friant-Kern Canal, and the Aqueduct, cheaper water was available to irrigate agricultural crops (Galloway and Riley 1999:23-24, 27-29).

Buena Vista Water Storage District

Miller & Lux preferred a separate water district despite the 1920 recommendation of the State Engineer (Giefer 1967:78). In 1922, a petition was filed to create the BVWSD under the 1921 California Water Storage District Act. At the time of the petition the district included 125,890 acres. In 1923, the state concluded that as proposed, the BVWSD did not meet a reasonable standard of feasibility, practicality, and utility. After a 1924 survey of the land by the state, Miller & Lux's attorney, and their superintendent, Miller & Lux agreed to remove the land north of Wasco Road from the district because their superintendent agreed that the alkali content of the land made it non-irrigatable. The petition was approved in 1924 (Giefer 1967:87-89). The BVWSD was organized to achieve flood control, drainage, and irrigation of the land northwest and southeast of Buttonwillow. When it was created the BVWSD overlapped with Reclamation District 2055 (Bonte 1930:215). Miller & Lux linked water rights to their land within District 2055 so that future sales could be made. They also exchanged bonds with District 2055 for their existing canals and sold other bonds for the construction of future canals (Giefer 1967:90-91).

BVWSD has improved the canals and ditches that were originally constructed by Miller & Lux and developed new facilities over time for the surrounding agricultural purposes. Most of these water features are earthen and have concrete turnouts and gates added as necessary. The drains, ditches, and canals in the Area of Potential Effects were constructed in the early to mid-20th century. The structures, maintained by BVWSD, are shaped twice a year and excavated between every 5 and 10 years.

3.3.2 Regulatory Framework

3.3.2.1 Federal Plans, Policies, Regulations, and Laws

National Historic Preservation Act

Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR Part 800 describe the process that a federal agency must take to identify cultural resources and assess the level of effect that a proposed undertaking would have on historic properties. This project is not considered a federal undertaking; however, if federal funding or permits are required, compliance with the National Historic Preservation Act will be required.

The NRHP is the nation's master inventory of known historic resources and includes listings of buildings, structures, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, and local levels. Properties that are eligible for listing on the NRHP

must be at least 50 years old, unless a property possesses exceptional significance, and must meet at least one of the following criteria (36 CFR 60):

A. Is associated with events that have made a significant contribution to the broad patterns of our history

B. Is associated with the lives of persons significant in our past

C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components might lack individual distinction

D. Has yielded, or may be likely to yield, information important in prehistory or history.

Individually eligible properties and historic districts must retain key character-defining features, or integrity, to convey their significance as a resource. Integrity specifically refers to the ability of a property to convey its significance. In other words, a historic property must have enough intact physical characteristics or features to communicate its significance under one or more of the NRHP criteria.

3.3.2.2 State Plans, Policies, Regulations, Laws

California Environmental Quality Act

CEQA requires that public or private projects financed or approved by public agencies assess the effects of the Recovery Project on historical resources. CEQA also applies to effects on archaeological sites that may be included among "historical resources" as defined by CEQA Guidelines § 15064.5, subdivision (a), or may be subject to provisions of PRC § 21083.2, which governs review of "unique archaeological resources." Historical resources are those meeting the following requirements:

- Resources listed in or determined eligible for listing in the California Register of Historical Resources (CRHR) (CEQA Guidelines § 15064.5[a][1]). Note that CRHR-eligible resources include resources listed on or eligible for the NRHP (PRC § 5024.1)
- Resources included in a local register as defined in PRC § 5020.1(k), "unless the preponderance of evidence demonstrates" that the resource "is not historically or culturally significant." (CEQA Guidelines § 15064.5[a][2])
- Resources that are identified as significant in surveys that meet the standards provided in PRC § 5024.1[g] (CEQA Guidelines § 15064.5[a][3])
- Any object, buildings, structure, site, area, place, record, or manuscript that the lead agency determines are significant, based on substantial evidence (CEQA Guidelines § 15064.5[a][3])

The fact that a resource is not listed in, or determined to be eligible for listing in, the CRHR; not included in a local register of historical resources; or identified in an historical resource survey does not preclude a CEQA lead agency from determining that the resource may be an historical resource as defined in PRC § 5020.1(j) or 5024.1 (CEQA Guidelines § 15064.5[a][4]).

Cultural resources are significant and considered "historical resources" for the purpose of CEQA if they meet any of the following criteria for listing in the CRHR and possess integrity:

- Are associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage, or the U.S. (CCR Title 14, § 4852[b][1])
- Are associated with the lives of persons important in our past (14 CCR § 4852[b][2])
- Embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of an important creative individual, or possess high artistic values (14 CCR § 4852[b][3])
- Yield, or may be likely to yield, information important in prehistory or history (14 CCR § 4852[b][4])

Unique archaeological resources, on the other hand, are defined in PRC § 21083.2 as a resource that meets at least one of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information
- Has a special and particular quality such as being the oldest of its type or the best available example of its type
- Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC § 21083.2[g])

CEQA requires that if a project results in an effect that may cause a substantial adverse change in the significance of an historical resource or would cause significant effects on a unique archaeological resource, then the Recovery Project may have a significant impact under CEQA (CEQA Guidelines § 15064.5[b]) and alternative plans or mitigation measures must be considered. A substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired. The significance of an historical resource is materially impaired if the project demolishes or materially alters any qualities that justify the:

- Inclusion or eligibility for inclusion of a resource on the CRHR (CEQA Guidelines § 15064.5[b][2][A],[C])
- Inclusion of the resource on a local register (CEQA Guidelines § 15064.5[b][2][B])

Assembly Bill 52 (AB 52)

AB 52, effective on July 1, 2015, amended CEQA and added sections relating to Native American consultation and certain types of cultural resources, Tribal Cultural Resources (TCRs). TCRs are either (1) sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that is either on or eligible for inclusion in the CRHR or a local historic register; or (2) the lead agency at its discretion and supported by substantial evidence, chooses to treat the resource as a TCR. Additionally, a cultural landscape may also qualify as a TCR if it meets the criteria to be eligible for inclusion in the CRHR and is geographically defined in terms of the size and scope of the landscape. Other historical resources (as described in California PRC 21084.1), a unique archaeological resource (as defined in California PRC 21083.2[g]), or non-unique archaeological resources (as described in California PRC 21083.2[h]) may also be TCRs if they conform to the criteria to be eligible for inclusion in the CRHR.

California PRC § 21084.2 provides that a project with an effect that may cause a substantial adverse change in the significance of a TCR may have a significant effect on the environment. California PRC Section 21080.3.1 (b) requires the lead agency to begin consultation with California Native American Tribes that are traditionally and culturally affiliated with the geographic area of the Recovery Project if the tribe requests the lead agency, in writing, to be informed by the lead agency through formal notification of projects that are proposed in that geographic area and the tribe subsequently requests consultation. California PRC Section 21084.3 states that, "public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource."

AB 52 explicitly recognizes,

> …that California Native American tribes may have expertise with regard to their tribal history and practices, which concern the tribal cultural resources with which they are traditionally and culturally affiliated. Because the California Environmental Quality Act calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources.

AB 52 and California PRC Section 21080.3.1 and Section 21080.3.2 therefore includes requirements for meaningful consultation with culturally and geographically affiliated Tribes to identify TCRs and to develop avoidance or mitigation as appropriate.

3.3.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

Kern County General Plan

The Kern County General Plan (2009) includes the following policies that pertain to cultural resources and are relevant to this analysis.

Archaeological, Paleontological, Cultural, and Historical Preservation

- Policy 25. The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.
- Implementation Measure K. Coordinate with the California State University, Bakersfield's Archaeology Inventory Center.
- Implementation Measure L. The County shall address archaeological and historical resources for discretionary projects in accordance with the CEQA.
- Implementation Measure N. The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. The notification will be accomplished through the established procedures for discretionary projects and CEQA documents.
- Implementation Measure O. On a project specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document.

3.3.3 Environmental Impacts and Mitigation Measures

3.3.3.1 Thresholds of Significance

Significance criteria are based on Appendix G of the CEQA Guidelines. A project alternative would have a significant impact on cultural resources if implementing the alternative would either:

- have a substantial adverse change in the significance of an historical resource because of physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired
- materially impair the significance of an historical resource because of the demolition or alteration of qualities that justify the inclusion or eligibility for inclusion of a resource on the CRHR or a local register

3.3.3.2 Analysis Methodology

Records Search

On June 14, 2019, GEI Consultants, Inc. archaeologist Matthew Chouest, Registered Professional Archeologist (RPA), submitted a records search request of the Recovery Project area and a surrounding 0.5-mile- radius at the Southern San Joaquin Valley Information Center (S.S.J.V.I.C.). The records search included a review of S.S.J.V.I.C.'s USGS 7.5-minute topographic base maps indicating previously conducted investigations and previously reported cultural resources, Department of Parks and Recreation 523 forms, and California Historic Landmarks documentation.

The records search identified 50 previously recorded cultural resources within 0.5-mile of the project area. Five previous investigations have been conducted within the project area and nineteen previous studies have been conducted within 0.5-mile of the project area.

Pedestrian Survey

GEI archaeologists Matthew Chouest, RPA, and Traci O'Brien conducted a pedestrian survey from June 7 to 9, 2019, of the proposed 22 miles of new conveyance pipeline alignment and nine new well sites in the southern Valley approximately 10 miles west of Bakersfield.

The pedestrian survey provided coverage of the proposed conveyance pipeline alignment to be installed in or adjacent to paved and dirt access roads. The roadway along with the accessible adjacent right-of-way that ranged from a few feet wide to approximately 30 feet wide was examined. The survey area covered the area between the edge of the road or canal up to existing agricultural cultivation or a fence line. Archaeologists walked both sides of the road or canal and wider areas were covered in 15-meter transects. In addition, the locations for the proposed nine new wells were examined along with a 100-foot-radius surrounding the well site.

No previously unrecorded cultural resources were identified during the pedestrian survey and a total of five historic-era (45 years old or older) built environment resources were identified in the project area: the East Side Canal, the West Side Canal, the Main Drain, and two unnamed canals in the western part of the project area. In 2018, the East Side Canal was determined ineligible for the NRHP and CRHR. The West Side Canal, Main Drain, and the unnamed canals were evaluated for CRHR significance and because of a

lack of integrity and significance they do not meet CRHR criteria. The five water features are also not considered historical resources for the purposes of CEQA.

Native American Contacts

In consistency with AB 52, BVWSD send a letter to the Torres Martinez Desert Cahuilla Indians Tribe (Tribe) on July 16, 2020. The letter invited the Tribe to consult on the project and gave a brief description of the project and its location. No response was received from the Tribe as of the publication of this document. There are no identified Tribal Cultural Resources in the project.

3.3.3.3 Impact Analysis

Impact CUL-1: ***Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5.***

It is possible that there are unidentified historical or archaeological resources within the project area that have not been identified that may be impacted by project-related, ground-disturbing activities. Therefore, implementing the project would result in a ***potentially significant*** *impact.*

No historical resources were identified during the pedestrian survey, however, the records search identified 50 prehistoric and historic-era resources within 0.5-mile of the Recovery Project area, several in proximity to the project alignment. It is possible, therefore, that buried, unidentified historical or archaeological resources may be impacted by project activities.

Mitigation Measure CUL-1: Implement a Worker Environmental Awareness Program

Prior to project-related, ground-disturbing activities a Program will be implemented which will include all construction personnel. Once the project begins, any new personnel will undergo the Program prior to beginning work. The Program will include information regarding what constitutes cultural resources, what procedures to follow if there is an inadvertent cultural resources find, who to contact if there is an inadvertent find, brief description of applicable laws, and all participants will receive a brochure summarizing the Program with appropriate contact information. The Program may be delivered either in person, remotely *via* teleconferencing, or electronic format.

Timing: Prior to construction work.

Responsibility: Buena Vista Water Storage District

Mitigation Measure CUL-2: Address Previously Undiscovered Historical, Archaeological, and Tribal Cultural Resources

BVWSD shall implement measures to reduce or avoid impacts on undiscovered historic properties, archaeological resources, and tribal cultural resources. If buried or previously unidentified historic properties or archaeological resources are discovered during project construction, all work within a 100-foot-radius of the find shall cease. BVWSD shall retain a professional archaeologist meeting the Secretary of the Interior's Professional Standards for Archaeologists to assess the discovery and recommend what, if any, further treatment

or investigation is necessary for the find. Interested Native American Tribes will also be contacted. Avoidance is the preferred CEQA treatment for cultural resources. If avoidance is not possible, any necessary treatment/investigation shall be developed in coordination with interested Native American Tribes providing recommendations to BVWSD and shall be completed before project activities continue in the vicinity of the find.

Timing: During construction work.

Responsibility: Buena Vista Water Storage District

Significance after Mitigation: The impact would be diminished to less-than-significant with implementation of the mitigation measures because any currently unidentified cultural resources would be identified and avoided, if possible, or treatment measures developed which would mitigate any impacts.

Impact CUL-2: ***Disturb any human remains, including remains interred outside of dedicated cemeteries.***

It is possible there are buried, undiscovered human remains that may be impacted by project-related, ground-disturbing activities. Therefore, implementing the project would result in a ***potentially significant*** *impact.*

No human remains were identified during investigation efforts for the Recovery Project. Human remains, however, have been reported in an agricultural field within 100 feet north of the project area. Given the proximity of the reported human remains, it is possible that buried, undiscovered human remains are within the project area.

Mitigation Measure CUL-3: Avoid potential effects on undiscovered burials.

If human remains are found, BVWSD will be immediately notified. The California Health and Safety Code requires that excavation be halted in the immediate area and that the County coroner be notified to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code § 7050.5[b]). If the coroner determines that the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) by telephone within 24 hours of making that determination (Health and Safety Code, § 7050.5[c]).

Once notified by the coroner, the NAHC shall identify the person determined to be the Most Likely Descendant (MLD) of the Native American remains. With permission of the legal landowner(s), the MLD may visit the site and make recommendations regarding the treatment and disposition of the human remains and any associated grave goods. This visit should be conducted within 24 hours of the MLD's notification by the NAHC (PRC § 5097.98[a]). If a satisfactory agreement for treatment of the remains cannot be reached, any of the parties may request mediation by the NAHC (PRC § 5097.94[k]). Should mediation fail, the landowner or the landowner's representative must reinter the remains and associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance (PRC § 5097.98[b]).

Timing: During construction activities

Responsibility: Buena Vista Water Storage District

Significance after Mitigation: The impact would be reduced to less-than-significant because any currently unidentified human remains would be identified during construction and the human remains undergo treatment as proscribed by state law and recommendations provided by the MLD.

Impact CUL-3: ***Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5 in project areas that have not been analyzed.***

It is possible there are buried, undiscovered human remains that may be impacted by project-related, ground-disturbing activities in project areas that have not yet been analyzed. Therefore, implementing the project would result in a ***potentially significant*** *impact.*

Approximately 2.6 miles of the pipeline alignment located in the northeast portion of the Recovery Project area could not be analyzed because of access issues. No cultural resources were identified during the records search in that area and no cultural resources were identified during the pedestrian survey that did occur within 100 feet of the Recovery Project area. A prehistoric site with reported burials, however, is located nearby. With cultural resources in proximity, it is possible that buried, undiscovered historical resources or archaeological resources are within the project area.

Mitigation Measure CUL-4: Investigate for the presence of historical resource or an archaeological resource pursuant to CCR Section 15064.5 and for the presence of human remains, including remains interred outside of dedicated cemeteries.

Prior to commencement of ground-disturbing, project-related activities, a cultural resources pedestrian survey will be conducted in all project areas that could not be accessed earlier. The records search that was originally conducted for the project covers the unaccessed areas, therefore an additional records search is not necessary. If cultural resources or human remains are identified during the pedestrian survey, then Mitigation Measures CUL-2 and CUL-3 will be implemented, as appropriate.

Timing: Prior to construction activities

Responsibility: Buena Vista Water Storage District

Significance after Mitigation: The impact would be reduced to less-than-significant because any identified historical resources, archaeological resources, or human remains would be addressed by Mitigation Measures CUL-2 and/or CUL-3.

3.4 Hydrology and Water Quality

3.4.1 Environmental Setting

3.4.1.1 Surface Water

The project site is located in the Tulare Lake Basin, in the South Valley Floor Hydrologic Unit, in the Semitropic Hydrologic Area, as designated by the Central Valley RWQCB (2018). In accordance with CWA Section 303, water quality standards for this basin are contained in the Water Quality Control Plan for the Tulare Lake Basin.

The District, established in 1924, is a public agency, which supplies surface water from the Kern River and SWP *via* the Aqueduct and pumps groundwater to agricultural customers, primarily. The District's principal source of surface water is the Kern River. The Kern River originates in the southern Sierra Nevada and flows in a south and southwesterly direction to the Central Valley northeast of Bakersfield. The District has utilized Kern River water under a schedule of long-standing diversion rights. BVWSD controls an average entitlement of approximately 150,000 acre-feet per year (AFY) of surface water from the Kern River, based on the Miller-Haggin Agreement of 1888. Kern River water is conveyed to the Second Point of Measurement *via* the Kern River Canal and is diverted at this location to the District's Alejandro Canal or the Kern River Channel. Water is also wheeled through the Aqueduct through exchanges with Kern River contractors further upstream.

The Kern River has a number of listed beneficial uses, including municipal supply, agricultural supply, industrial supply, industrial process, hydropower generation, contact and non-contact recreation; warm freshwater habitat; wildlife habitat; rare, threatened or endangered species; and groundwater recharge. The Kern River is not listed as an impaired water body because none of the water quality parameters to support beneficial uses exceed regulatory action levels (RWQCB 2018). Surface water quality in the Kern River is good, with concentrations for all constituents below their maximum contaminant levels (MCLs) (**Table 3-4**).

SWP water is supplied from the Sacramento/San Joaquin Delta area and is delivered through the Aqueduct to Kern County and other areas. In 1973, BVWSD contracted with the KCWA for an additional surface water supply from the SWP delivered *via* the Aqueduct. The contract provided for an annual firm supply of 21,300 AFY (Table A) and a supply of 3,750 AFY (Article 21). Over the period from 1995 through 2005, water imported *via* the SWP supplied 36 percent of the surface water available to the District, with the Kern River being the source of the remaining 64 percent (BVGSA 2020).

Available water quality data for water in the Aqueduct closest to the Palms Project was evaluated. Since Improvement District No. 4 receives their water from four sources, one being the Aqueduct with water quality samples collected at Tupman, results presented in KCWA Improvement District No. 4, Report on Water Conditions for years 2017, 2019, and 2020 were used for this evaluation. **Table 3-4** provides a summary of results from the Aqueduct at Tupman. Using this sampling location provides a representation of the Aqueduct water quality near the Palms Project.

Table 3-4. Summary of Water Quality in Kern River and California Aqueduct (at Tupman)

Constituent	Drinking Water Standard	Kern River	Aqueduct	Units
Arsenic	10	ND	ND - 3	µs/cm
Chloride	250 – 500	3 – 4	30 – 47	ppm
Conductivity	900 – 1,600	119 – 185	246 – 396	µs/cm
Sodium	DWR = 200	9 – 17	23 – 44	ppm
Sulfate	250 - 500	8 – 16	22 – 37	ppm
TDS	500 – 1,000	90 – 113	140 – 238	ppm
Boron	NL= 1	ND – 0.13	ND – 0.15	ppm
Hardness	Very Hard > 181	38 – 54	58 – 82	ppm

Notes: ppm = parts per million; µs/cm = microSiemens per centimeter; NL= notification level; DWR = California Department of Water Resources; TDS = total dissolved solids, ND= not detected
Data obtained from Kern County Water Agency Improvement District No. 4, Report on Water Conditions – Table 13 for years 2017, 2019, and 2020. Aqueduct samples collected near Tupman, CA.

The water conveyance systems in and around BVWSD consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals and drains that deliver surface water to, and collect runoff from, the lands within BVWSD. BVWSD provides water to two service areas, the larger is the Buttonwillow Service Area to the west and the smaller is the Maples Service Area to the southeast (*refer to* **Figure 2-1**). Altogether, there are approximately 60 miles of pipelines, 5 miles of lined canals, 152 miles of unlined canals and 42 miles of drainage ditches within BVWSD with seepage from the unlined canals recharging groundwater. BVWSD operates all of the water conveyance and control facilities within its service area and maintains flow records for each reach of District canal.

The proportion of surface water and groundwater used on an annual basis varies widely depending on hydrologic conditions, and over the years, regulatory requirements have impacted the availability of imported water. Environmental constraints on pumping from the Sacramento/San Joaquin River Delta have limited the reliability of SWP supplies. Typically, surface water supplies meet the majority of the District's water demand, the remaining water demands are met from district- and privately-owned wells.

3.4.1.2 Groundwater Resources

The project site is in the San Joaquin – Kern County Groundwater Subbasin (#5-022.14), as designated by DWR Bulletin 118 (DWR 2016). The site is located within a groundwater basin designated as "High Priority" or "Critically Overdrafted" (DWR 2019). Because of the status of the Kern County Groundwater Subbasin, water agencies in the subbasin are among the first to be required to complete GSPs and to implement SGMA. As part of this effort, new GSAs were formed with the responsibility to bring the Subbasin into compliance with SGMA by 2040. As part of this effort, the BVGSA was formed in 2015 and the BVGSA submitted its GSP to DWR in January 2020 along with four other GSAs in the Kern Subbasin. The following is a brief description of the BVGSA.

Buena Vista Groundwater Sustainability Agency

The BVGSA covers an agricultural area of the County located in the trough of California's southern Valley approximately 16 miles west of the city of Bakersfield. The boundaries of the BVGSA coincide closely with those of the District (*refer to* **Figure 2-3**).

The BVGSA is bordered by the following GSAs:

- Kern Groundwater Authority GSA
- Kern River GSA
- West Kern Water District GSA
- Semitropic Water Storage District GSA

The BVGSA is made up largely of reclaimed swamp lands in and along the pre-development course of the lower Kern River which, after exiting the Southern Sierra Nevada mountains and flowing south and then southwest across the southern Valley, runs through the topographic axis of the valley toward its terminus at a drainage basin which was once Tulare Lake. The water conveyance systems in and around the GSA consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals for delivery of surface water. Of the GSA's total area of 50,560 acres, approximately 46,600 acres receive water service from the BVWSD. Of that acreage approximately 35,000 acres are farmed each year, primarily in tree and row crops, with this number fluctuating based on factors including water supply and market conditions. The GSA also encompasses the Community of Buttonwillow, three other public water systems and domestic users all of whom rely entirely on groundwater for domestic, municipal and commercial users (BVWSD 2020).

The BVWSD has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Prior to the construction of the SWP, the Kern River was the BVWSD's sole source of surface water. Kern River water is now stored in Lake Isabella for release in response to water orders from the District. With construction of the SWP regulated diversions from the Kern River have been supplemented by schedulable deliveries from the Aqueduct, which runs immediately to the west of the GSA (BVGSA 2020).

Conjunctive management within the BVGSA begins with deliveries of surface water from the Kern River and the Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands. Thus, during years when supplies are above average, surface water is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the BVGSA takes place through seepage from facilities constructed by the BVWSD including canals, laterals and recharge basins. By contrast, due to the low infiltration rate of topsoils in the area, deep percolation of precipitation and irrigation water from farmland is not an important contributor to recharge.

Groundwater Monitoring

DWR's GSP regulations and guidance documents require that monitoring networks be established to monitor each relevant sustainability indicator within the GSA. BVWSD has been monitoring groundwater levels since the early 1990s. Monitoring performed by the BVWSD provides information on diversions of surface water from the Kern River and the SWP, deliveries to users, and groundwater extractions recorded by meters installed on all District and landowner production wells. Additional monitoring is performed by the Buena Vista Coalition to carry out their Groundwater Quality Trend Monitoring Work

Plan in compliance with the Irrigated Lands Regulatory Program. Monitoring is also carried out by the public water agencies within the GSA, notably the Buttonwillow County Water District which serves the Community of Buttonwillow.

BVWSD's groundwater monitoring network and protocols were evaluated and revised during the development of the Buena Vista Groundwater Sustainability Area's GSP and are described in detail in the GSP (BVWSD 2020). The objective of the BVGSA monitoring networks is to gather spatial and temporal data on parameters including groundwater levels, groundwater quality, and land surface elevations sufficient to characterize groundwater conditions as defined by locally established MOs and undesirable results.

The monitoring networks are intended to monitor four relevant undesirable results:

- Chronic lowering of groundwater levels
- Reduction in groundwater storage
- Degraded groundwater quality
- Land subsidence

Groundwater Level Conditions in the Project Area

Groundwater levels in areas north and west of the Recovery Project[5] show a relatively stable to slightly declining trend from 1970 to 2000. Following 2000, groundwater levels have declined by upwards of 100 feet through 2017. It should be noted that this period represents a time of unusually dry climatic conditions culminating in a statewide historic drought period from 2012 through 2016. The drought caused reductions in the local and imported water supplies available to the County which caused an increased demand on groundwater. Hydrographs grouped by geographic location, to the north, east, and in close proximity to the Recovery Project, are shown on **Figure 3-6**.

The middle and lower graphs on **Figure 3-6** shows that groundwater level data for wells in close proximity and to the east of the Recovery Project are generally similar. Overall, the groundwater levels show a variable trend from 1960 to 1993. However, increased banking by BVWSD, WKWD and other nearby agencies following 1993 shows a significant increase in groundwater levels from 1993 to 2000. As noted above, the unusually dry climatic conditions from 2000 to 2016 produced a general declining trend in groundwater levels. However, significant increases are noted in 2005 and 2011 as a result of increased groundwater banking during these unusually wet years due to the increased short-term availability of local and imported surface water supplies.

Multiple researchers have found that the area around the Palms Groundwater Recharge Project and the Recovery Project (the south end of the District, near the Tule Elk Preserve, Eastside Canal, and Main Canal) is hydraulically connected to areas to the south and east (ESA 2010). Groundwater flow directions

[5] Water level measurements were obtained from DWR's state-wide water level database, and from BVWSD who has measured groundwater levels in nearby wells between two and four times a year since about 1993.

are interpreted from groundwater elevation contours. **Figure 3-7** shows regional groundwater level contours for 2015 for BVWSD (GEI 2017; BVWSD 2016). The groundwater elevations near the Recovery Project are lower than areas to the northwest of the project, indicating that water generally flows in a southeasterly direction. Local groundwater flow direction near the Recovery Project appears to be in an easterly direction. **Figure 3-7** shows that groundwater elevations in the vicinity of the Recovery Project where groundwater levels range from 160 feet above mean sea level (msl) to the west to 110 feet in the southeast corner of the Buttonwillow Service Area. Chapter 9.7 – Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis, includes a detailed analysis of groundwater levels and flow directions in the project area. **Figure 3-8** shows the depth to groundwater map for BVWSD (GEI 2017; BVWSD 2016). In the Recovery Project vicinity, depth to groundwater ranged from over 180 feet below ground surface (bgs) in the southeast to about 130 feet bgs to the northwest. This provides an indication of the potentially available capacity for aquifer storage at the Recovery Project site.

While most of the groundwater pumping within BVWSD is attributable to on-farm pumping from approximately 200 privately-owned wells, BVWSD maintains and operates seven production wells within BVWSD with an eighth well lying outside BVWSD's boundaries along the Alejandro Canal near the Kern River Channel. The majority of irrigation wells in BVWSD are completed to depths between 200 and 600 feet bgs with perforated intervals extending from around 150 feet bgs to the bottom, in a 21-inch-diameter (minimum) bore hole, however none are known to be perforated below the Corcoran Clay. Pumping lifts vary with hydrology and location; however, the average lift has been approximately 100 feet in recent years with pumping lifts being the greatest in the southern portion of the GSA, the area where the Palms Project is located (BVWSD 2014, 2016, 2020).

Figure 3-6. Regional Groundwater Trends near Recovery Project

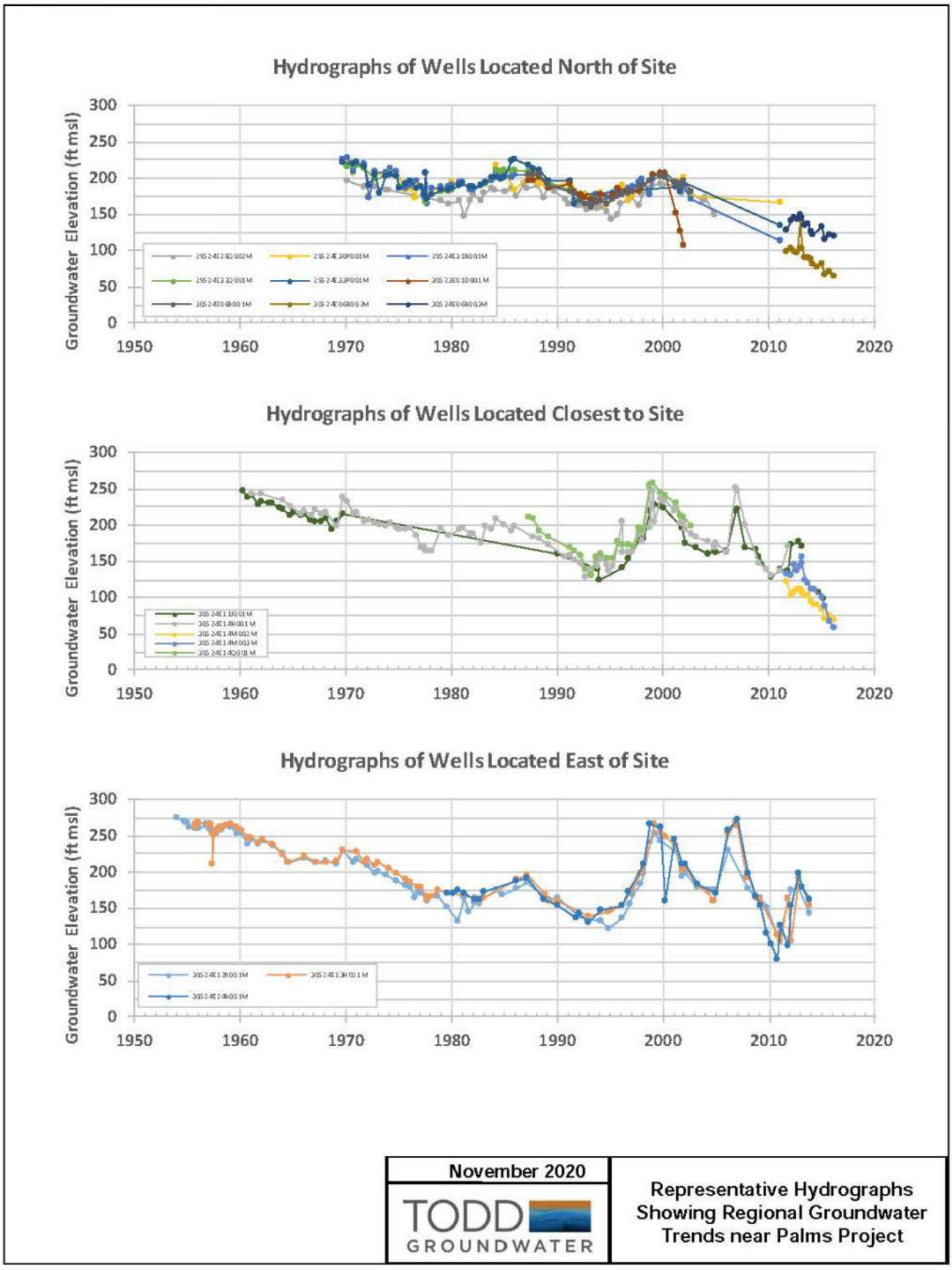


Figure 3-7. Groundwater Elevation Map of the Buena Vista Water Storage District

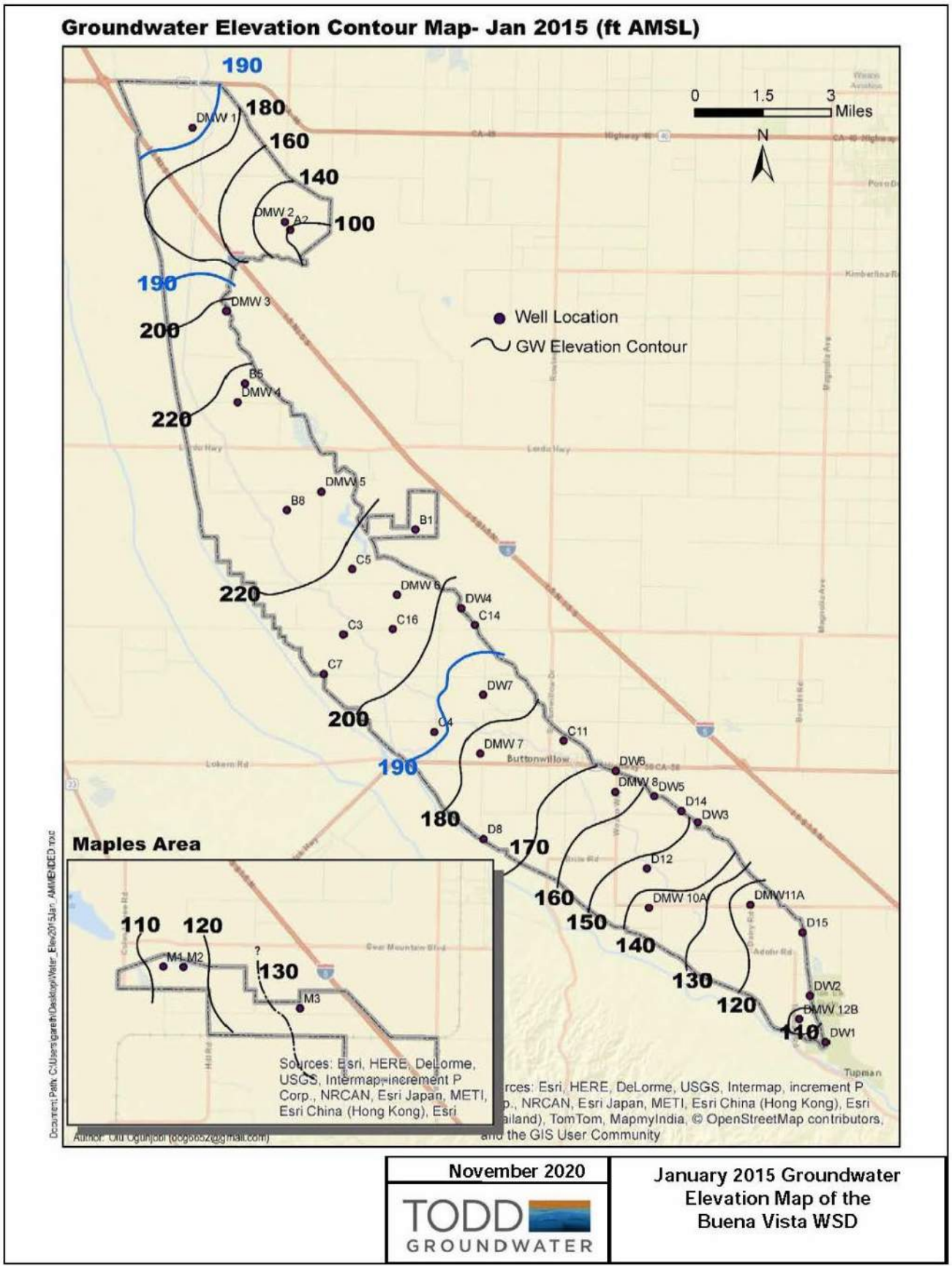
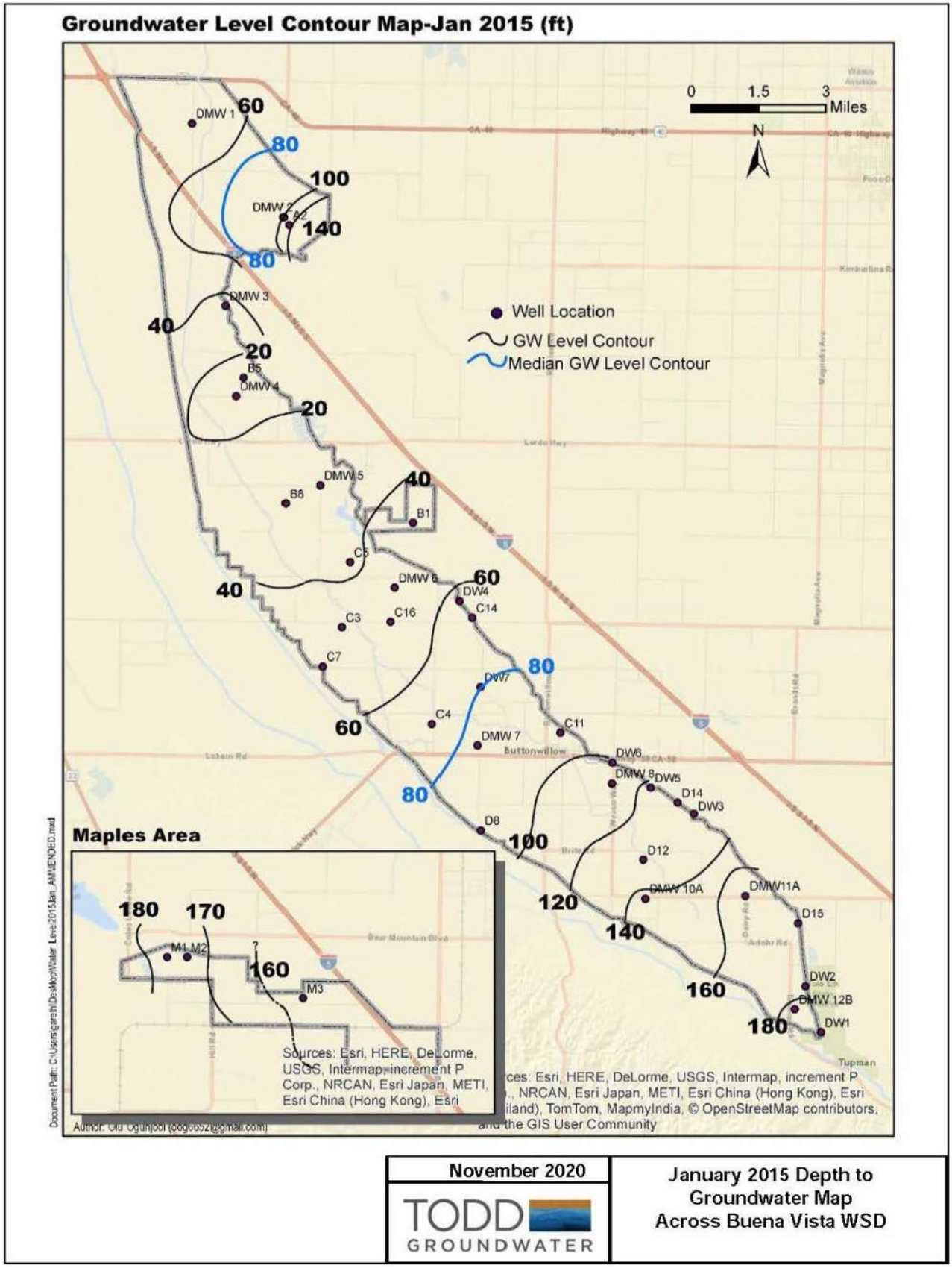


Figure 3-8. Depth to Groundwater, Buena Vista Water Storage District



3.4.1.3 Groundwater Quality

Groundwater in the southern Central Valley can be divided into three groups based on geography: east side, west side, and axial trough (Dale et al. 1966). The Recovery Project is at the western extent of the axial trough bordering the west side of the southern Central Valley. The boundary between the axial trough and west side groundwater may be the District's western border (RWQCB 1986). Consequently, groundwater quality tends to maintain the sulfate-rich characteristics of infiltration from the Coastal/Temblor Range as well as bicarbonate characteristics of the axial trough as it is a mixture of east side and west side groundwater.

To characterize the localized conditions of groundwater quality in the Recovery Project area, water quality from various wells located either within or around the Recovery Project area was evaluated. Wells evaluated were BVWSD's production and monitoring wells, private landowner wells, WKWD's production wells, and a KWBA monitoring well. Historical data was used in the evaluation, however there is a limited amount of data available that is representative of the portion of the Recovery Project area underlying the Palms Project area.

The boundaries for this water quality evaluation are Stockdale Highway on the north, BVWSD's southern boundary on the south, Dunford Road on the west, and Morris Road on the east. The Recovery Project area is divided into two areas – the western area underlying the Palms Project area and the eastern parcels of the Recovery Project area, with the East Side Canal serving as the dividing line.

Monitoring well DMW-13 middle zone was used to represent groundwater quality west of East Side Canal. This well was selected as being representative since it was determined that the newly-constructed Project wells would extract from the middle portion of the aquifer and water quality data for this well is the most representative of the future recovery wells. This is a newer constructed monitoring well, therefore only three sets of sample results were available ranging from one set of results in 2018 and two sets in 2020. Results in 2018 included more constituents, although not a complete set of Title 22 results. In 2020, a limited set of analysis was conducted for arsenic, hardness, EPA 504, gross alpha, agricultural suitability, mass balance, Sodium Adsorption Ratio, total dissolved solids (TDS), and 1,2,3-trichloropropane (TCP).

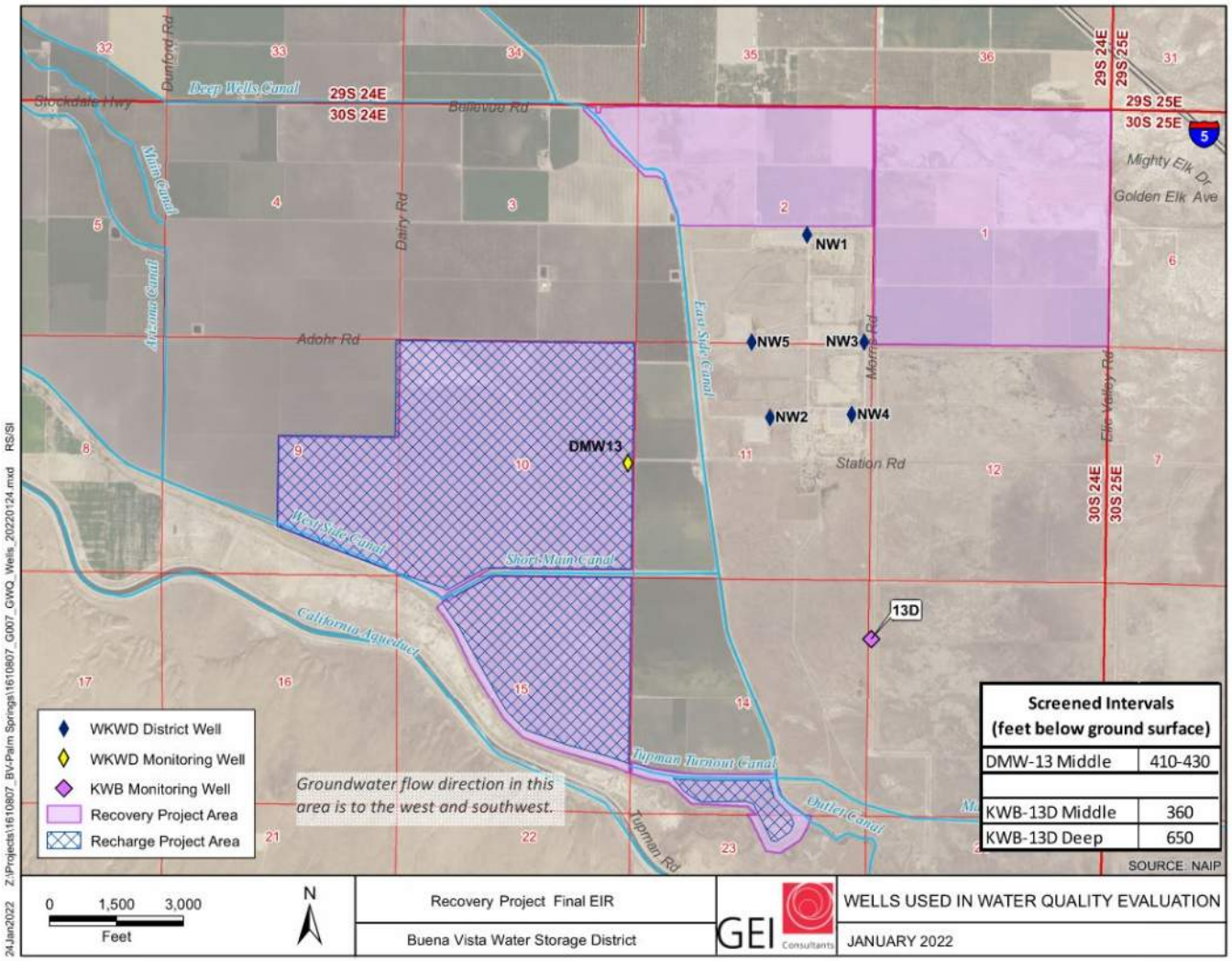
For the wells representing eastern parcels of the Recovery Area, there were five public drinking water wells from WKWD and one monitoring well from KWBA. Since the WKWD wells are regulated by DDW, results are at a more consistent frequency of once every three years. Based on DDW's Drinking Water Database, it appears the WKWD wells used in this evaluation are new since the wells were activated in 2012 and the first sample results are from 2012. Therefore, WKWD available results were from 2012 through 2019.

KWBA well 13D has historical data from early 1990s. KWB 13D has three nested wells representing shallow, middle, and deep. Similar to earlier discussions on the omission of DMW 13 shallow, KWB 13D shallow results were not used for the analysis. For most constituents, it appears samples are conducted annually. However, monitoring is not always consistent among the nested well, especially for the middle zone. Therefore, all historical data was used to have a larger dataset. Full Title 22 results do not appear to available, although a review of available data shows organics such as Volatile Organic Compounds and

Synthetic Organic Compounds may have been sampled in the early 1990s with no results after 1994. For the constituents of concern in the Project Area, results were available for KWB 13D.

At a minimum, sample results for agricultural suitability analysis were available for all wells. Complete Title 22 sample results were available for WKWD wells (NW-1 through NW-5). Title 22 drinking water standards are regulated by State Water Board – Division of Drinking Water.

Figure 3-9. Map of Water Quality Data Sources



In general, groundwater in the Recovery Project area meets drinking water standards and agricultural thresholds (**Table 3-5**). Agricultural thresholds, as established by Ayers and Westcot (1985), are not regulated but are used as a numerical reference for the suitability of water for irrigation use. These thresholds "contain criteria protective of various agricultural uses of water, including irrigation of various types of crops and stock watering. At or below the thresholds presented in the Water Quality Goals database, agricultural uses of water should not be limited" (Ayers and Westcot, 1985).

As shown in **Table 3-5**, water quality is comparable between DMW-13 and wells east of the East Side Canal. All constituents of concern are within the primary and secondary drinking water limits but salinity

is higher than the conservative agricultural thresholds recommended by Ayers and Westcot; however, these wells are currently used for irrigation and are suitable for crops with a moderate salt tolerance that are presently planted in the District.

Table 3-5. Water Quality Constituents of Concern in the Project Area

Constituent	Drinking Water Standard	Agricultural Threshold	West of East Side Canal - Average	West of East Side Canal - Max	East of East Side Canal – Average	East of East Side Canal – Max
Antimony (ppb)	MCL = 6	N/A	0	0	0.7 Average	5 Max
Arsenic (ppb)	MCL = 10	100	0	0	2.7 Average	5.6 Max
Bromide (ppm)	N/A	N/A	0.75	0.75	0.09 Average	0.1 Max
Boron (ppm)	NL = 1	0.7	0.15 Average	0.24 Max	0.2 Average	0.5 Max
Chloride (ppm)	250 - 500	106	56 Average	62 Max	75 Average	95 Max
Conductivity (µS/cm)	900 – 1,600	700	981 Average	1100 Max	891 Average	976 Max
Gross Alpha (pCi/L)	MCL = 15	N/A	13.6 Average*	39.4 Max*	11.6 Average	14.6 Max
Hardness (ppm)	Very Hard > 181	N/A	268 Average	320 Max	179 Average	289 Max
Iron (ppb)	SMCL = 300	5000	44	44	80 Average	240 Max
Manganese (ppb)	SMCL = 50	200	49	49	10.9 Average	25 Max
Nitrate as N (ppm)	MCL = 10	N/A	0.04 Average	0.11 Max	4.7 Average	6.8 Max
Sodium (ppm)	DWR = 200	69	108 Average	120 Max	99 Average	123 Max
Sulfate (ppm)	250 - 500	N/A	330 Average	370 Max	257 Average	334 Max
TDS (ppm)	500 – 1,000	450	677 Average	750 Max	589 Average	808 Max
Total Organic Carbon (ppm)	N/A	N/A	N/A	N/A	0.8	0.8
Uranium (pCi/L)	MCL = 20	N/A	5.5	5.5	11 Average	15 Max

Notes: ppm = parts per million; µS/cm = microSiemens per centimeter; NL= notification level; DWR = California Department of Water Resources; N/A = not applicable; TDS = total dissolved solids.
SMCL = Secondary Maximum Contaminant Level, a drinking water standard set based on aesthetic concerns. Some SMCL's have a range of acceptable values, known as Consumer Acceptance Levels. The values presented in Table 3-5 are the Recommended and Upper Limits. The Upper Limit is commonly treated as an MCL.
* There was an outlier gross alpha result that cannot be explained as there are no subsequent sample results. Theoretical blend calculations include the outlier result.

3.4.1.4 Flood Management

The Kern River has been subject to flooding from storms and snowmelt in portions of its watershed. Flooding of the Kern River has resulted from high-intensity winter rainstorms which generally occur from November through April. Flooding can also be caused by snowmelt, which occurs in the late spring and early summer months. However, snowmelt is less damaging because it has a longer period of runoff and a lower peak than rain floods and due to operation of Isabella Dam, a USACE facility built and managed to regulate flows in the Kern River. Within the past 40 years, seven major floods have occurred including, the 1998 flood caused by the El Niño weather pattern. These floods have been investigated by the Kern

County Water Agency and the USACE. Since 1971, the U.S. Department of Housing and Urban Development (HUD) has designated the unincorporated portions of the County as a special flood hazard area. In compliance with the Federal Flood Insurance Program, HUD has provided the County with a series of 83 Flood Hazard Boundary Maps. These maps delineate major areas of flooding throughout the County.

The project site is relatively flat with an elevation of approximately 280 feet above msl. The project site is not located within a 100-year flood zone and is mapped as Zone X (area of minimal flood hazard) (FEMA 2011). The project site is not mapped within a dam inundation zone (DWR 2020a). The project site is not in a coastal area and is outside the tsunami hazard zone. Additionally, there are no water bodies on or near the project site large enough to be subjected to a seiche, as a result of an earthquake.

3.4.2 Regulatory Framework

3.4.2.1 Federal Plans, Policies, Regulations, and Laws

Federal Clean Water Act

The CWA (33 U.S.C. § 1251 et seq.), formerly the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the U.S. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water. Those discharges are regulated by the N.P.D.E.S. permit process (CWA § 402). CWA Section 401 regulates surface water quality and a Water Quality Certification is required for federal actions (including construction activities) that may entail impacts to surface water. In California, N.P.D.E.S. permitting authority is delegated to, and administered by, the State Water Board and the nine RWQCBs.

National Pollutant Discharge Elimination System

The objective of the N.P.D.E.S. program is to control and reduce discharges of pollutants to water bodies in surface water discharges. Under the CWA Section 402, the State Water Board and RWQCBs have been delegated authority by EPA to implement and enforce the N.P.D.E.S. program within California. The State Water Board adopted Construction General Permit Order 2009-009-DWQ on September 2, 2009, and it became effective on July 1, 2010. Order 2009-009-DWQ was subsequently amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ. The 2009 order superseded Order 99-08-DWQ. The Construction General Permit Order includes the following requirements:

- Establishment of three project risk levels based on erosion potential of the project site and sensitivity of receiving waters
- Monitoring and reporting requirements based on project type and risk level, which may include analyzing samples of discharges and receiving waters
- Certification and training requirements for personnel preparing and implementing SWPPPs
- Postconstruction performance standards for the quality, quantity, and intensity of stormwater discharges
- Option for obtaining a rainfall erosivity waiver for projects that meet specific requirements

- Technology-based numeric action levels
- Specified minimum requirements for BMPs
- Site-specific soil characterization for determination of project risk levels
- Requirement for rain event action plans for risk level 2 and 3 projects
- Increased annual reporting and compliance certification requirements
- Documentation of final site stabilization based on percentage of stabilized area, analysis using the Revised Universal Soil Loss Equation (commonly referred to as RUSLE) model, or custom methods

These requirements seek to ensure that the construction and postconstruction conditions at a project site do not cause or contribute to direct or indirect impacts on water quality (i.e., pollution and/or hydromodification) upstream and downstream. To comply with the requirements of the Construction General Permit, developers must file a notice of intent with the State Water Board to obtain coverage under the permit; prepare a SWPPP; and implement inspection, monitoring, and reporting requirements appropriate to the project's risk level as specified in the SWPPP. The SWPPP includes a site map, describes construction activities and potential pollutants, and identifies BMPs that will be employed to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources, such as petroleum products, solvents, paints, and cement.

3.4.2.2 State Plans, Policies, Regulations, Laws

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act defines water quality objectives as, "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" (Water Code Section 13050(h)). It also requires the Regional Water Board to establish water quality objectives, while acknowledging that it is possible for water quality to be changed to some degree without unreasonably affecting beneficial uses.

The Water Quality Objective applicable to this project is the State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California (Antidegradation Polity).

The State Water Board General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), Order 2009-009-DWQ as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ, applies to land-disturbing construction activities that would affect 1 acre or more and discharge stormwater to waters of the U.S. (*refer to* Chapter 3.3.2.1 – Federal Plans, Policies, Regulations, and Laws). The Central Valley RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain discharges to land or waters of the state.

Water Quality Control Plan

The Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) designates beneficial uses in the Hydrologic Units of the Tulare Lake Basin. The Eastside Canal divides Hydrologic Units 257 and 258 in

the Recovery Project Area. Beneficial uses of groundwater in Hydrologic Unit 258 are Municipal and Domestic Supply (MUN), Agricultural (AGR), Industrial Supply (IND) and Industrial Process Supply (PRO). The eastern parcels of the Recovery Project area are on the western boundary of Hydrologic Unit 257 which adds Water Contact Recreation (REC-1) in addition to beneficial uses listed for Unit 258 (RWQCB 2018).

The Basin Plan includes numerical and narrative water quality objectives for physical and chemical water quality constituents. The entire Recovery Project area is within the Tulare Lake Basin Ground Water Hydrographic Unit Westside South. Numerical objective for groundwater quality is set for Salinity, which is expressed as electrical conductivity and a maximum average annual increase in electrical conductivity of 1 micromoh per centimeter. Narrative objectives for groundwater are set for bacteria, chemical constituents (Title 22), pesticides, radioactivity, salinity, and tastes and odors.

Sustainable Groundwater Management Act

SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. DWR designates the Kern County Subbasin as a critically over-drafted basin, meaning it must achieve sustainability by 2040.

The BVGSA has been created to manage groundwater for a portion of the Kern County Subbasin (Basin Number 5-22.14, DWR Bulletin 118) within the San Joaquin Valley Groundwater Basin and is the exclusive GSA within its territory with powers to comply with SGMA (§ 10723[c][1][D]). The BVGSA notified the DWR of its intent to undertake sustainable groundwater management under SGMA and was granted exclusive GSA status under SGMA (§ 10723(c)).

Under SGMA, sustainable management of groundwater through attainment of a locally defined sustainability goal is assessed though monitoring of six sustainability indicators presented in the SGMA legislation. Undesirable results occur when conditions related to any of the sustainability indicators become significant and unreasonable on a scale that jeopardizes sustainable groundwater management basin wide. Therefore, determining whether a groundwater basin is being managed sustainably relies on monitoring of sustainability indicators at locations throughout the basin.

The four sustainability indicators of interest within the BVGSA have been defined to fit the conditions of the Kern County Groundwater Subbasin, using language agreed upon by each of the GSAs within the Subbasin, as follows:

- Chronic lowering of groundwater levels: The point at which significant and unreasonable impacts over the planning and implementation horizon, as determined by depth to water, affect the reasonable and beneficial use of, and access to, groundwater by overlying users. Declining groundwater levels during a prolonged drought are not alone sufficient to confirm a chronic lowering of groundwater levels. Extractions and groundwater recharge can be managed to ensure that reductions in groundwater levels or storage during a drought are offset by increases in groundwater levels during other periods.

- Significant and unreasonable reduction of groundwater storage: The point at which significant and unreasonable impacts, as determined by the amount of groundwater in the Subbasin, affect the reasonable and beneficial use of, and access to, groundwater of overlying users over an extended drought period.
- Significant and unreasonable degraded water quality: The point at which significant and unreasonable impacts over the planning and implementation horizon, as caused by water management actions, affect the reasonable and beneficial use of, and access to, groundwater by overlying users.
- Significant and unreasonable subsidence: The point at which significant and unreasonable impacts, as determined by a subsidence rate in the Subbasin, that affect the surface land users or critical infrastructure.

3.4.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

Department of Water Resources Bulletin 74-81 and Bulletin 74-90

DWR Bulletin 74-81, established in December 1981, developed standards for the construction, maintenance, and destruction of wells. These standards were developed to reduce groundwater quality deterioration. While wells themselves do not contribute to poor water quality, the inadequate construction or improper destruction can result in the deterioration of groundwater. Additionally, Bulletin 74-90, established in June 1991, is a supplement to DWRs Bulletin 74-81. Bulletin 74-90 was developed to satisfy DWRs contract with the State Water Board in which DWR was responsible for the review and update of water well standards in Bulletin 74-81, establishment of minimum standards for monitoring wells, and update and replacement of cathodic protection well standards in Bulletin 74-1. Additionally, Bulletin 74-90 was developed to respond to DWRs responsibilities under the Water Code in which DWR is responsible for developing standards for wells for the protection of water quality under Section 231, and to keep pace with technical advances during the 10-year period following publication of Bulletin 74-81. The Bulletin 74-90 supplement is to be used together with Bulletin 74-81 for a complete description of DWR water well standards. Monitoring well standards are presented separately in the Bulletin 74-90 supplement and are in parallel form to the water well standards. Cathodic protection well standards in the Bulletin 74-90 supplement replace those in Bulletin 74-1.

DWR Water Quality Policy for Acceptance of Non-Project Water into the State Water Project

It is the DWR policy to assist with the conveyance of water to provide water supply and to protect the SWP water quality within the Aqueduct. In order to facilitate this policy, DWR provides an implementation process to accept Non-Project water into the Aqueduct. The policy provisions are as follows:

- DWR shall consider and evaluate all requests for Non-Project water that will be pumped into the Aqueduct. Non-Project water is considered to be any water input into the Aqueduct that is not directly diverted from the Sacramento-San Joaquin Delta or natural inflow into SWP reservoirs.
- A proposal for any Non-Project water shall demonstrate that the water is of consistent, predictable, and acceptable quality.

- DWR will consult with SWP, existing Non-Project participants, and State Water Resources Control Board – Division of Drinking Water on drinking water quality issues relating to Non-Project water as needed to assure protection of SWP water quality.
- DWR's policy does not authorize the objectives of Article 19 of the SWP water supply contracts or drinking water MCLs to be exceeded.
- The policy shall not constrain the ability of DWR to operate the SWP for its intended purposes and shall not adversely impact SWP water deliveries, operation, or facilities.

When evaluating Non-Project water proposals for input into the Aqueduct, DWR uses a two-tiered approach. A Tier 1 PIP has water quality that is essentially the same or better than what is in the Aqueduct: PIPs deemed Tier 1 are approved by DWR. Tier 2 PIP has different and possibly worse water quality than what is in the Aqueduct. Tier 2 PIPs are referred and reviewed by a Non-Project Facilitation Group who, if needed, makes recommendations to DWR in consideration of the PIP. Tier 2 PIP must demonstrate that the lower quality water with constituents exceeding MCLs is either treated or blended with better quality water so that the SWP water will not be degraded.

DWR uses a stakeholder process to review and approve the water quality agreements. This allows downstream water users to voice concerns over impacts to the water they receive. From those concerns, a negotiated agreement may be reached to minimize impacts to water users while still allowing some transfer to occur.

Kern County Well Permits

DWR has responsibility for developing standards for wells for the protection of water quality under California Water Code Section 231. All counties and cities and water agencies, where appropriate, were required to adopt a well ordinance that meets or exceeds DWR's Water Resources Bulletin 74-81, "Water Standards: State of California" and Bulletin 74-90. Kern County Environmental Health Department has well-permitting authority in the Kern County Subbasin for new and replacement wells and well destruction. Kern County Ordinance Code, Section 14.08, describes well drilling permit requirements. The following requirements apply:

- Except as otherwise provided, it is unlawful for any person or contractor acting on his behalf to construct, reconstruct, deepen or destroy any well described in Section 14.08.116 or cause any of these acts to be done without first having filed a valid application for a permit with the County public health services department and having received approval to begin work.
- Every permit shall be deemed to be conditioned upon compliance with the requirements of Article III of this chapter, except that permits issued to construct, reconstruct, deepen or destroy cathodic protection wells and hazardous material monitoring wells shall be deemed to be conditioned on compliance with the respective reference documents specified in Sections 14.08.220 and 14.08.230.
- The safe and appropriate handling and disposal of drilling fluids and other drilling materials used in connection with the permitted work shall be required as a condition of the permit.

- Any abandoned wells located on the property for which a permit to construct or reconstruct a well has been issued shall be destroyed in accordance with the standards provided in Section 14.08.360 as a condition of that permit.
- It shall be the responsibility of the permittee to maintain a copy of the permit on the drilling site during all stages of construction or destruction.
- The health officer may prescribe additional permit conditions if the health officer determines that they are required to prevent degradation of underground waters as provided for in Section 14.08.010.

Kern County General Plan

The Kern County General Plan (2009) includes the following policies that pertain to hydrology and water quality and are relevant to this analysis.

Physical and Environmental Constraints

GOAL 1: To strive to prevent loss of life, reduce personal injuries, and property damage, minimize economic and social diseconomies resulting from natural disaster by directing development to areas which are not hazardous.

- Policy 11. Protect and maintain watershed integrity within the County
- Implementation Measure C. Cooperate with the Kern County Water Agency to classify lands in the County overlying groundwater according to groundwater quantity and quality limitations.

Public Facilities and Services

GOAL 1: Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within the County.

- Policy 11. Protect and maintain watershed integrity within the County

Resources

- Policy 10. To encourage effective groundwater resource management for the long-term economic benefit of the County the following shall be considered:

  (a) Promote groundwater recharge activities in various zone districts.

  (b) Support for the development of Urban Water Management Plans and promote DWR grant funding for all water providers.

  (c) Support the development of groundwater management plans.

  (d) Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water and groundwater and desalination.
- Policy 11. Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances.

Surface Water and Groundwater

- **Policy 33.** Water related infrastructure shall be provided in an efficient and cost-effective manner.
- **Policy 34.** Ensure that water quality standards are met for existing users and future development.
- **Policy 35.** Ensure that adequate water storage, treatment, and transmission facilities are constructed concurrently with planned growth.
- Ensure that appropriate funding mechanisms for water are in place to fund the needed improvements resulting from growth and subsequent development.
- **Policy 37.** Ensure maintenance and repair of existing water systems.
- **Policy 39.** Encourage the development of the County's groundwater supply to sustain and ensure water quality and quantity for existing users, planned growth, and maintenance of the natural environment.
- **Policy 40.** Encourage utilization of community water systems rather than the reliance on individual wells.
- **Policy 43.** Drainage shall conform to the Kern County Development Standards and the Grading Ordinance.

Implementation Measure U. The Kern County Environmental Health Services Department will develop guidelines for the protection of groundwater quality which will include comprehensive well construction standards and the promotion of groundwater protection for identified degraded watersheds.

Implementation Measure Y. Promote efficient water use by utilizing measures such as:

(c) Requiring water-conserving design and equipment in new construction.

(d) Encouraging water-conserving landscaping and irrigation methods.

(e) Encouraging the retrofitting of existing development with water conserving devices.

3.4.3 Environmental Impacts and Mitigation Measures

3.4.3.1 Thresholds of Significance

Significance criteria are based on Appendix G of the CEQA Guidelines. A project alternative would have a significant impact on hydrology and water quality if implementing the alternative would:

- Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

- result in substantial erosion or siltation on- or off-site
- substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite
- create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. For the Recovery Project, groundwater level drawdown would be considered a significant impact if it could result in groundwater levels falling below MTs as specified in a GSP.

3.4.3.2 Issues Not Discussed Further

The June 2020 IS (**Appendix B**) evaluated potential impacts to hydrology and water quality and found either less-than-significant impacts or no impacts to several thresholds of significance, specifically:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces. The Recovery Project will not alter the existing drainage pattern of the area, therefore there will be no impact and this topic will not be evaluated further in the EIR.
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation. The IS found the Recovery Project to have no impact.

These potential impacts will not be discussed further in this DEIR.

Comments were received on the NOP (**Appendix B**) expressing concern about groundwater levels and water quality. In response to those comments, groundwater quantity and water quality are discussed in more detail in this FEIR.

3.4.3.3 Groundwater Level Analysis Methodology

Modeling Approach

A superposition modeling approach was selected as the most suitable method to support the groundwater impacts analysis. The superposition approach enables the Recovery Project-related changes to be calculated throughout the basin and superimposed upon the groundwater system so that the accumulated effects of the Recovery Project over time can be determined. The Superposition Model was used as a screening model to evaluate various alternatives for the recovery of banked groundwater from the Recovery Project. For the Recovery Project, the various alternatives to pump the recharged groundwater at a rate up to 25,000 AFY for use by BVWSD. Additional details on the approach, setup and validation of the Superposition Model are presented in **Appendix D**, Attachments A, B, and C.

The modeling used to simulate the potential groundwater level impacts of the Recovery Project is based on the principle of superposition. The principle of superposition, as applied to a groundwater system, means that the result of multiple stresses on an aquifer system is equal to the sum of the results of the

individual stresses. Additional information about applying the principle of superposition to numerical groundwater models is provided in Attachment A of **Appendix D**.

Superposition allows the groundwater impacts analysis to assess the effects of the Recovery Project on the groundwater system in isolation from other acting stresses (e.g., pumping, recharge, etc.) without having to obtain data of non-project related stresses to simulate the Recovery Project. Using a superposition model, calculation of groundwater impacts is inherently precise because flow quantities other than Recovery Project related components are set to zero (Leake 2011).

When the Principle of Superposition is used in groundwater modeling, the model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. Therefore, the model results provide the relative change in groundwater levels due to the Recovery Project; in other words, a superposition model directly calculates the groundwater level impacts from the Recovery Project. By applying the Principle of Superposition, the relative change in groundwater levels can be added (superimposed) to measured or simulated groundwater elevations to determine a predicted groundwater elevation associated with Recovery Project impacts. This means that calculated changes in groundwater levels can then be added to other groundwater level distributions to determine the combined effects on the groundwater system (Reilly et al. 1987).

Groundwater Model Setup

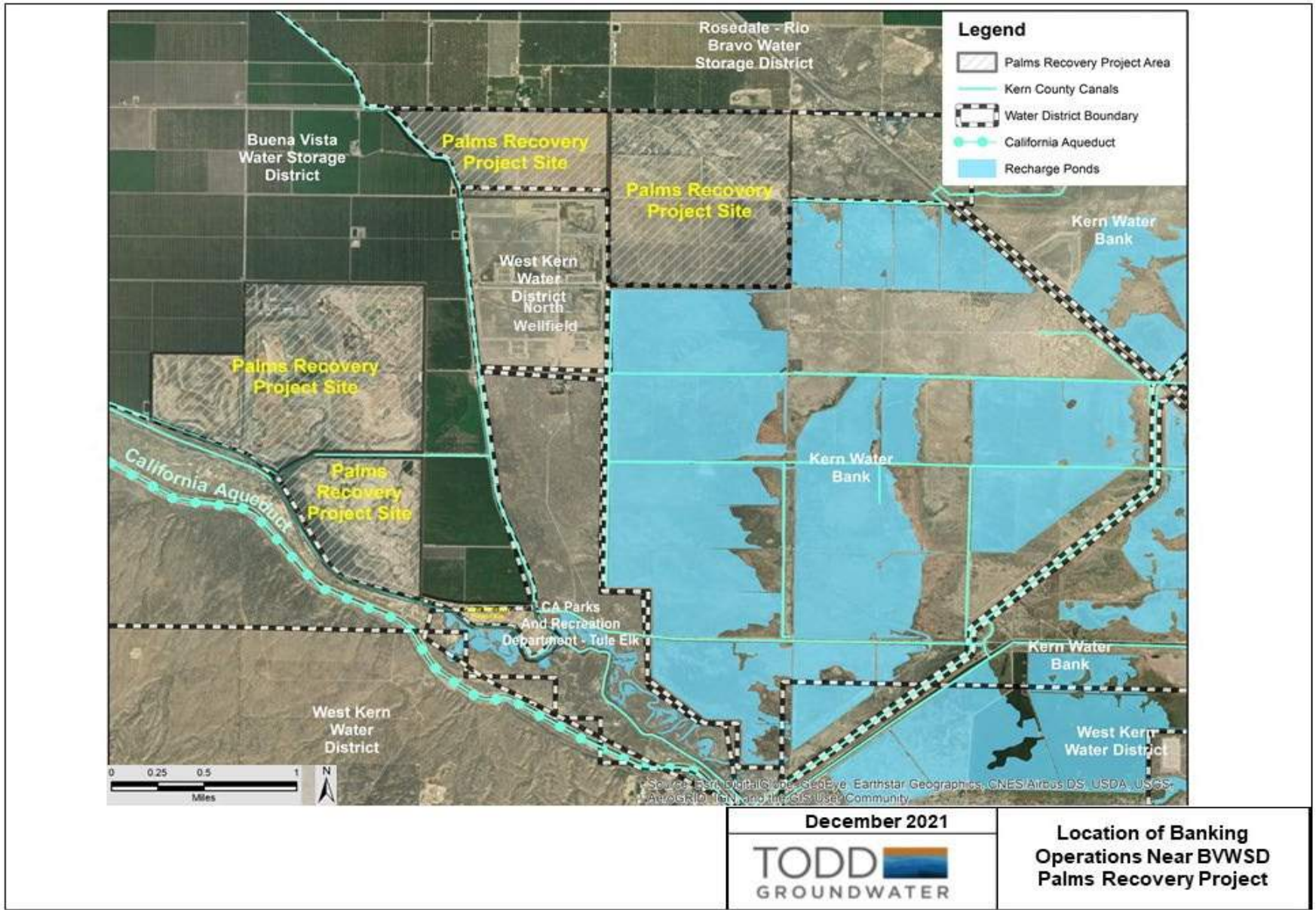
The Superposition Model used for the Recovery Project was previously developed and used for a recent CEQA analysis Supplemental EIR (for the Kern River Water Allocation Plan for Kern Delta Water District). The Draft Supplemental EIR was completed in 2017 (ESA 2017), and the description of the groundwater modeling used was included in the Groundwater Impacts Assessment Report (Todd Groundwater 2017). Following the general methodology for applying superposition methods to groundwater modeling (Reilly et al. 1987), the Kern County Superposition Model was developed from the existing, previously calibrated, USGS Central Valley Hydrologic Model (CVHM) (Faunt 2009). CVHM is a three-dimensional computer model developed by the USGS to simulate surface water and groundwater flow across the entire Central Valley (Faunt 2009). The geologic framework and aquifer properties of CVHM are based on a comprehensive geologic analysis (USGS Sediment Texture Analysis) that provides a regionally consistent evaluation of aquifer properties based on the analysis of local well logs (Faunt, Hanson, and Belitz 2009). Additional details on the setup and modifications of the Superposition Model are presented in Attachment B of **Appendix D**.

Superposition Model Validation

Although the underlying CVHM Base Model was calibrated by the USGS to data obtained throughout the Central Valley – presumably using reasonable care in developing the geologic framework and determining aquifer properties – it is appropriate to demonstrate that the use of the Kern County Superposition Model built from the CVHM for the specific objectives of this impact analysis reasonably reproduces historical groundwater level changes. Details on the setup and results of the Validation Scenarios are presented in **Appendix D**, Attachment C.

An initial validation scenario compared an analytical model simulation based on pumping tests at the WKWD North Wellfield which is located adjacent to the Recovery Project (**Figure 3-9**). The WKWD simulations projected the pumping test results for evaluating the potential drawdown for operating the WKWD North Wellfield.

Figure 3-10. Location of Banking Operations Operated by Others, near the Recovery Project[6]



[This page intentionally left blank.]

[6] The Palms Groundwater Recharge Project is operated by the Buena Vista Water Storage District

In July 2020, WKWD provided additional detailed data on aquifer testing, groundwater pumping and measured water levels for the North Wellfield. The pumping data from the five WKWD groundwater production wells was provided from October 2012 through December 2014. This period was the beginning of a significant drought, and groundwater pumping associated with the nearby groundwater banks was occurring, and the measured groundwater elevations at the WKWD North wells would be affected by this pumping as well. Therefore, the measured groundwater recovery pumping from the groundwater banks was also included in the validation scenario. Based on this comparison, modifications were made to the hydraulic conductivity in the Superposition Model for the BVWSD area as described in Attachments B and C of **Appendix D**.

A previous validation scenario had been constructed to evaluate groundwater level changes resulting from recharge operations at the KWB from 1993 to 1998 (Todd Groundwater 2017). This period represents the initial recharge operations at the KWB and other nearby recharge facilities prior to significant recovery activities. This scenario evaluates the capability of the Superposition Model to simulate the effects of major changes in groundwater levels as a result of managed aquifer recharge. The previous scenario was rerun using the modified hydraulic conductivities from the WKWD validation scenarios.

Since the changes in the validation scenario meet or exceed those produced by the Recovery Project, the validation results are considered to have a relative percentage of uncertainty that is comparable to that of the Recovery Project. The validation scenarios indicate a relative level of uncertainty of approximately 10 to 20 percent (Attachment C of **Appendix D**). This would apply to the overall model results with the acknowledgement that comparisons for a specific location may have a larger range. The model validation demonstrates the capability of the Superposition Model, as it is configured for this study, to reasonably simulate the change in groundwater levels and trends based on the comparison to measured data.

Operational Scenarios

Two operational scenarios were setup and run using the Superposition Model to assess changes in groundwater conditions:

- Scenario A simulates the Recovery Project operations using an assumption of 100% recovery of the recharged water as a worst-case scenario with respect to groundwater level impacts. The simulated recovery pumping occurs at a rate of 25,000 AFY over a 6-month period over 4 consecutive years. This scenario was modeled as a worst-case scenario for impact analysis purposes. Actual recovery would likely extend over a longer time period and therefore have less impact.
- Scenario B, the Reduced Recovery Alternative (*see* Chapter 5.7.2) simulates the Recovery Project operations using an assumption of 90% recovery of the recharged water as a most-likely case scenario with respect to groundwater level impacts. The simulated recovery pumping occurs at a rate of 25,000 AFY over a 6-month period over 3 consecutive years. During Year 4, the simulated recovery pumping occurs at a rate of 15,000 AFY. The same pumping rate occurs during the first 3 months, reduced pumping occurs in the 4th month, and no pumping during the final 2 months of Year 4 of the extraction period. As described for Scenario A, this recovery schedule is anticipated to be the worst-case scenario, with actual recovery extending over a longer time period, with less impact to groundwater levels.

3.4.3.4 Groundwater Level Impact Analysis

The Superposition Model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. Therefore, the model results provide the relative change in groundwater levels due to the Recovery Project; in other words, a superposition model directly calculates the groundwater level impacts from the Recovery Project. Model results are presented using a variety of maps and graphs to provide for a comprehensive analysis of Recovery Project-related impacts on groundwater resources. Techniques used to present the results of the groundwater impacts analysis are summarized briefly below:

Groundwater Level Change Maps – contour maps that show the simulated change in groundwater levels over the areas in the vicinity of the Recovery Project. This analysis provides a direct assessment of the spatial distribution of groundwater level impacts of the Recovery Project.

Change Hydrographs – hydrographs that show the change in groundwater levels over time for representative locations in the vicinity of the Recovery Project to provide a direct assessment of the magnitude of impacts of the Recovery Project operations on groundwater levels over time.

Superposition Hydrographs – simulated groundwater elevation changes are superimposed onto hydrographs (based on measured groundwater elevation data) to evaluate Recovery Project-related impacts relative to historical groundwater elevation data. This analysis evaluates the scale of the impacts of the Recovery Project compared to the historical variation in groundwater levels in the Study Area over time. The superposition hydrographs are compared to historical data for Scenario B (*see* Chapter 5.8.2 – Reduced Recovery Alternative).

Collectively, these maps and graphs, along with additional model results, illustrate how the Recovery Project will impact groundwater in the vicinity of the Recovery Project. The results of the groundwater impacts analysis using the Superposition Model is summarized below.

Recovery Project Scenario Groundwater Change Maps

A series of groundwater level change maps are provided to show the simulated change in groundwater levels at key intervals during the simulated operations of the Recovery Project to illustrate the spatial distribution of groundwater level change resulting from the proposed Recovery Project operations.

Figure 3-10 shows the distribution of the change in groundwater levels representing the maximum mounding at the end of the Year 1 recharge event. Both Scenarios A and B use the same recharge setup, so **Figure 3-10** is the same for both Scenarios A and B. The contours show the wide areal distribution of these changes in groundwater levels from the distribution of a large area. As a result, the maximum increase of groundwater levels up to 100 feet occur near the center of the Palms Project but mounding of 10 to 50 feet covers a large area of the Palms Project area. Lesser amounts of mounding extend into WKWD and the western areas of the KWB.

Figure 3-11 shows the shows the distribution of the residual mound prior to the initiation of recovery pumping in Year 3. This map is the same for both Scenario A and B. This represents the buildup of groundwater levels as groundwater flows away from the recharge area to the surrounding areas over the 20 months between the end of recharge and the beginning of the recovery.

Figure 3-11. Maximum Mounding After One Year of Recharge

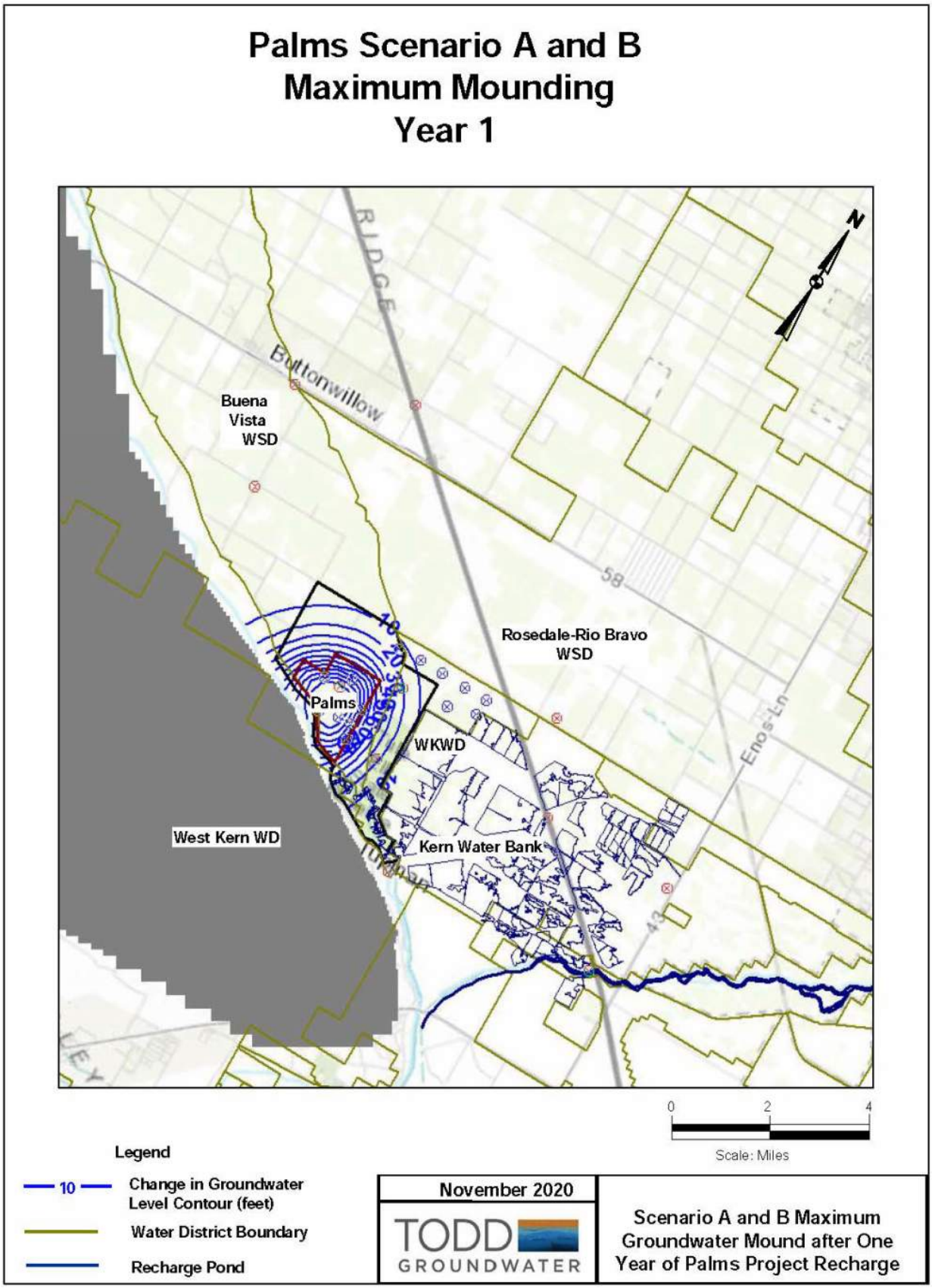


Figure 3-12. Residual Mound Prior to Start of Pumping

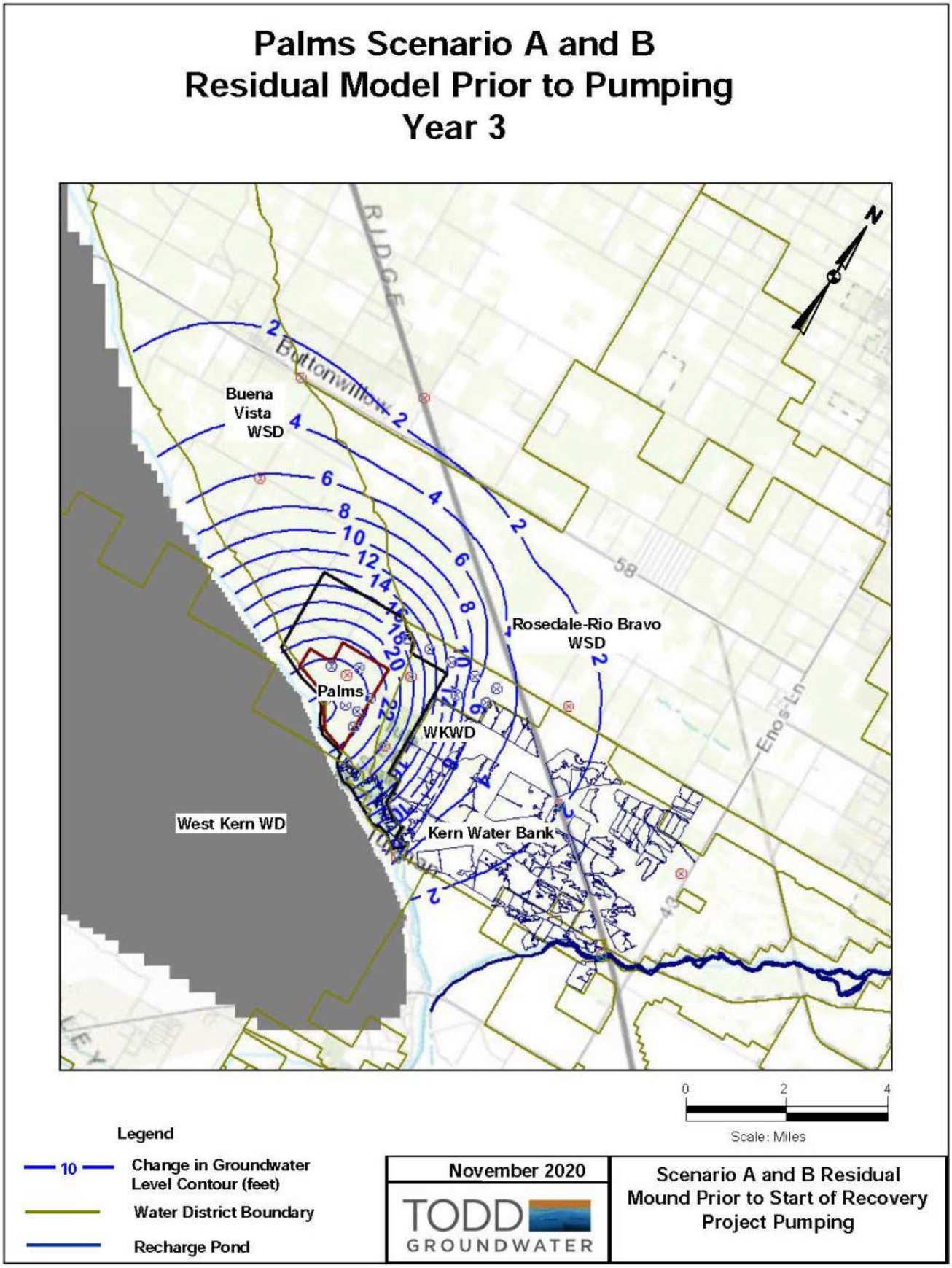


Figure 3-12 shows the distribution of the cumulative groundwater level change for the simulation after the 1st year of recovery pumping in Year 3 of the simulation. This map is the same for Scenarios A and B. Drawdown from Recovery Project pumping in Simulation Year 1 would be relative to the buildup resulting from the recharge (*refer to* **Figure 3-11**). Therefore, the change in groundwater levels relative to the beginning of the scenario as shown on Figure 3-12 show the maximum groundwater level change of less than 10 feet occurs near the recovery wells. Groundwater level declines of 0 to 10 feet occur in the vicinity of the Recovery Project recovery wells. Adjacent areas in WKWD North, RRBWSD, and KWB still have elevated groundwater levels of 0 to 4 feet resulting from the Palms Project's recharge.

Figure 3-13 shows the distribution of the cumulative groundwater level change for Scenario A after Year 4 of recovery pumping in Year 6 of the simulation. The contours show the maximum groundwater level change relative to the start of the simulation of 20 to 35 feet occurs near the recovery wells. The groundwater level declines of 2 to 10 feet cover the area of Recovery Project and extends further into western areas in RRBWSD and across the western half of the KWB primarily west of I-5. An area of the residual mound remains to the north of the Recovery Project in BVWSD.

Figure 3-13. Groundwater Level Change After One Year of Pumping

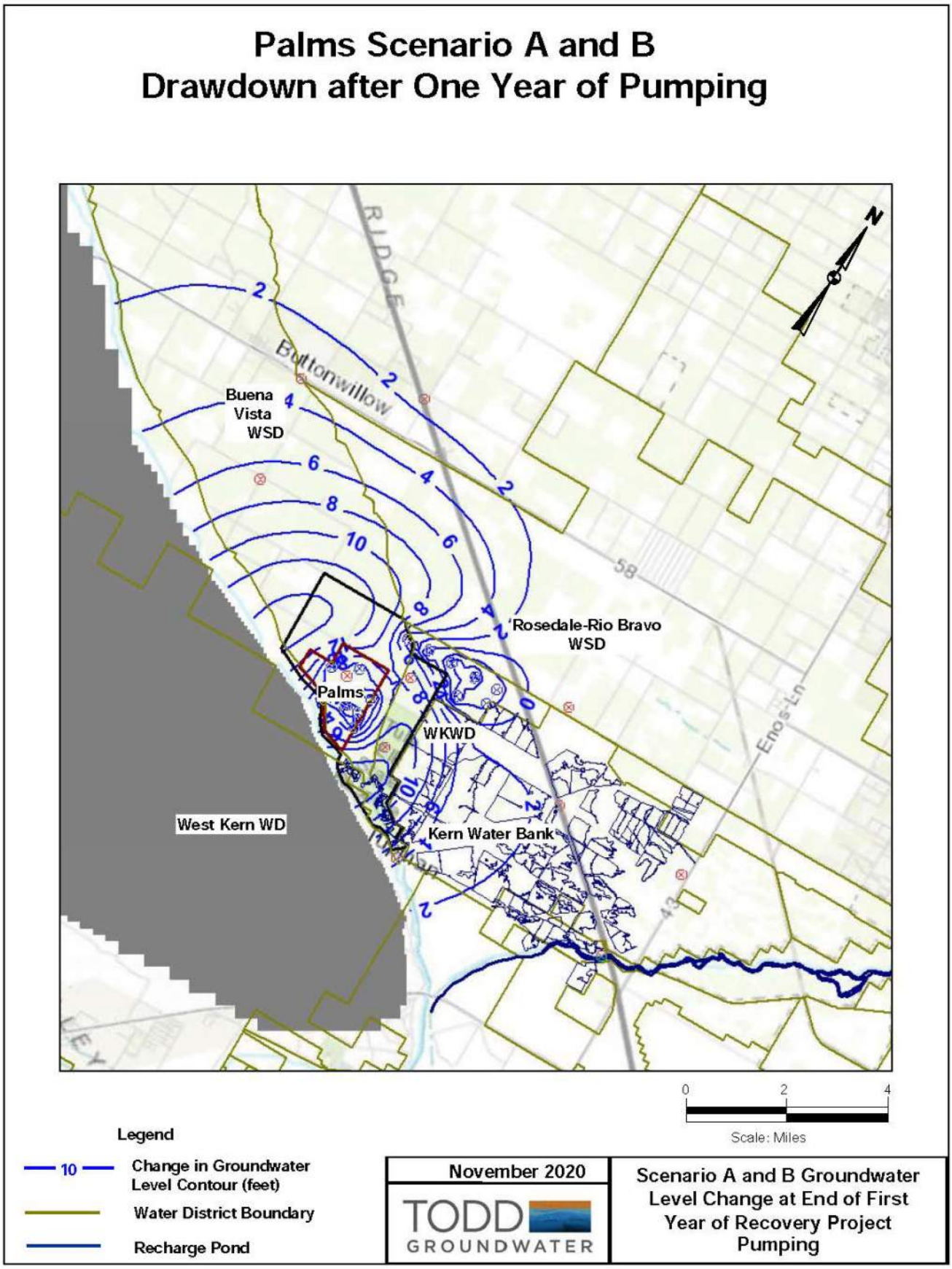
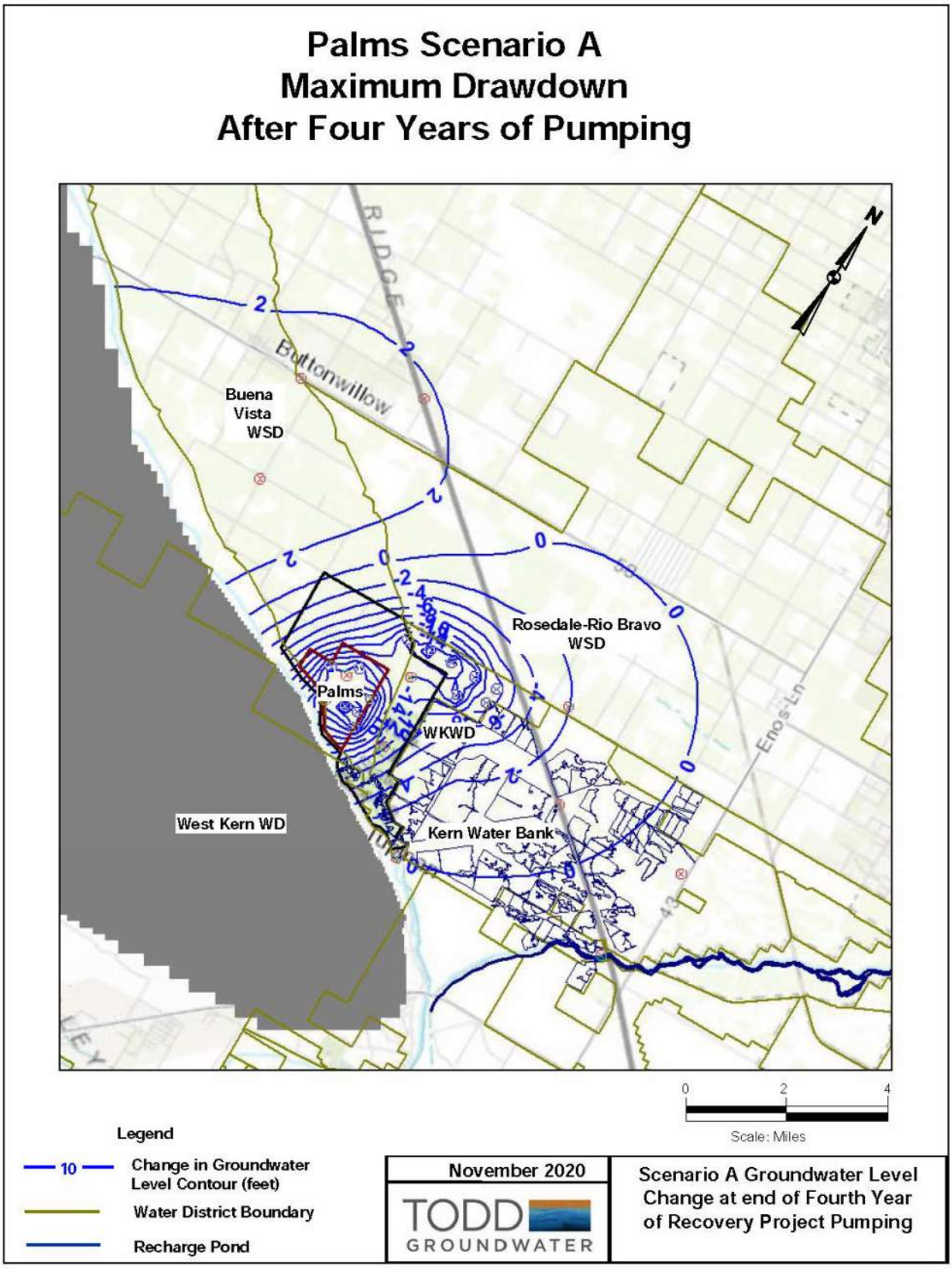


Figure 3-14. Groundwater Level Change After Four Years of Pumping and 100% Recovery of Recharged Water (Scenario A)



Recovery Project Scenario Groundwater Change Hydrographs

The groundwater change hydrographs show the change in groundwater levels over time for representative locations throughout the Study Area as a result of the Recovery Project. This analysis provides a direct assessment of the magnitude of impacts of the Recovery Project on groundwater levels over time in the Study Area.

Figure 3-14 shows the simulated change in groundwater levels at the Recovery Project recovery wells for Scenario A, 100 percent recovery of recharged water[7]. The upper graph on **Figure 3-14** provides the hydrographs for the seven wells located within the original Recovery Project. Here the mounding from the recharge reaches a maximum of about 100 feet at the end of the recharge period and a residual mound of 15 feet remains at the beginning of the first pumping period. Drawdowns over the pumping periods are generally on the order of about 20 feet for all wells. The cumulative groundwater level declines range from 15 to 25 feet over the 4-year pumping period with drawdown increasing with each successive pumping period.

The lower graph on **Figure 3-14** provides the hydrographs for the seven wells located within the northeast Recovery Project. Here the mounding is less. The mounding reaches a maximum of 8 to 28 feet at the end of the recharge period and a residual mound of 7 to 12 feet remains at the beginning of the first pumping period. The drawdowns, however, are on the order of about 20 feet for each successive pumping period reflecting the influence of higher hydraulic conductivities in this area. The groundwater level declines range from 10 to 18 feet over the 4-year pumping period.

[7] Appendix D, Figure 15 shows the locations of the simulated Recovery Project Recovery Wells used for the Palms Scenario including interim reference names. There are two areas of pumping. One is located adjacent to the Palms Recharge Ponds and the second area is an annexed area to the northeast where BVWSD has purchased property for the Recovery Project.

Figure 3-15. Groundwater Level Change at Recovery Wells, 100% Recovery of Recharged Water (Scenario A)

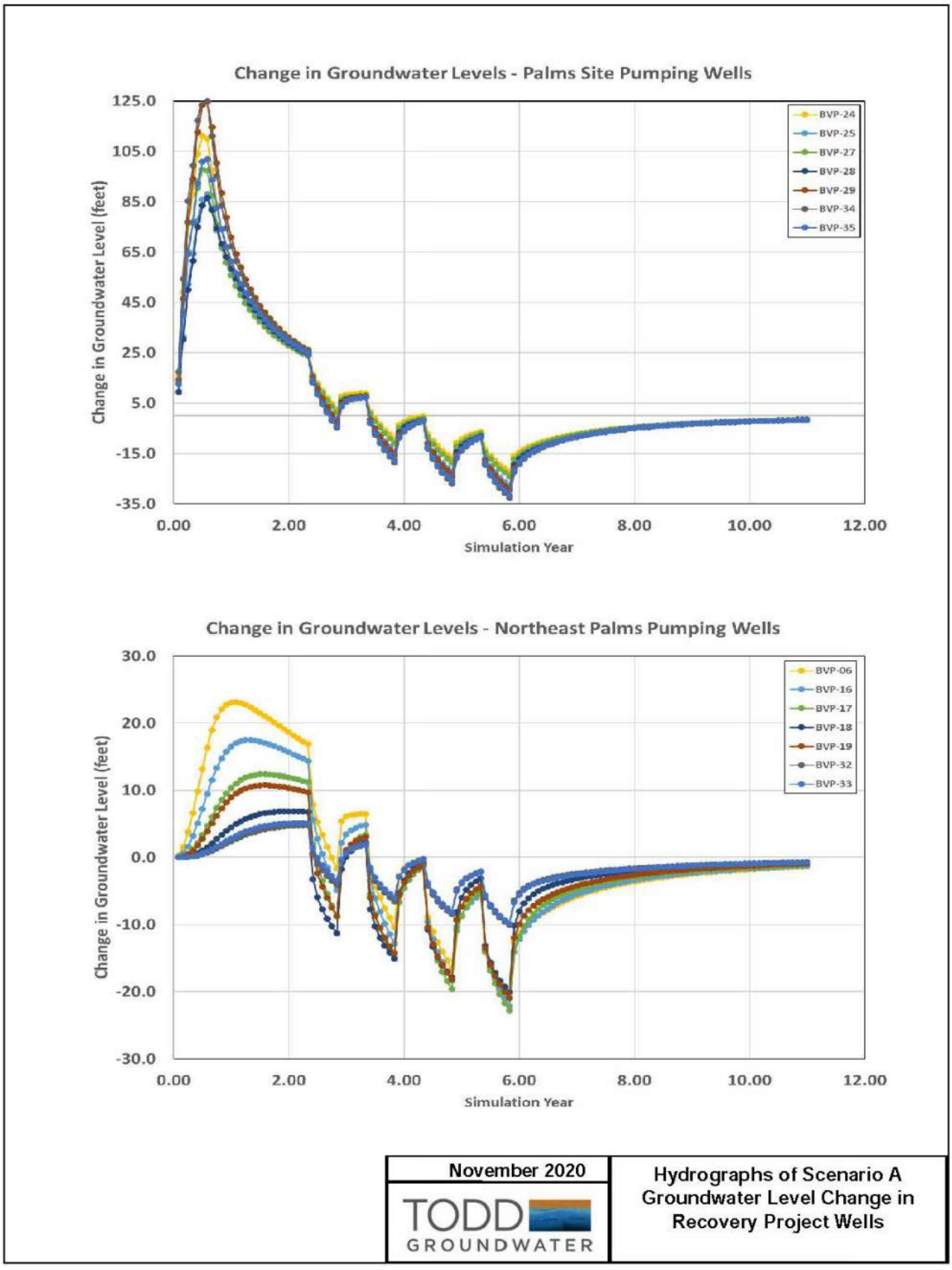
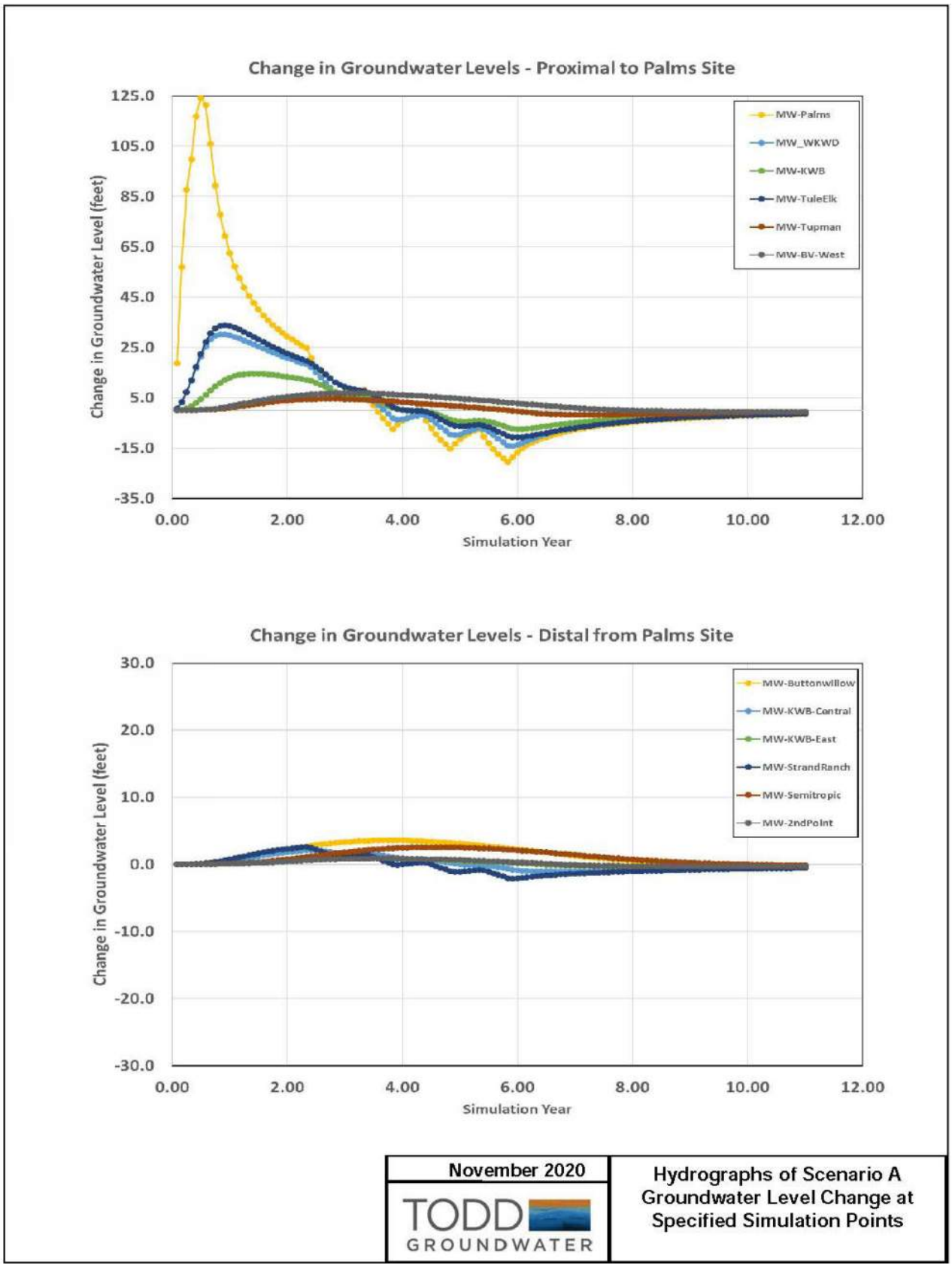


Figure 3-15 shows the simulated change in groundwater levels produced by the Superposition Model for the Recovery Project Scenario at the simulated monitoring points[8]. The upper graph on **Figure 3-15** provides the hydrographs for the six simulated monitoring points located proximal to the Recovery Project site. The simulated monitoring points located nearest to the recovery wells show responses similar to the recovery wells. At greater distances away from the Recovery Project Site, the effects of the Recovery Project operations produce lesser amounts of mounding and drawdown. This is also seen on the lower graph on **Figure 3-15** where the responses show groundwater level changes of 5 feet or less. Groundwater levels gradually recover at the end of the 4-year cycle of pumping.

[8] Appendix D, Figure 18 shows the locations of the simulated monitoring points placed in the Superposition to help with understanding the spatial distribution of response the Recovery Project operations. These do not reflect actual monitoring points; however, future simulations would include monitoring points at specific locations of interest for the groundwater impacts assessment.

Figure 3-16. Groundwater Level Change at Simulated Monitoring Points, 100% Recovery of Recharged Water (Scenario A)



The results of the Recovery Project Scenarios indicate that most of the drawdown associated with the recovery wells occurs within and adjacent to BVWSD and the Recovery Project. The simulation results indicate that drawdowns of 0 to 10 feet would be expected at areas adjacent to BVWSD as a result of Recovery Project operations after 4 years of full recovery of a recharge volume of 100,000 AF.

Impact HYDRO-1: ***Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.***

Recovery Project pumping could result in a decline in groundwater levels, potentially affecting other water users or resulting in undesirable outcomes as defined in a GSP.

The results of the Recovery Project Scenarios indicate that most of the drawdown associated with the recovery wells occurs within and adjacent to BVWSD and the Recovery Project. The simulations results indicate that drawdowns of 0 to 10 feet would be expected at areas adjacent to BVWSD as a result of the Recovery Project recovery wells after 4 years of full recovery of a recharge volume of 100,000 AF. At greater distances away from the Recovery Project Site, the effects of the Recovery Project operations produce lesser amounts of mounding and drawdown. Groundwater levels gradually return to baseline conditions in the Project area after the completion of the 4-year recovery cycle. This impact is **less-than-significant**.

Mitigation Measure: No mitigation is required.

3.4.3.5 Water Quality Impact Analysis

Banked groundwater will be used for crop irrigation when surface water is not available, and in the future, BVWSD will apply to DWR for approval to Pump-In to the Aqueduct. Current groundwater quality data indicate that, when compared against conservative agricultural thresholds established by Ayers and Westcot (*refer to* **Table 3-5**), salinity is high for sensitive crops. However, groundwater is currently used, and is suitable for, irrigation for crops presently planted in the District. Since the groundwater is currently used for irrigation, no detrimental impact to agriculture is expected from the District's use of groundwater pumped from the Recovery Project. The Recovery Project benefits agriculture by providing a sustainable water supply.

For the future application to DWR for Pump-In to the Aqueduct, the impacts analysis focused on potential constituents of concern, which were selected because they either had noticeable detections or are part of the DWR's constituents of concern for non-SWP water that is pumped into the Aqueduct.

While dissolved salts and minerals (chloride, conductivity, hardness, sodium, sulfate and total dissolved solids) are within Title 22 consumer acceptance ranges, they are present at concentrations greater than the Aqueduct. To evaluate potential impact to Aqueduct water quality, theoretical (mass balance) blending calculations were performed to determine what ratio of wells would need to be constructed, where the ideal locations may be, and which zones within the aquifer should be used at the selected locations. Results of the theoretical blending calculations show that blending of the groundwaters with 50 percent of wells from each side of the Recovery Project Area will theoretically produce water that meets state and federal drinking water standards and will cause a **less than significant impact** to the water quality of the

Aqueduct. **Table 3-6** provides the theoretical blending calculations for the worst-case scenario, by using the historical maximum values, and the average concentrations.

Table 3-6. Theoretical Blending Calculation of Project Water before Pump-In

Constituent	Drinking Water Standard	Theoretical Blend Result (Worst Case) – Max Results	Theoretical Blend Result – Average Results
Antimony (ppb)	MCL = 6	2.7 Max Results	0.4 Average Results
Arsenic (ppb)	MCL = 10	3 Max Results	1.5 Average Results
Boron (ppm)	NL = 1	0.4 Max Results	0.2 Average Results
Bromide (ppm)	N/A	0.40 Max Results	0.39 Average Results
Chloride (ppm)	250 – 500	80 Max Results	66 Average Results
Conductivity (µS/cm)	900 – 1,600	1033 Max Results	933 Average Results
Gross Alpha (pCi/L)*	MCL = 15	26 Max Results	12.5 Average Results
Hardness (ppm)	Very Hard > 181	303 Max Results	220 Average Results
Iron (ppb)	SMCL = 300	150 Max Results	63 Average Results
Manganese (ppb)	SMCL = 50	36 Max Results	28 Average Results
Nitrate as N (ppm)	MCL = 10	3.7 Max Results	2.5 Average Results
Sodium (ppm)	DWR = 200	122 Max Results	103 Average Results
Sulfate (ppm)	250 – 500	351 Max Results	291 Average Results
Total Dissolved Solids (ppm)	500 – 1,000	781 Max Results	630 Average Results
Total Organic Carbon (ppm)	N/A	Not enough data	Not enough data
Uranium (pCi/L)	MCL = 20	10.6 Max Results	8.5 Average Results

Notes: ppb = parts per billion; ppm = parts per million; µS/cm = microSiemens per centimeter; MCL = maximum contaminant level; NL= notification level; DWR = California Department of Water Resources; N/A = not applicable; TDS = total dissolved solids.
SMCL = Secondary Maximum Contaminant Level, a drinking water standard set based on aesthetic concerns. Some SMCL's have a range of acceptable values, known as Consumer Acceptance Levels. The values presented in Table 3-6 are the Recommended and Upper Limits. The Upper Limit is commonly treated as an MCL.
* pCi/L = picocuries per liter of air; There was an outlier gross alpha result that cannot be explained as there are no subsequent sample results. Theoretical blend calculations include the outlier result.

To further evaluate the potential impacts of the Recovery Project water when it enters the Aqueduct, the average theoretical blend values were compared against the average values observed in the Aqueduct near the Tupman. **Table 3-7** presents a comparison of average blended Recovery Project water quality to Aqueduct water quality.

Table 3-7. Comparison of Average Project Water and Aqueduct Water Quality

Constituent	Aqueduct*	Project Water**
Antimony (ppb)	0	0.4
Arsenic (ppb)	ND – 3	1.5
Boron (ppm)	ND – 0.15	0.2
Bromide (ppm)	0.09 – 0.18	0.39
Chloride (ppm)	30 – 47	66
Conductivity (µS/cm)	246 – 396	933
Gross Alpha (pCi/L)	ND – 3.5	12.5***
Hardness (ppm)	58 – 82	220
Iron (ppb)	110 – 454	63
Manganese (ppb)	22 - 37	28
Nitrate as N (ppm)	ND – 1	2.5
Sodium (ppm)	23 – 44	103
Sulfate (ppm)	22 – 37	291

Constituent	Aqueduct*	Project Water**
TDS (ppm)	140 – 238	630
Uranium (pCi/L)	No data	8.5

Notes: ppb = parts per billion; ppm = parts per million; ND = not detected; µS/cm = microSiemens per centimeter; TDS = total dissolved solids.

*Data obtained from Kern County Water Agency Improvement District No. 4, Report on Water Conditions – Table 13 for years 2017, 2019, and 2020. Aqueduct samples collected near Tupman, CA.

**Project water is the theoretical blend using average results

***There was an outlier gross alpha result that cannot be explained as there are no subsequent sample results. Theoretical blend calculations include the outlier result.

One of DWR's requirements for pumping non-SWP water into the Aqueduct is that the water is of consistent, predictable, and acceptable quality prior to discharge and there cannot be adverse impacts to the receiving water. The District will comply with DWR's requirements as DWR will not permit pumping non-SWP water into the Aqueduct until the District demonstrates the water is of acceptable quality.

DWR also requires wellhead sampling for all Title 22 constituents every 3 years. Pump-In Entities may also be required to monitor the quality of the water pumped into the Aqueduct. If the Title 22 analysis indicates constituent(s) may exceed its drinking water standard, DWR will typically require a Pump-In Entity to monitor their list of "Constituents of Concern" weekly for 4 consecutive weeks to demonstrate the water is of consistent, predictable, and reliable quality upon startup. After a month of weekly monitoring, or until consistent water quality is demonstrated, the "Constituents of Concern" are then sampled quarterly at the turnout location where groundwater is discharged into the Aqueduct.

Results of the theoretical blending calculations shows that blending of the groundwaters with 50 percent of wells from each side of the Recovery Project Area will theoretically produce water that meets state and federal drinking water standards for most constituents. However, the water quality of the new production wells may vary from the water quality of the existing wells. Therefore, this impact is **potentially significant**. The District is proposing mitigation measures (listed below) to reduce this potential impact to a level of less-than-significant. Prior to well construction, either aquifer isolation zone testing, which is common water quality testing method used by the scientific and well drilling communities, will be conducted or alternatively, nested monitoring wells will be constructed.

In general, isolation aquifer zone testing consists of constructing a temporary monitoring well. If isolation zone testing is conducted, the pilot hole will be drilled, and geophysical characteristics logged to identify aquifers and clay beds that separate the aquifers. A piece of well screen is attached to the drilling rods inserted to a selected depth. Bentonite clay is placed above and below the screens' gravel pack opposite the screens to effectively seal off the aquifer to be tested. The temporary well is then developed and pumped to obtain a water quality sample representative of just that aquifer. After collection of the water sample the drill rods are extracted, raising the well screen to the next aquifer, and the process repeated. This method can only be used when clay layers are present so not all aquifers may be tested. This method will likely be used during construction of first few wells and may be discontinued for wells constructed after the water quality is better understood.

Alternatively, the District may construct nested monitoring wells adjacent to the proposed location of the production well. If this alternative is selected, the monitoring well can remain in place permanently. In

either scenario, water quality sampling will be conducted at varying depths to determine the appropriate well screen interval for the production wells. The production wells will then be designed to just collect water from aquifers with favorable water quality. Newly constructed wells will be added to BVWSD's existing monitoring well network and the District will continue to operate their groundwater monitoring program.

During well construction, strong well screens will be used, which will allow patches to be placed over them to prevent poorer quality water from entering the well once it is constructed. Bentonite clay seals will again be placed along with the gravel pack to isolate aquifers so that if patches are installed the poor-quality water does not move vertically within the gravel pack and enter the well through another well screen. The water quality may also be able to be adjusted by changing the pump intake depth.

To further reduce unfavorable levels of constituents identified earlier, treatment by blending will be conducted in a transmission pipeline. All wells will be blended in the pipeline prior to discharge into the Aqueduct *via* a turnout.

Impact HYDRO-2: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality

The Recovery Project could have impacts to the water quality of the Aqueduct, if discharges degrade the Aqueduct's existing water quality.

Results of the theoretical blending calculations shows that blending of the groundwaters with 50 percent of wells from each side of the Recovery Project Area will theoretically produce water that meets state and federal drinking water standards for most constituents. However, the water quality of the new production wells may vary from the water quality of the existing wells. Therefore, this impact is **potentially significant**.

MM HYDRO-1: Isolation aquifer zone testing or installation of nested monitoring wells will be conducted to identify aquifers with poor quality water prior to new well construction until the aquifers and water quality is better understood and then may be discontinued.

MM HYDRO-2: If needed, patches will be installed into a constructed well to improve water quality from the well. The depth of the pump may also be modified to improve water quality.

MM HYDRO-3: To develop the PIP, the District will conduct water quality sampling of all the wells quarterly for 1 year. Sampling will include Division of Drinking Water's Title 22 constituents along with DWR's "Constituents of Concern" that are not included in Title 22.

MM HYDRO-4: When water quality data becomes available on the Recovery Project's production wells (both existing and new wells), blending calculations will be updated. The final blending scenario will be selected to ensure that the final, blended water quality, meets DWR requirements.

MM HYDRO-5: The District will follow the water quality monitoring and reporting requirements in the Pump-In Agreement with DWR.

Timing: MM HYDRO-1 through MM HYDRO-4 will be implemented during Recovery Project construction. MM HYDRO-5 will be implemented during Recovery Project operation.

Responsibility: Buena Vista Water Storage District

Significance after Mitigation: Impacts after the implementation of mitigation will be **less-than-significant**.

3.5 Geological Resources

3.5.1 Environmental Setting

3.5.1.1 Regional Geology

The Recovery Project is located in the Great Valley geomorphic province near the eastern edge of the Coast Range (California Geologic Survey [CGS] 2002). The Great Valley is composed of thousands of feet of sedimentary deposits that have undergone periods of subsidence and uplift over millions of years. The Great Valley basin began to form during the Jurassic period as the Pacific oceanic plate was subducted underneath the adjacent North American continental plate. The faulted and folded sediments of the Coast Ranges extend eastward beneath most of the Central Valley. The igneous and metamorphic rocks of the Sierra Nevada extend westward beneath the eastern Central Valley. During the Jurassic and Cretaceous periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. Most of the surface of the Great Valley is covered with Holocene- and Pleistocene-age alluvium.

3.5.1.2 Seismicity and Other Hazards

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary hazard is fault ground rupture, also called surface faulting. Common secondary seismic hazards include ground shaking, liquefaction, settlement, and subsidence. Each of these potential hazards is discussed below.

3.5.1.3 Fault Ground Rupture and Ground Shaking

Surface rupture is an actual cracking or breaking of the ground along a fault during an earthquake. Structures built over an active fault can be torn apart if the ground ruptures. Surface ground rupture along faults is generally limited to a linear zone a few yards wide. The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (*refer to* Chapter 3.5.2.2 – State Plans, Policies, Regulations, Laws) was created to prohibit the location of structures designed for human occupancy across the traces of active faults, thereby reducing the loss of life and property from an earthquake. The Recovery Project is not located in or adjacent to an Alquist-Priolo Earthquake Fault Zone (CGS 2020a), and there are no known faults that cross or are located adjacent to the Recovery Project area (CGS 2020b).

The San Andreas Fault, located approximately 18 miles west of the Recovery Project, is the dominant structural feature of the eastern Coast Ranges. The San Andreas is more than 600 miles long, extending

from Point Arena to the Gulf of California. This fault is one in which historic (last 200 years) displacement has occurred.

3.5.1.4 Liquefaction and Settlement

Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid, thus becoming similar to quicksand. The factors that determine liquefaction potential are the soil type, level and duration of seismic ground motions, type and consistency of soils, and depth to groundwater. Loose sands and peat deposits, as well as uncompacted fill and Holocene deposits, are more susceptible to liquefaction. Generally, clayey silts, silty clays, clays deposited in freshwater environments, and deposits that are older than 11,700 years B.P. (i.e., Holocene) are more stable under the influence of seismic ground shaking.

Liquefaction poses a hazard to engineered structures, such as bridges, roads, buildings, and levees, and to underground utility pipelines. The loss of soil strength can cause bearing capacity to be insufficient to support foundation loads, can increase lateral pressure on retaining walls, and can result in slope instability.

Vertical settlement and/or lateral deformation of the ground surface is a common result of liquefaction. Vertical settlement may result from volume loss from venting to the ground surface or densification of the deposit. Densification occurs as excess pore pressures dissipate, sometimes resulting in settlement at the ground surface. Lateral deformation may result from lateral spreading toward a sloping freeface or shear deformations resulting from a reduction in the shear strength of the deposit. These lateral ground movements are often associated with a weakening or failure of an embankment or soil mass overlying a layer of liquefied sands or weak soils.

The valley floor of western Kern County is comprised of thick, unconsolidated, coarse-textured alluvial sediments composed of gravel, sand and silt of granitic composition. Due to the depth to groundwater, liquefaction does not present a major potential hazard within these areas.

3.5.1.5 Subsidence

Subsidence is the gradual settling or sudden sinking of the ground surface resulting from subsurface movement of earth materials. Land subsidence has historically occurred within the Valley. This type of ground failure can be aggravated by ground shaking. It is most often caused by the withdrawal of large volumes of fluids from underground reservoirs, but it can also occur by the addition of surface water to certain types of soils (hydrocompaction). Subsidence from any cause accelerates maintenance problems on roads, railroads, power lines, lined and unlined canals, and underground utilities. All new installations in areas suspected of subsidence should be engineered to withstand such subsidence.

According to the Kern County General Plan (2009), there are four types of subsidence that occur in the County:

Tectonic subsidence: a long-term, very slow sinking of the valley, which is significant only over a geologic time period.

Subsidence caused by the extraction of oil and gas. This type of subsidence in the project area is not a serious concern. The California Geologic Energy Management

Division (CalGEM) (formerly the California State Division of Oil, Gas, and Geothermal Resources (DOGGR)) monitors subsidence in oil and gas fields and regulates oil and gas withdrawal and repressurizing of the fields.

Subsidence caused by withdrawal of groundwater in quantities much larger than replacement can occur, causing a decline of the water level. This type of subsidence is of concern in parts of Kern County and should be closely observed and controlled. This practice has lowered the ground level over a large area south of Bakersfield and in other areas of the County. Subsidence of this type is one of the 6 undesirable results presented in California's Sustainable Groundwater Management Act (SGMA) where the undesirable result is defined as "significant and unreasonable land subsidence that substantially interferes with surface land uses".

Subsidence caused by hydrocompaction of moisture – deficient alluvial deposits. This is a one-time densification from collapse of the soil structure in near-surface strata where the rainfall or other moisture has not penetrated during a long period of time. Parts of the California Aqueduct were constructed through and over hydrocompactable deposits after compaction has occurred through ponding. The areas where hydrocompaction exists and suspect areas should be mapped, studied, and evaluated. Any development on these areas of damaging subsidence requires corrective measures.

The mechanism that could generate subsidence in the vicinity of the Recovery Project is withdrawal of groundwater. Infrastructure lying near or within the Recovery Project area include state and county roads, power lines, and water conveyance and control facilities including earth-lined canals and pipelines. This infrastructure has not exhibited damage from past subsidence. The principal subsidence concern is creation of groundwater conditions that could contribute to subsidence of Interstate Highway 5 and the Aqueduct, two facilities of regional and statewide importance that run near the Recovery Project area.

Subsidence in the Recovery Project area and the surrounding region is monitored at GPS stations P545 and P563, two participating stations of the Continuously Operating Reference Stations (CORS) network that provides Global Navigation Satellite System (GNSS) data. The two CORS stations are part of the National Geodetic Survey (NGS), an office of National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service that manages the CORS network on behalf of a group of government, academic, and private organizations. CORS enhanced post-processed coordinates approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically.

Data from CORS stations is supplemented by monitoring of ground surface elevations using data provided by DWR from the Interferometric Synthetic Aperture Radar (InSAR) network that measures vertical ground surface displacement. InSAR data is collected by the European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration's Jet Propulsion Laboratory.

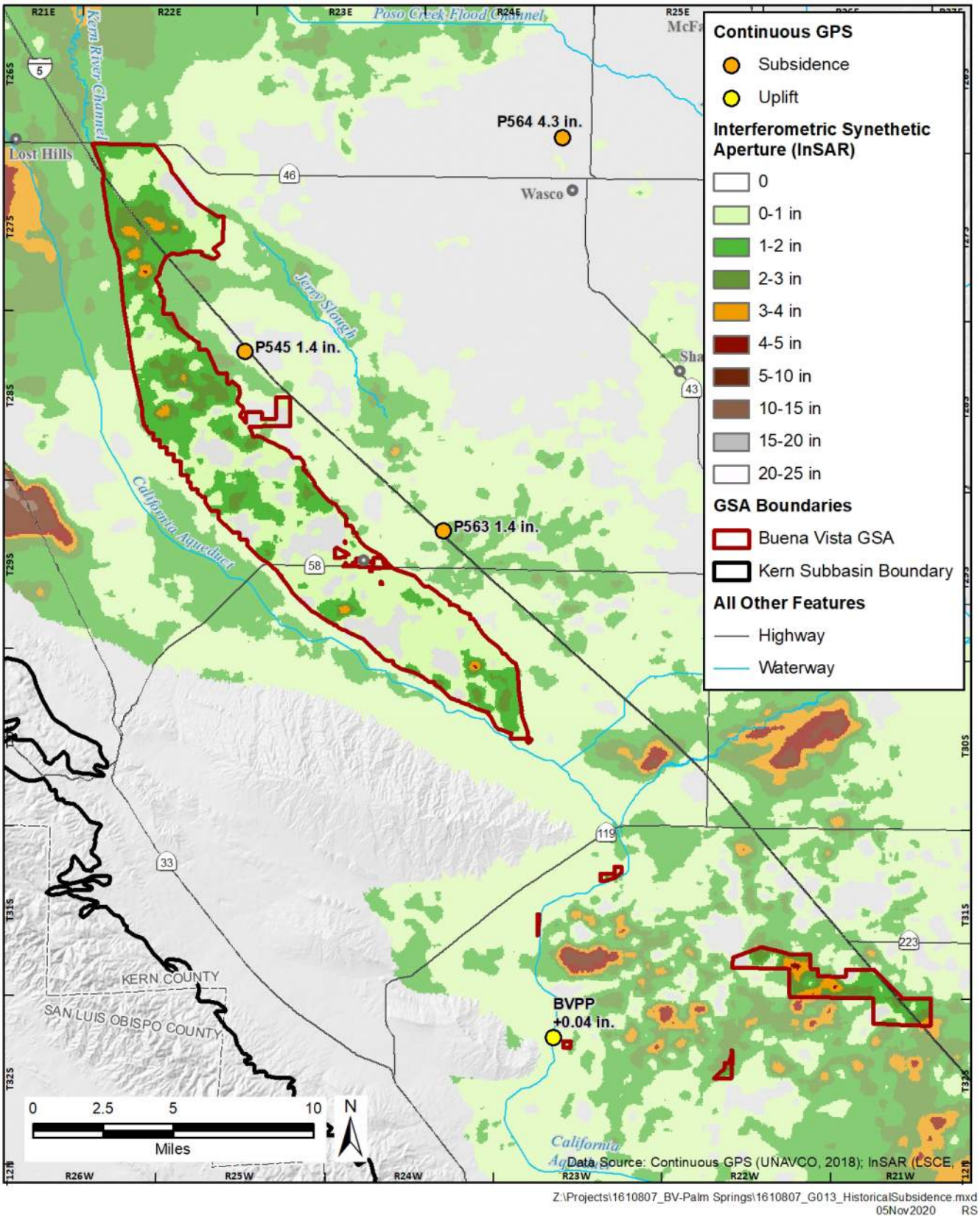
Historical subsidence, as observed by the CORS network over the period between January 2007 and March 2011 is shown on **Figure 3-16** prepared for the GSP submitted by the BVGSA. As shown on **Figure 3-16**, subsidence of from 0 to 2 inches was observed in the vicinity of the Palms over this period. If the average rate of subsidence is 1 inch, the midpoint of this range, the average annual rate of subsidence would be approximately 0.25 inches per year. This rate is consistent with cumulative subsidence of 3.15 inches

reported at CORS station P563 over the period from 2006 to 2019, which is equivalent to an annual rate of 0.24 inches.

Thus, while monitoring of land surface elevations described in the GSP has detected small levels of subsidence, there is insufficient evidence presented in the BVGSA GSP or in GSPs and other studies developed in neighboring areas to offer a correlation between land surface elevations and groundwater elevations sufficient to allow groundwater levels to serve as a proxy for ongoing or incipient inelastic subsidence.

Given these uncertainties, the BVGSA will join the other GSAs in the Subbasin "to develop a joint subsidence monitoring program to better understand the cause and impacts of subsidence and to develop MTs for subsidence for inclusion in the 2025 GSP update" (KGAGSP 2020).

Figure 3-17. Historical Subsidence January 2007 to March 2011



3.5.1.6 Slope Stability

Seismic-induced landslides would not represent a hazard due to the construction of the Recovery Project (CGS 2020c). The Recovery Project site is not located in an area that is susceptible to landslides as the site is relatively flat.

3.5.1.7 Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey nine soil map units are present within the Recovery Project area (**Table 3-8**) (NRCS 2020). Buttonwillow clay and Lokern clay occupying approximately 73 percent of the Recovery Project area and exhibit a high shrink-swell potential.

Table 3-8. Soils in the Recovery Project area

Soil Series Name and ID	Parent Material	Shrink-Swell Potential
123, Buttonwillow clay, drained	Alluvium derived from granite	High
125, Granoso loam sand, 0 to 2% slopes	Alluvium derived from mixed rock sources	Low
126, Granoso loamy 2 to 5% slopes	Alluvium derived from mixed rock sources	Low
152, Excelsior sandy loam, 0 to 2% slopes, MLRA 17	Calcareous coarse-loamy alluvium derived from sedimentary rock	Low
156, Garces silt loam	Alluvium derived from granite	Low
174, Kimberlina fine sandy loam, 0 to 2% slopes MLRA 17	Alluvium derived from igneous and sedimentary rock	Low
187, Lokern clay, drained	Alluvium derived from granite	High
214, Calflax clay loam, saline-sodic, 0 to 2% slopes, MLRA 17	Alluvium derived from calcareous sedimentary rock	Moderate
245, Westhaven fine sandy loam	Alluvium derived from granite	Low

Notes: MLRA 17 = Major Land Resource Area 17, Sacramento and San Joaquin Valleys
Source: NRCS 2020

3.5.1.8 Paleontological Resources

The Recovery Project is located on Pleistocene-Holocene alluvium, basin and fan deposits (CGS 2010; DOC 1964). The bedrock underlying the site is comprised of marine and nonmarine sedimentary rock. Sediments associated with Holocene-age alluvium are too young to contain paleontologically sensitive resources.

3.5.2 Regulatory Framework

3.5.2.1 Federal Plans, Policies, Regulations, and Laws

Earthquake Hazards Reduction Act of 1977

The Earthquake Hazards Reduction Act of 1977 established the National Earthquake Hazards Reduction Program (NEHRP), "to reduce the risks of life and property from future earthquakes in the U.S. through the establishment and maintenance of an effective earthquake hazards reduction program." The four principal goals of the NEHRP are:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems
- Improve earthquake hazards identification and risk assessment methods, and their use
- Improve the understanding of earthquakes and their effects

Many of the tools used to assess, as well as mitigate, earthquake hazards and impacts were developed under the NEHRP.

3.5.2.2 State Plans, Policies, Regulations, Laws

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Act (PRC § 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (PRC § 2690–2699.6) addresses earthquake hazards from nonsurface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

National Pollutant Discharge Elimination System Permit

In California, State Water Board administers regulations promulgated by EPA (55 CFR § 47990) requiring the permitting of stormwater-generated pollution under the N.P.D.E.S. In turn, State Water Board's jurisdiction is administered through nine regional water quality control boards. Under these federal regulations, an operator must obtain a general permit through the N.P.D.E.S. Stormwater Program for all construction activities with ground disturbance of 1 acre or more. The general permit requires the implementation of BMPs to reduce sedimentation into surface waters and to control erosion. One element of compliance with the N.P.D.E.S. permit is preparation of a SWPPP that addresses control of water pollution, including sediment, in runoff during construction. (*See* Chapter 3.4 – Hydrology and Water Quality, for more information about N.P.D.E.S. and SWPPP requirements.)

Professional Paleontological Standards

The Society of Vertebrate Paleontology (1995), a national scientific organization of professional vertebrate paleontologists, has established standard guidelines that outline acceptable professional

practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation. Most practicing professional paleontologists in the nation adhere to the Society of Vertebrate Paleontology assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines.

3.5.2.3 Regional and Local Plans, Policies, Regulations, and Ordinances

Kern County General Plan

The Kern County General Plan (2009) includes the following policies that pertain to geological resources and are relevant to this analysis.

Landslides, Subsidence, Seiche[9], and Liquefaction

- **Policy 3.** Reduce potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion.

3.5.3 Environmental Impacts and Mitigation Measures

3.5.3.1 Thresholds of Significance

Significance criteria are based on Appendix G of the CEQA Guidelines. The Recovery Project would have a significant impact on geology resources if it would either:

- expose people, property, or structures to potential substantial adverse impacts, including the risk of loss, injury, or death involving either:
  - 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
  - strong seismic ground shaking
  - seismic-related ground failure, including liquefaction
  - landslides
- result in substantial soil erosion or the loss of topsoil
- 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
- 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
- have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater

[9] A seiche is a standing wave in an enclosed or partly enclosed body of water.

- 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 or a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan

3.5.3.2 Issues Not Discussed Further

The project area is located approximately 11 miles from the nearest Alquist-Priolo Earthquake Fault Zone, and it is not underlain by or located immediately adjacent to any known faults. Because the damage from surface fault rupture is generally limited to a linear zone a few yards wide, the potential for surface fault rupture to cause damage to the proposed wells and conveyance pipes is negligible. Therefore, this impact is not evaluated further in this FEIR.

The Recovery Project facilities, wells and conveyance pipes, would either be buried or extend only a few feet above ground, and would not pose a direct risk to people during seismic activity. If a seismic event should cause a pipeline to break or well to collapse, the water would be released underground in a low gradient, agricultural area, posing minimal risk to people or structures. Therefore, Recovery Project implementation would result in no significant impact to people or structures from any seismic-related activity. as a result of implementation of the Recovery Project.

The Recovery Project is not located on unstable soils and implementation of the proposed project would not result in instability or excessive soil erosion. Because construction activities would disturb an area larger than 1 acre, the District is required by law to obtain coverage under the State Water Board N.P.D.E.S. stormwater permit for general construction activity, including preparation and submittal of a Notice of Intent to discharge with the Central Valley RWQCB. The District is required to prepare a SWPPP and comply with the conditions of the N.P.D.E.S. general stormwater permit for construction activities. The SWPPP shall describe the construction activities to be conducted, BMPs that would be implemented to prevent soil erosion and contaminated stormwater discharges into waterways, and inspection and monitoring activities that would be conducted. Topsoil may be stripped and stockpiled for later reuse on the site. With the implementation of a Dust Control Plan or Construction Notification form loss of topsoil would be minimized during construction. Operation of the Recovery Project would not create the potential for soil erosion or loss of topsoil as the area is in a cultivated agricultural field and is topographically flat.

During project construction activities, portable restroom facilities would be provided. The project would not require the provision of sewer service. Because project soils would not be used for septic systems or alternative means of waste disposal, there would be no impact, and this issue is not evaluated further in this FEIR.

Because the Recovery Project area is distant from the Pacific Ocean, tsunamis or seiches would not represent a hazard in the project area. Therefore, this issue is not evaluated further in this FEIR.

3.5.3.3 Analysis Methodology

The analysis prepared for this FEIR relied on NRCS soil survey data and published geologic literature and maps. The information obtained from these sources was reviewed and summarized to present the existing conditions and to identify potential environmental impacts, based on the thresholds of significance

presented in this section. Impacts associated with geology resources that could result from project construction and O&M activities were evaluated qualitatively based on site conditions; expected construction practices; and the materials, locations, and duration of project construction, O&M, and related activities.

3.5.3.4 Impact Analysis

Impact GEO-1: ***Increase Subsidence-Induced Risks to People and Structures:***

The Recovery Project has the potential to cause subsidence during operations due to extraction of groundwater. However, groundwater extraction would not occur from beneath the E-clay and groundwater levels will not decline to levels significantly more than what the site has historically experienced. In addition, "significant and unreasonable land subsidence that substantially interferes with surface land uses" is defined as an undesirable result under SGMA. Therefore, subsidence is being monitored and mitigation measures would be taken to avoid operation of the Recovery Project leading to subsidence that compromised the sustainable management of the Kern County Subbasin. Therefore, this impact would be ***less-than-significant****.*

Inelastic land subsidence is a concern in areas of active groundwater extraction due to risks to canal and infrastructure damage, permanent reduction in the groundwater storage capacity of the aquifer, well casing collapse, and increased flood risk in low lying areas. Inelastic subsidence typically occurs in the clay layers within aquifers and aquitards due to the withdrawal of water in storage within these layers during over-pumping, which induces the permanent rearrangement or collapse of the clay layer.

According to DWR (2014), the Kern County Subbasin was rated at a high risk for future subsidence due to 1) a significant number of wells with water levels at or below historic lows; 2) documented historical subsidence; and 3) documented current subsidence. However, the BVGSA has displayed little evidence of any of these tendencies. This may be due to the BVWSD's long standing reliance on surface water, which has enabled water users to pump groundwater as a supplemental source of supply. Limiting reliance on groundwater has helped support groundwater elevations and has avoided the need to extract water from beneath the E-clay. By contrast other parts of the Subbasin have experienced greater reductions in groundwater levels and a greater need to extract water from both above and below the E-clay, practices which are likely to have fueled subsidence.

Future subsidence will depend on whether water levels decline below previous low levels and remain low for a considerable length of time (BVGSA 2020). The range of groundwater elevations at monitoring locations due to project operation is expected to be similar to the range of elevations that has been experienced in the past (*see* **Figure 5-5**).

The BVGSA discourages groundwater extraction from beneath the E-clay, in part, because of the potential for extraction from this confined zone to induce subsidence (BVGSA 2020). The BVGSA GSP states that the risk of inducing subsidence by extracting water from the zone above the E-clay is likely to be lower than the risk induced by extracting water from beneath the E-clay. The volume of groundwater stored above the E-clay is likely to be adequate to meet the demands of the Buttonwillow Service Area, which

the Recovery Project resides in, under foreseeable conditions. Recovery wells constructed as part of the Recovery Project will not be constructed below the E-clay.

The BVGSA proposes to monitor subsidence as described in the BVGSA GSP. Subsidence is monitored directly at GPS stations participating in the CORS network that provides GNSS data. These stations are part of the NGS, an office of NOAA's National Ocean Service. Data from CORS stations in the Recovery Project vicinity will be supplemented through monitoring of ground surface elevations using data provided by DWR from the InSAR network that measures vertical ground surface displacement. The European Space Agency Sentinel-1A satellite collects InSAR data which now provides cumulative vertical ground surface displacement from June 2015 through September 2019 for lands in the Recovery Project vicinity.

Therefore, this impact would be **less-than-significant**.

Mitigation Measure: No mitigation is required.

Impact GEO-2: ***Possible Damage to or Destruction of Previously Unknown Unique Paleontological Resources during Construction-Related Activities:***

The Recovery Project would be constructed on Holocene Alluvium rock formation. This formation is not typically considered to be paleontologically sensitive, however, the exact age of the bedrock is unknown. Since sedimentary soils are found within the project site and fossils are found exclusively in sedimentary soils there is a chance that paleontological resources could be uncovered, therefore this impact would be ***potentially significant****.*

Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years) (Society of Vertebrate Paleontology 2010). The Recovery Project would be constructed on Holocene (current geologic epoch which began approximately 111,650 cal B.P.) alluvium sediment. Holocene deposits contain only the remains of extant, modern taxa (if any resources are present), which are not considered "unique" paleontological resources. Therefore, this formation is not considered to be paleontologically sensitive and construction activities that occur in this rock formation would have no impact on unique paleontological resources. However, since the exact age of the bedrock is unknown and paleontological resources are found almost exclusively in sedimentary rock, there is a chance of discovering unknown paleontological resources within the Recovery Project site. With implementation of the below mentioned mitigation measure impacts would be less-than-significant with mitigation

Mitigation Measure GEO-1: **Avoid Potential Effects on Paleontological Resources**.

In the event that a paleontological resource is uncovered during Recovery Project implementation, all ground-disturbing work within 50 meters of the discovery shall be halted. A qualified paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts will occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, a qualified paleontologist shall evaluate the resource and determine whether it is "unique" under CEQA, Appendix G, part VII. The determination and associated plan for protection of the resource shall be provided to the District for review and approval. If

the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the paleontologist shall consult with the District staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation in place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources and shall be required unless there are other equally effective methods. Other methods may be used but must ensure that the fossils are recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of a qualified paleontologist. All recovered fossils shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology standard guidelines; typically, the Natural History Museum of Los Angeles County and University of California, Berkeley accept paleontological collections at no cost to the donor. Work may commence upon completion of treatment, as approved by the District.

Timing: During construction activities

Responsibility: BVWSD

Significance after Mitigation: The impact would be reduced to **less-than-significant**.

[This page intentionally left blank.]

4.0 Other CEQA Required Sections

4.1 Introduction

This chapter describes other required topics including growth inducing impacts, significant and unavoidable impacts, significant irreversible environmental changes relative to the proposed project, and the cumulative impact assessment.

4.2 Growth Inducing Impacts

CEQA (Guidelines § 15126.2(e)) requires that an EIR evaluate the growth inducing impact of a proposed project. The CEQA Guidelines describe the required growth inducement analysis as follows:

> Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.

Included in this definition are public works projects, which would remove obstacles to population growth, would tax community service facilities, or encourage or facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

A project can have the potential for direct and/or indirect growth inducement. Direct growth inducement would result if a project involved construction of new housing which would facilitate new population in an area. Indirect growth inducement or secondary growth-inducement potential would be present if it would establish substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises), or if it would involve a substantial construction effort with substantial long-term employment opportunities which could indirectly stimulate the need for additional housing and services to support the new employment demand.

Similarly, a project could indirectly induce growth if it would remove a physical obstacle to additional growth and development, such as removing a constraint or adding a required public service. Examples of removing a physical obstacle would include construction of a new roadway into an undeveloped area or construction of a wastewater treatment plant with sufficient capacity to serve additional new development. Construction of these types of infrastructure projects cannot be considered isolated from the immediate development that they facilitate and serve. Projects that physically remove obstacles to growth, or projects that indirectly induce growth, are those that may provide a catalyst for future unrelated development in the area. The growth inducing potential of a project could also be considered significant if it fosters growth in excess of what is assumed in the local master plans and land use plans, or in projections made by regional planning agencies.

4.2.1 Direct Growth Inducement

The proposed project does not include the construction of new housing, businesses, or roadways, require acquisition of private property, or create new connections to undeveloped land. The proposed project aims to increase the District's ability to recharge groundwater in wet years and return that water in dry years. This would mainly benefit agriculture by providing irrigation water supplies in years with limited surface water supplies. No impacts would occur to the surrounding communities. The proposed project would also not create permanent employment. The Recovery Project is consistent with the Kern County General Plan (2009) as the proposed project would be zoned for Agriculture and the Recovery Project would not change the zoning designation of adjacent areas. Development of the site as proposed would not alter the existing landscape. Therefore, the Recovery Project will have **no impact** on growth.

4.3 Significant and Unavoidable Impacts

CEQA Guidelines section 15126(b) requires an EIR to "describe any significant impacts, including those which can be mitigated but not reduced to a level of insignificance. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the proposed project is being proposed, notwithstanding their effect, should be described."

Chapter 3.0 – Environmental Setting, Impact Analysis, and Mitigation Measures, provides a description of the potential environmental impacts of the proposed project and recommends mitigation measures to reduce impacts to a less than significant level, where possible. After implementation of the recommended mitigation measures, all of the potentially significant impacts associated with the proposed project would be reduced to a **less-than-significant** level. Therefore, the Recovery Project will not have significant and unavoidable impacts.

4.4 Irreversible and Irretrievable Commitment of Resources

CEQA Guidelines section 15126.2(d) describes irreversible environmental changes as follows:

> Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

The CEQA Guidelines refer to the need to evaluate and justify the consumption of nonrenewable resources and the extent to which the proposed project commits future generations to similar uses of nonrenewable resources. In addition, CEQA requires that irreversible damage that could result from an environmental accident associated with the Recovery Project be evaluated.

Construction of the proposed project would result in the commitment of nonrenewable natural resources used in the construction process and during operation, including electricity, petroleum products and other materials. As described in Chapter 2.0 – Project Description, the proposed project would not require large areas to be

excavated or include the demolition or removal of existing buildings or infrastructure that would generate large amounts of construction waste.

Construction and operation of the proposed project would also result in commitment of energy resources such as fossil fuels and electricity. Direct energy used during construction and operation would involve using petroleum products and electricity to operate equipment during construction activities, and to operate pump motors in all proposed new wells, and replacement wells during operations. Construction-related energy consumption would be temporary and would be confined to the construction period. Nevertheless, construction and operation activities would, as with any construction project, cause irreversible and irretrievable commitments of finite nonrenewable energy resources, such as gasoline and diesel fuel.

Although no significance thresholds are available for analysis of energy consumption, energy would be used wisely and efficiently during project construction and operations because air quality impacts would be mitigated to the extent feasible. Furthermore, the selected construction contractor(s) would use the best available engineering techniques, construction and design practices, and equipment operating procedures. In addition, the proposed project would comply with applicable federal, state and local policies and regulations pertaining to energy standards and would ensure that natural resources are conserved to the maximum extent possible. Therefore, due to the rate and amount of energy consumed, the proposed project would not result in the unnecessary, inefficient, or wasteful use of resources and energy use would be accomplished in a manner consistent with applicable laws and regulations.

4.5 Cumulative Impact Analysis

CEQA requires an EIR to include a discussion of cumulative effects of a project when the Recovery Project's incremental effect is "cumulatively considerable." An effect is cumulatively considerable when it is significant in connection with the effects of past projects, the effects of other current projects and the effects of future projects (CEQA Guidelines § 15065(a)(3)).

A "cumulative impact" is an impact that is created as a result of the combination of a project together with other projects causing related impacts. The first step in the cumulative analysis, therefore, is to identify each impact of the project and, in each case, consider whether there are other projects (past, current, future) that could have related impacts, and then to determine whether the project's contribution to the overall impact is "cumulatively considerable."

4.5.1 Geographic Scope of Cumulative Impact Analysis

The geographic area that is analyzed for cumulative impacts depends on the resource being analyzed. The geographic area associated with a proposed project's different environmental impacts defines the boundaries of the area used for compiling the list of past, present, and probable future projects considered in the cumulative impact analysis. The geographic area varies depending on the type of environmental resource being considered (**Table 4-1**).

4.5.2 Projects Considered in Cumulative Impact Analysis

A discussion of cumulative impacts must include either a list of past, present, and probable future projects producing related or cumulative impacts, or a summary of projections contained in adopted local, regional,

or statewide plan or related planning document (CEQA Guidelines § 15130(b)). For this FEIR, both approaches were applied (**Table 4-1**).

A list of past, current, and reasonably foreseeable future projects was compiled using information provided by BVWSD, and comments received in response to the NOP. The past, present and reasonably foreseeable future projects proposed are within or directly adjacent to the Recovery Project, or the surrounding community were identified and categorized in **Table 4-2**, below. For the purposes of this discussion, these projects that may have a cumulative effect on the resources of the Recovery Project are often referred to as the "collective projects." These projects are described in **Table 4-2**.

Table 4-1. Geographic Scope of Cumulative Impact and Method Evaluation

Resource Topic	Geographic Area	Method of Evaluation[10]
Biological Resources	Immediate Recovery Project area and adjacent surrounding vicinity	Projects listed in **Table 4-2**
Cultural Resources	Immediate Recovery Project area and adjacent surrounding vicinity	Projects listed in **Table 4-2**
Hydrology and Water Quality	San Joaquin Valley Groundwater Basin - Kern County Subbasin	Projections from the C2VSimFG-Kern model for the 2020 Kern County Subbasin GSAs (**Appendix D**, Attachment D)
Geological Resources	Immediate Recovery Project area and adjacent surrounding vicinity	Projections from the C2VSimFG-Kern model for the 2020 Kern County Subbasin GSAs (**Appendix D**, Attachment D)

Notes: C2VSimFG-Kern = California Central Valley Groundwater-Surface Water Simulation Model

Table 4-2. List of Collective Past, Present, and Reasonably Anticipated Future Projects

Project	Status	In-District Location	Description
Corn Camp Groundwater Recharge Pond Project	Construction scheduled for 2021	20 miles west of Bakersfield	Construction and operation of a 50-acre recharge pond, with capacity to recharge up to 24,500 AFY
Buena Vista Pipeline and Brite Pump Station Project	Construction scheduled for 2021	Between State Route 58 and the Kern River Flood Canal	32 miles of pipeline
Belridge Pipeline Project	Construction scheduled for late 2021	Between the Aqueduct and the Kern River Flood Canal	2.2 miles of pipeline

4.5.3 Methods

The analysis below examines the cumulative impacts of the proposed project for each of the topics that are analyzed in Chapter 3.0 – Environmental Setting, Impact Analysis, and Mitigation Measures. The impacts are assessed by short term (construction) and long term (operational) impacts of the proposed project combined with the impacts of the past and planned projects listed in **Table 4-2**.

[10] Projects: the use of a list of past, present, and reasonably foreseeable projects. Projections: the use of Projections contained in relevant planning documents.

The following objectives were set forth to analyze the short-term construction and long-term operational cumulative impacts. First, there is an assessment of whether the baseline condition, when considered with the proposed project, entails a significant impact to any specific resource. Then, there is an assessment of whether the combined impacts of the proposed project and the projects listed in **Table 4-2** are cumulatively significant. Finally, there is a determination of whether the incremental effects of the proposed project would 'contribute considerably' and therefore cause a cumulatively considerable effect. If so, there is also a determination of whether mitigation is feasible.

Note: it is possible that even when the cumulative impact of multiple projects is significant, the incremental contribution of the impact for the proposed project may itself not be cumulatively considerable (CCR § 15064.H4, *Communities for Better Environment v. South Coast Air Quality Management District*). In this case, the Recovery Project's impact would not be cumulatively considerable.

Furthermore, a project's contribution is less than cumulatively considerable if the project implements mitigation measures designed to alleviate the cumulative impact (CEQA Guidelines § 15130 (a)(3)).

4.6 Cumulative Impact Analysis by Resource Area

The following resource sections have the potential to have cumulative impacts from development of the Recovery Project and collective projects.

4.6.1 Biological Resources

As indicated in the biological resources impact analysis in Chapter 3.2 – Biological Resources project operation is not anticipated to impact biological resources, because the Recovery Project would be managed to improve groundwater elevations in the long term by recharging more water than is recovered and project facilities are located within existing disturbed corridors and agricultural lands. Therefore, potential for cumulative impacts is limited to project construction.

Several species-status reptiles, birds, and mammals were determined to have potential to occur on or adjacent to the Recovery Project site and be significantly impacted by project construction. Of these, six birds and one mammal also have potential to be significantly impacted by one or more of the other projects in the vicinity (*refer to* **Table 4-2**). Therefore, simultaneous construction of the Recovery Project and nearby cumulative projects could potentially result in significant impacts on special-status wildlife, if such wildlife are present on or adjacent to any of project sites. However, mitigation measures would be implemented to reduce potential impacts of the cumulative projects to a less-than-significant level. In addition, with implementation of Mitigation Measures BIO-1, BIO-2a, BIO-2b, and BIO-3 described in Chapter 3.2 – Biological Resources, all Recovery Project impacts on special-status wildlife would be reduced to less than significant. Residual impacts of the Recovery Project and the cumulative projects would be minimal, and the combined impacts of all the projects would remain less than significant.

Because combined impacts of the projects do not constitute a significant impact and the Recovery Project would not have residual significant impacts on biological resources, the Recovery Project would not make a cumulatively considerable incremental contribution to a significant cumulative impact related to biological resources.

4.6.2 Cultural Resources

Cultural resources, specifically prehistoric archaeological resources, are not renewable, once they have been destroyed, either by inadvertent circumstances or even by archaeological excavation. It's impossible to quantify how large a loss to cultural resources the loss of a given number of resources would be because the number of cultural resources is unknown. A relative impact can be surmised, however. The Recovery Project would not result in cumulative impacts to cultural resources in the region because there are no known cultural resources that would be impacted.

It is, however, possible the Recovery Project could directly impact unanticipated cultural resources or human remains during construction. Although the project could create potentially significant impacts to undiscovered cultural resources and human remains, any such impacts would be reduced to less-than-significant with the implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3. Therefore, implementation of the project would not make a cumulatively significant impact on cultural resources.

Since combined impacts of the projects do not constitute a significant impact and the Recovery Project does not entail a significant impact to cultural resources, there would not be a contribution to a cumulatively considerable impact.

4.6.3 Hydrology and Water Quantity

4.6.3.1 Hydrology Analysis Method

The Kern County Subbasin Coordination Agreement refers to the local groundwater-surface water model (C2VSimFG-Kern) as the agreed upon method for generating coordinated water budgets for the Kern County Subbasin. Appendices 2 and 4 of the Kern County Subbasin Coordination Agreement include a technical report (Maley and Brush 2020) on the development and application of C2VSimFG-Kern for these purposes. Notwithstanding some limitations, C2VSimFG-Kern is considered to be the best available information and well-suited as a planning tool to estimate the impacts of the proposed SGMA projects and management actions on groundwater conditions in the Kern County Subbasin. Additional information on C2VSimFG-Kern can be found in **Appendix D** of this FEIR.

Four different scenarios were modeled, a Baseline Scenario, a Baseline-with-SGMA Projects Scenario, a Cumulative Scenario, and a Cumulative with Deferred Recovery Scenario.

The Baseline Scenario simulates how potential future groundwater conditions in the Kern County Subbasin aquifer would respond if the recent hydrology were repeated with current expected surface water availability and current land use over a 50-year planning horizon under a range of climatic conditions, following DWR guidance.

The Baseline Scenario was then modified to include reasonably foreseeable future projects (known as proposed future SGMA projects). A listing of the proposed future SGMA projects included in the Baseline-with-SGMA Projects Scenario are described in the Kern County Subbasin GSPs (KGA 2020; Kern River Groundwater Sustainability Agency [KRGSA] 2020; HMGSA 2020). Excerpts from those GSPs describing these proposed future SGMA projects are provided in **Appendix D**, Attachment D.

The Recovery Project's recharge and recovery pumping rates were added to the C2VSimFG-Kern model's Baseline-with-SGMA Projects Scenario to produce the Cumulative Scenario. The purpose of the Cumulative Scenario is to assess the potential cumulative effects of a range of potential operational scenarios of the Recovery Project in context with the proposed future SGMA projects in complying with the SGMA MTs and MOs.

The setup of the Cumulative Scenario is limited to adding the recharge at the Palms Recharge Facility during the wet years. These wet years are equivalent to the historical hydrology years of 1998, 2006, and 2011. The Cumulative Scenario assumes 90 percent recovery, where pumping occurs at a rate of 25,000 AFY over 6 months in the years after the recharge event until the total recovery equals 90 percent of the total recharge.

The Cumulative Scenario includes recharge at different volumes. This was done primary to fit straightforward cycles of groundwater recharge followed by a complete 90 percent recovery of the recharge to provide a clear cause and effect analysis of the simulation results without consideration of the effects of recharge account carryover to later years.

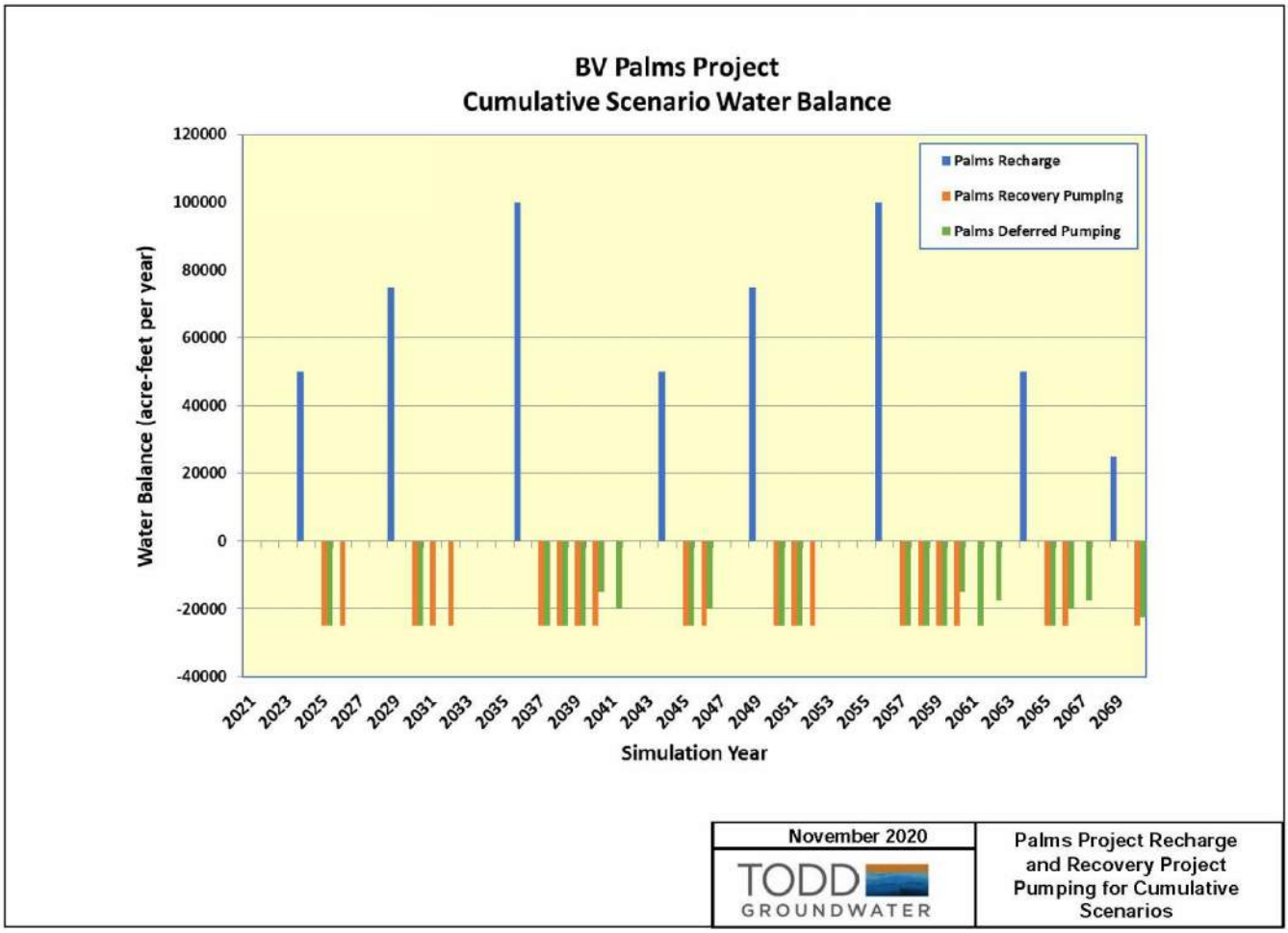
- 1998 hydrology equivalent: 100,000-AF recharge event occurred in simulation years 2036, 2056 followed by 4 years of pumping of 90% of recharge total
- 2006 hydrology equivalent: 50,000-acre-foot recharge event occurred in simulation years 2036, 2056 followed by 2 years of pumping of 90% of recharge total
- 2011 hydrology equivalent: 75,000-acre-foot recharge event occurred in simulation years 2036, 2056 followed by 3 years of pumping of 90% of recharge total
- Final 2 years of simulation: 25,000-acre-foot recharge event occurred in simulation year 2069 followed by 1 year of pumping of 90% of recharge total

This distribution is graphically displayed on **Figure 4-1**. Over the 50-year simulation, the total recharge is 525,000 AF with 472,500 AF of pumping to recover 90 percent of the Palms Project recharge. The remaining 10 percent of the recharge (52,500 AF) is left in the aquifer.

As is discussed below, the Cumulative Scenario results indicated that groundwater elevations at some representative monitoring well (RMW) locations adjacent to the Recovery Project's recovery wells may fall below their MT. Conversely, groundwater levels during the recharge events are higher than those without the Palms Projects.

For the Cumulative with Deferred Recovery Scenario, the approach was to apply the recharge following the same schedule as for the Cumulative Scenario, but to stop Recovery Project pumping prior to groundwater levels reaching their MTs at RMW locations (**Figure 4-1**). This pumping was then applied during a later period in the 50-year simulation when simulated groundwater levels were higher, thus, simulating a deferred recovery mitigation measure. As a result, the total recharge and pumping over the 50-year simulation period is the same as the Cumulative Scenario. This scenario was developed to test whether deferring the pumping to a later period would keep groundwater levels above the MTs.

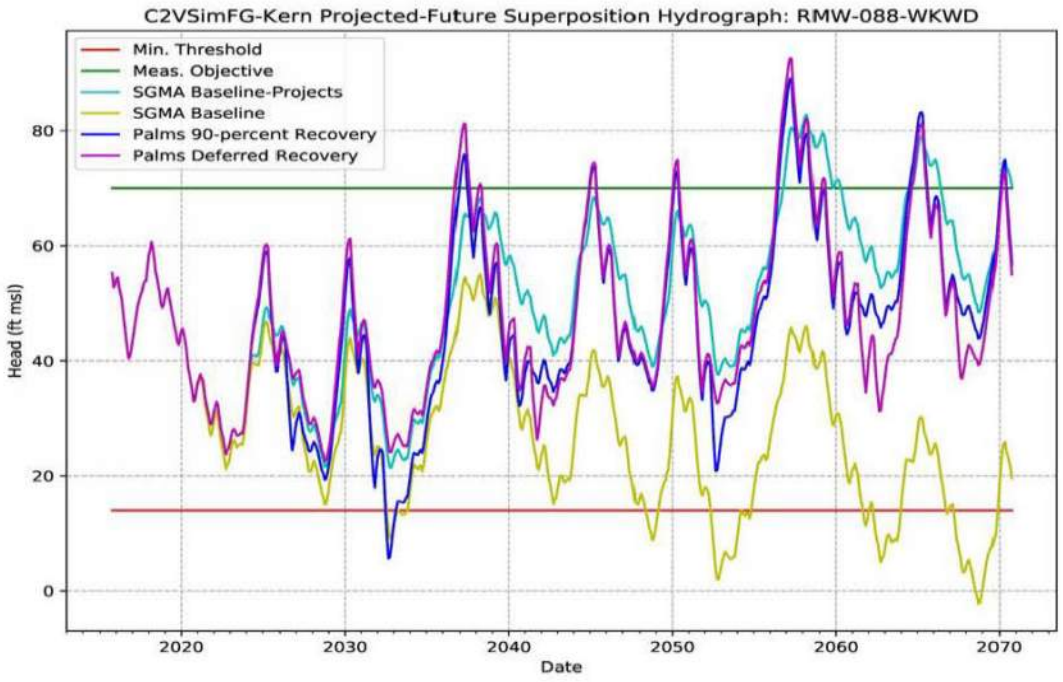
Figure 4-1. Recharge and Recovery Operations for Cumulative Scenarios

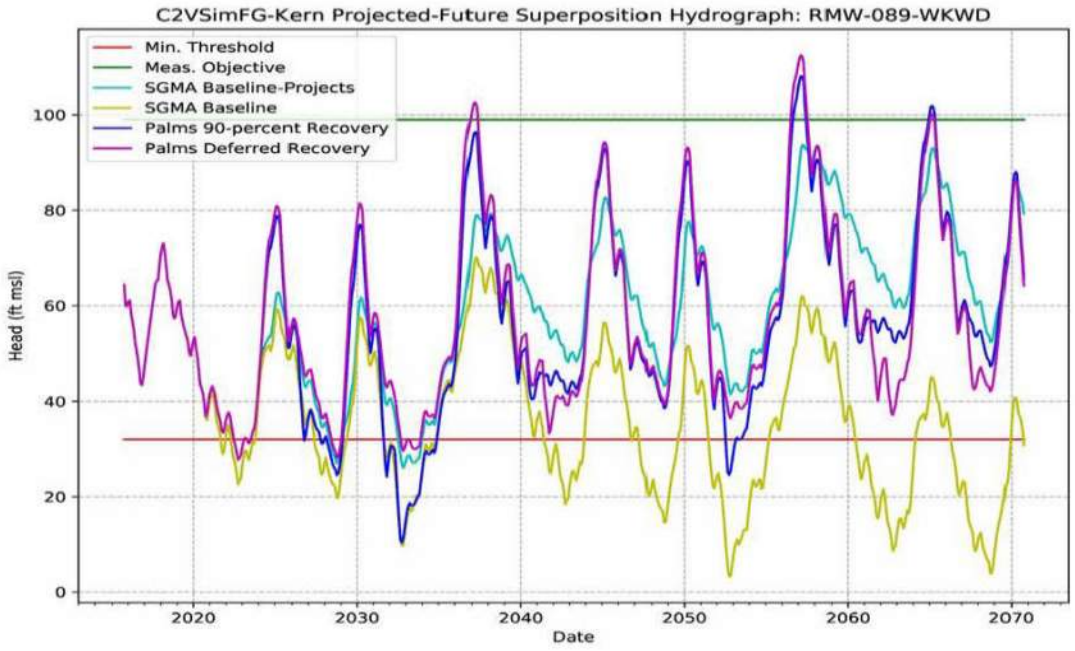


4.6.3.2 Hydrology Results

The results of the cumulative impact assessment are provided on a series of hydrographs from RMW locations in the vicinity of the Recovery Project. **Figures 4-2, 4-3, 4-4, and 4-5** provide the results of the RMW locations in the vicinity of the Recovery Project. The graphs present the MTs and MOs, two of the Sustainable Management Criteria (SMCs) established by each GSA under SGMA, for each RMW location along with the results of the modeling for each of the four scenarios.

Figure 4-2. Cumulative Scenarios WKWD North Locations





November 2020	Cumulative Scenario Hydrographs of WKWD North Locations
TODD GROUNDWATER	

Figure 4-3. Cumulative Scenarios Western RRBWSD Locations

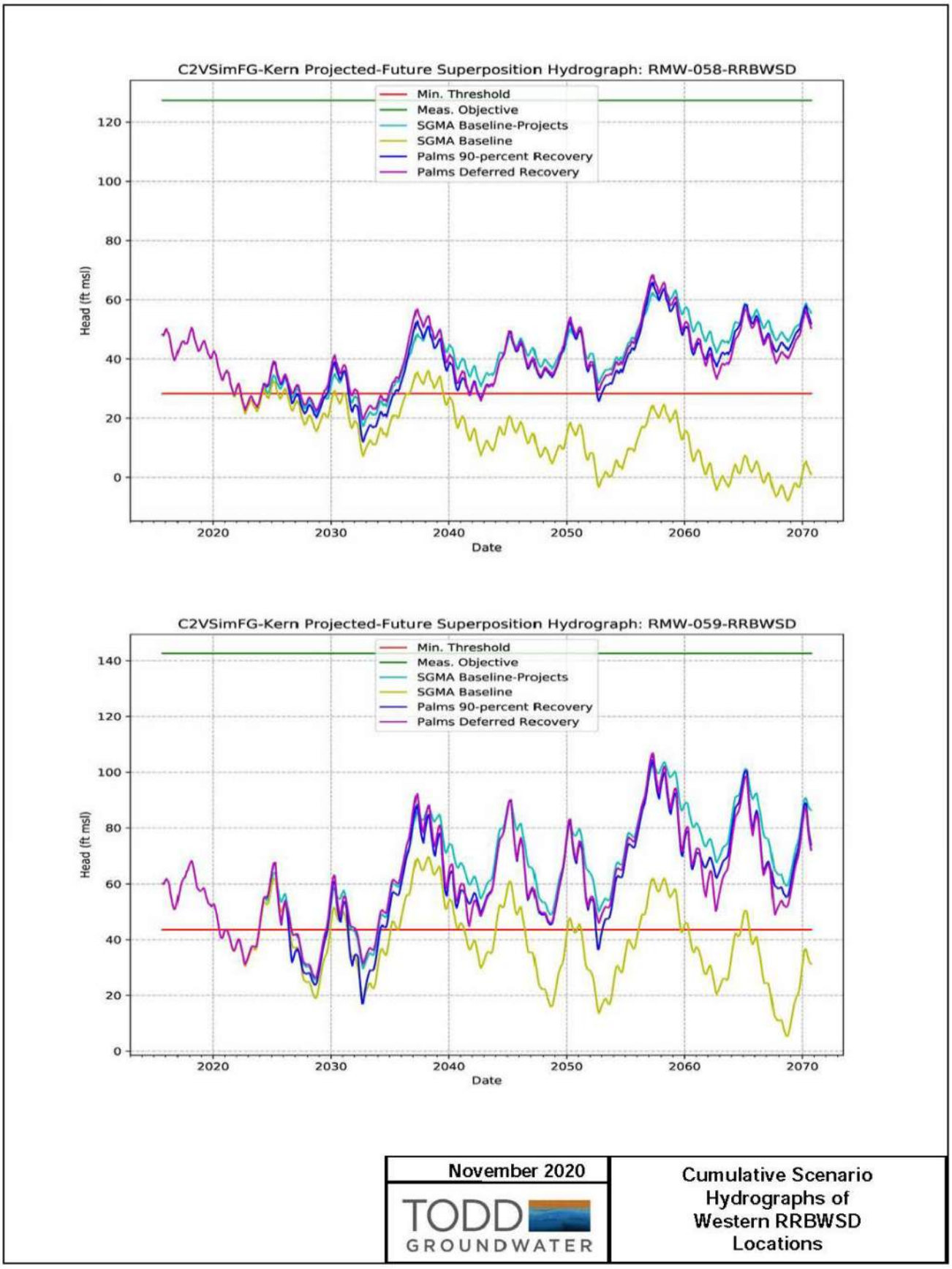


Figure 4-4 Cumulative Scenarios Distal from Recovery Project Site

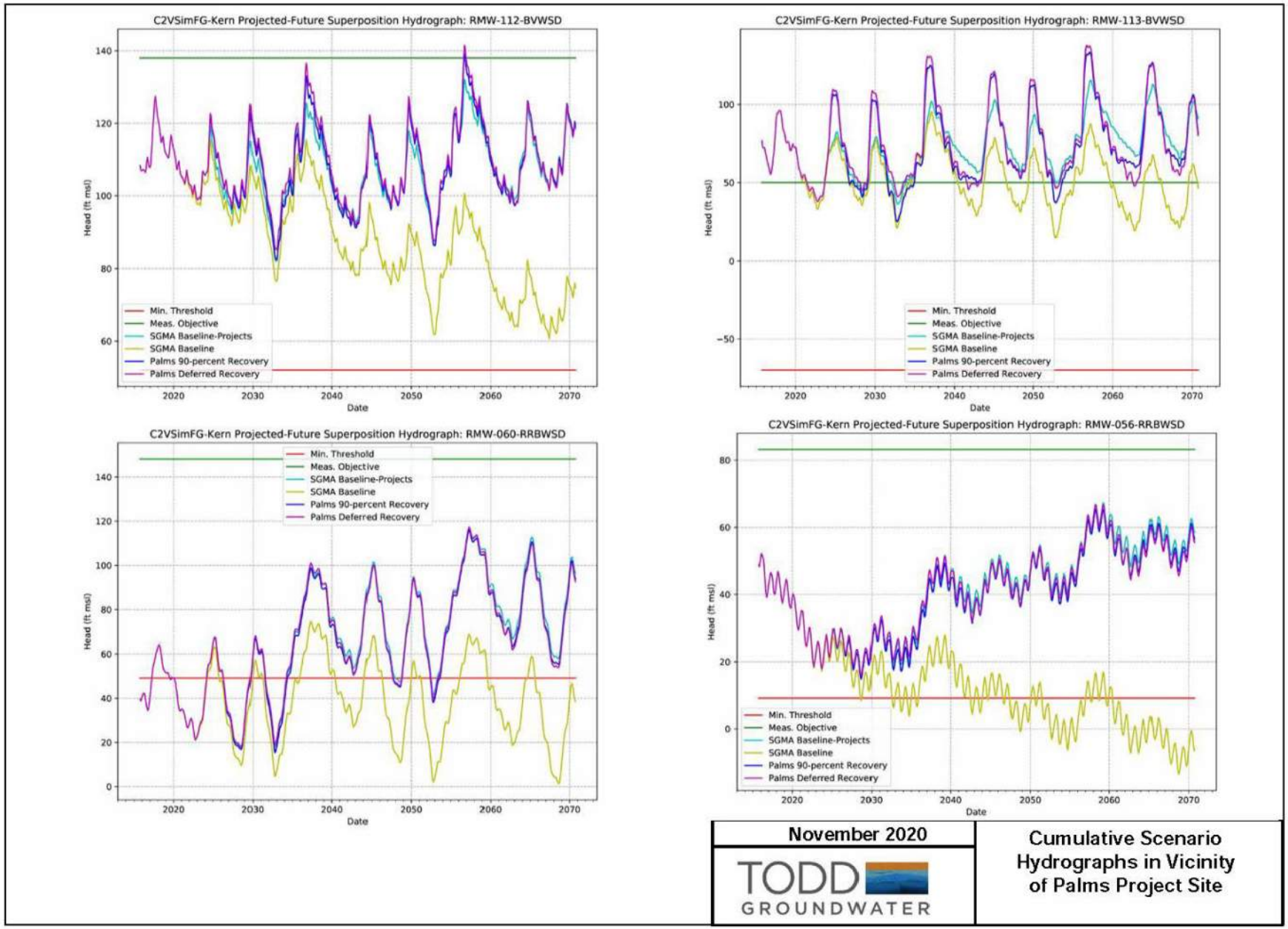
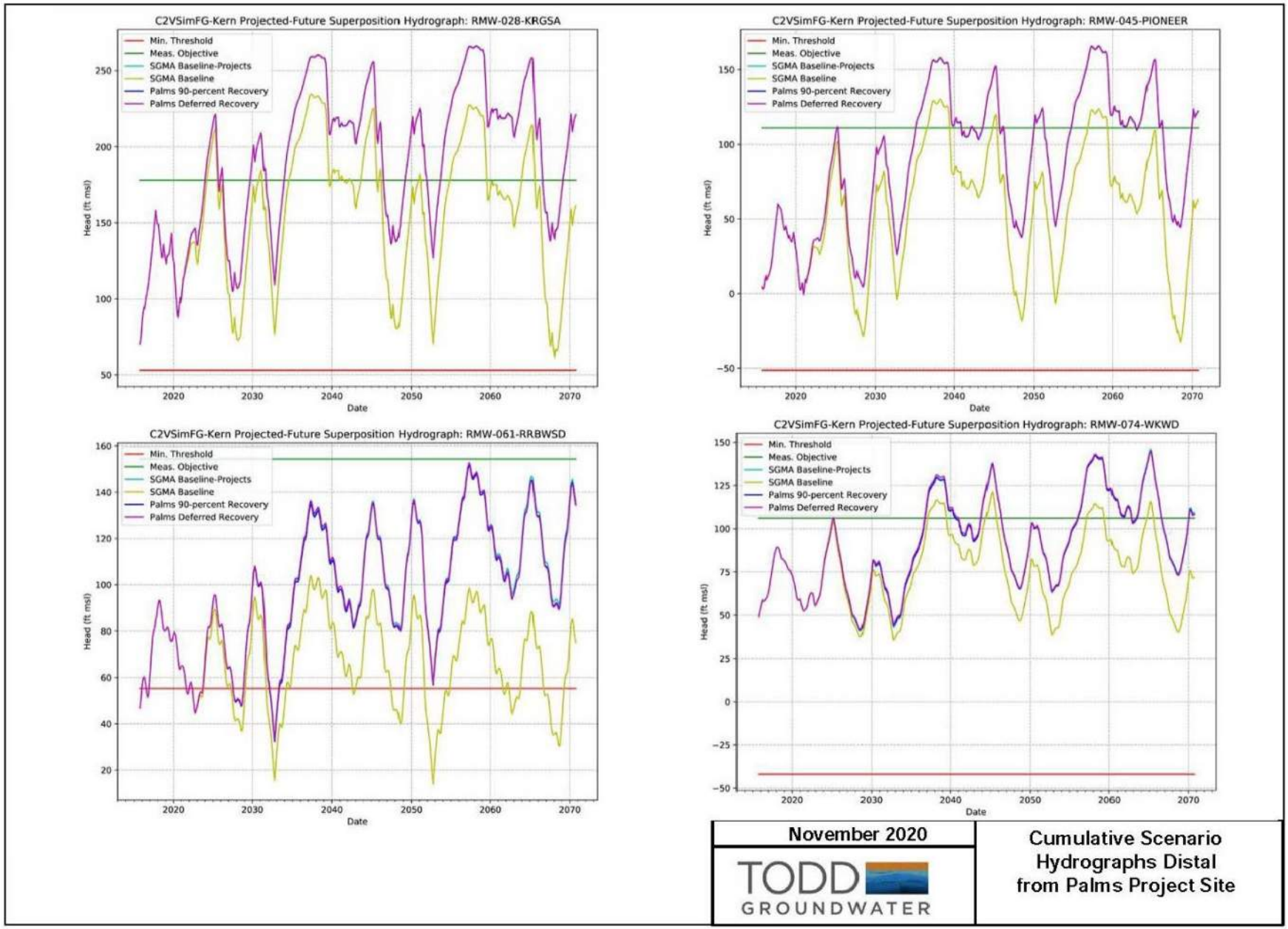


Figure 4-5. Cumulative Scenarios Vicinity of Palms Project Site



The results are presented within the context of the SGMA simulations. These results indicate the potential for pumping by the Recovery Project in the Cumulative Scenario to cause the groundwater levels at the WKWD North Wellfield (*refer to* **Figure 4-2**) and the far western areas of RRBWSD (*refer to* **Figure 4-3**) to fall below the MT during simulation years.

Conversely, groundwater levels during the recharge events are higher with the Palms Project than without. Groundwater levels exceed the MO approximately 20 years earlier, and more frequently, with the Palms Project than without.

Other RMW locations more distant from the Recovery Project in WKWD South Wellfield, RRBWSD, KRGSA (city of Bakersfield) and the Pioneer Project show negligible effects from the Recovery Project operations (*refer to* **Figures 4-4** and **4-5**). The KWBA did not include RMW locations in their GSP, so the KWBA does not have MT or MOs for assessment under the cumulative analysis. However, it can be assumed that they will show similar effects as a function of distance from the Recovery Project as seen in the other RMW locations. Therefore, there is the potential for similar effects in the western KWBA that will diminish to negligible in the central and eastern areas.

The Cumulative with Deferred Recovery Scenario shows that groundwater levels at the WKWD North Wellfield (*refer to* **Figure 4-2**) and the far western areas of RRBWSD (*refer to* **Figure 4-3**) are higher than those with the Baseline with Recovery Project Scenarios. By deferring the recovery pumping, these RMW locations still have some benefit of the Palms Project recharge. The deferred pumping occurs during a period when the simulated groundwater levels for the planned SGMA projects are sufficiently far above the MTs for the WKWD North Wellfield and the far western RRBWSD RMW locations that subsequent minimum groundwater levels reached after imposition of the pumping deferments remain above their respective MTs.

In the GSPs for the WKWD and RRBWSD, the definition of the potential undesirable results from groundwater levels falling below MTs is defined in terms of number of wells within an area and duration of the occurrence. Excerpts taken from the WKWD and RRBWSD GSPs defining undesirable results is provided below:

- West Kern Water District – An undesirable result would occur when the MT for groundwater levels is exceeded in at least three adjacent management areas that represent at least 15% of the Subbasin, or that represent greater than 30% of the Subbasin (as measured by each management area. Each GSA will set MTs for each Chapter of the GSP that participates in the KGA (WKWD 2019).
- Rosedale-Rio Bravo Water Storage District – The Rosedale Rio-Bravo Management Area (RRBMA) will seek to maintain at least two water level monitoring points for each monitoring zone. To the extent that average water levels at designated monitoring points have exceeded the MT of the monitoring zone, it will be considered an undesirable result. To the extent that two of the North, Central, and South of River zones exceed this criterion, the RRBMA will consider it an undesirable result. To the extent that either the South or East zones exceed this criterion, the RRBMA will consider it an undesirable result (RRBWSD 2019).

The operations used for the Cumulative Scenario represent a practical strategy for management of the Palms under the hydrological conditions presented over the 50-year Baseline scenario. Actual operations

would be dependent upon future hydrologic conditions which would affect the availability of surface water for recharge and local water demand.

Impact CUM-1: ***Have an impact that is individually limited, but cumulatively considerable for groundwater levels.***

There is the potential for pumping by the Recovery Project in the Cumulative Scenario to cause the groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD to fall below the MT during simulation years.

The incremental contribution to the combined cumulative impact of operating the Recovery Project, when added to other closely related past, present, and reasonably foreseeable probable future projects, is **potentially significant**.

The results of the Cumulative with Deferred Recovery Scenario indicate that there are active mitigation measures that are available to reduce the potential of undesirable results resulting from the Recovery Project recovery pumping. Therefore, mitigation measure CUM-1 will be applied to reduce potentially significant cumulative impacts.

> **Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD**. Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90 percent of the recharged amount.
>
> **Timing**: During operation
>
> **Responsibility:** Buena Vista Water Storage District
>
> **Significance after Mitigation**: Implementing Mitigation Measure CUM-1 would reduce the potentially significant impact on groundwater levels to a **less-than-significant** level because it would minimize the potential that groundwater levels will decline below the MT.

4.6.3.3 Water Quality

The Palms Project has a potential beneficial impact on groundwater quality because the water that is recharged is high quality surface water. The Recovery Project will not have a detrimental impact on groundwater quality. Since combined impacts of the projects do not constitute a significant impact and the Recovery Project does not entail a significant impact to water quality, there would not be a contribution to a cumulatively considerable impact.

4.6.4 Geological Resources

As described in Chapter 4.6.3 – Cumulative Impacts Hydrological Resources, the Recovery Project has the potential, in the Cumulative Scenario, to cause the groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD to fall below the MT during some simulation years. However, in other locations, how the cumulative effects of operation of the Recovery Project together with implementation of other reasonably foreseeable projects would be likely to be protective against

subsidence by maintaining groundwater levels above MTs and by avoiding the continuing decline of groundwater levels projected under the baseline condition.

Impact CUM-2: ***Have an impact that is individually limited, but cumulatively considerable for subsidence***

There is the potential for pumping by the Recovery Project in the Cumulative Scenario to cause the groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD to fall below the MT during simulation years which could increase the risk of subsidence/

The incremental contribution to the combined cumulative impact of operating the Recovery Project, when added to other closely related past, present, and reasonably foreseeable probable future projects, is **potentially significant**.

The results of the Cumulative with Deferred Recovery Scenario indicate that there are active mitigation measures that are available to reduce the potential of undesirable results resulting from the Recovery Project recovery pumping. Therefore, mitigation measure CUM-1 will be applied to reduce potentially significant cumulative impacts.

Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD. Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90 percent of the recharged amount.

Timing: During operation

Responsibility: Buena Vista Water Storage District

Significance after Mitigation: Implementing Mitigation Measure CUM-1 would reduce the potentially significant impact on groundwater levels to a **less-than-significant** level because it would minimize the potential that groundwater levels will decline below the MT.

5.0 Alternatives to the Proposed Project

5.1 CEQA Requirements

The CEQA Guidelines §15126.6 require consideration and discussion of alternatives of a proposed project in an EIR. The purpose of the alternatives analysis is to identify ways to mitigate or avoid the potentially significant adverse effects that may result from implementation of the proposed project. This chapter identifies and considers alternatives to the Recovery Project.

CEQA provides the following guidelines for discussing alternatives to a proposed project:

- The EIR must describe a reasonable range of alternatives to the project that would "…feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives." [CEQA Guidelines §15126.6(a)]
- The EIR must identify ways to mitigate or avoid significant effects of the project on the environment, "…the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." [CEQA Guidelines §15126.6(b)]
- The range of potential alternatives to the proposed Project shall include those that could feasibly accomplish most of the basic objectives of the project and those that could avoid or substantially lessen one or more of the significant adverse effects. If there is a specific proposed Project or a preferred alternative, the EIR must explain why other alternatives considered in developing the proposed Project were rejected in favor of the proposal. "The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." [CEQA Guidelines § 15126.6(c)]
- The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed Project. "If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed." [CEQA Guidelines §15126.6(d)]
- The specific alternative of "no project" "shall be evaluated along with its impact." The purpose of describing and analyzing a no project alternative is to allow, "decision-makers to compare the impacts of approving the proposed Project with the impacts of not approving the proposed Project." The CEQA Guidelines also stipulate that the "no project" analysis "shall discuss the existing conditions at the time the NOP is published...as well as what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans..." [CEQA Guidelines §15126.6(e)(2)]

- The CEQA Guidelines also instruct that, "If the environmentally superior alternative is the No Project Alternative, the EIR shall also identify the environmentally superior alternative among the other alternatives." [CEQA Guidelines §15126.6(e)(2)]
- Under the CEQA Guidelines §15126.6(f), the range of alternatives required in an EIR is governed by a "rule of reason" that requires an EIR to set forth only those alternatives necessary to permit a reasoned choice. "The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making."

5.2 Overview of the Alternative Selection Process

The alternative selection process involved the following sequence of steps:

1) Identification of Recovery Project goals and objectives
2) Identification of potentially significant impacts to the proposed Recovery Project
3) Development of evaluation criteria
4) Review of a range of alternatives
5) Identification of those alternatives that meet the criteria and explanation of why alternatives were rejected as infeasible
6) Evaluation of alternatives based upon comparative environmental impact assess

5.3 Goals and Objectives of the Recovery Project

The overall purpose of the Recovery Project is to enhance groundwater management by increasing the District's ability to recharge groundwater in wet years and return that banked water in dry years. Additionally, enhanced groundwater management would benefit agriculture by providing irrigation water supplies in years with limited surface water supplies.

The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of the County by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies
- Improve conveyance of previously stored water throughout the District and to neighboring districts
- Install recovery facilities to attract new banking partners in order to increase groundwater in the Kern Subbasin for District use
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the Aqueduct

5.4 Potentially Significant Impacts of the Recovery Project

Potentially significant impacts related to implementing the Recovery Project are listed below:

- Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species
- Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR § 15064.5
- Disturb any human remains, including remains interred outside of dedicated cemeteries
- Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality
- Have an impact that is individually limited, but cumulatively considerable for groundwater levels
- Have an impact that is individually limited, but cumulatively considerable for subsidence risk

5.5 Alternatives Evaluation Criteria

Once identified, the alternatives were evaluated based on the following criteria. The alternative must meet the three criteria to be considered for further analysis in the DEIR.

Criterion 1: The alternative must feasibly attain most of the Recovery Project's objectives. This criterion focuses on identifying which alternatives were capable of achieving the same results as the proposed Recovery Project (i.e., meeting the goals and objectives of the Recovery Project) in a feasible manner. "Feasible" is defined in the CEQA Guidelines §15364 as: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

Criterion 2: Section 15126.6 of the CEQA Guidelines requires examination of a reasonable range of alternatives to the proposal. As part of the EIR certification process and action on the proposed project, the lead agency determines whether or not the alternatives are feasible.

Criterion 3: The alternative must avoid or substantially lessen an identified significant adverse environmental impact of the Recovery Project.

5.6 Alternatives Considered but Rejected from Detailed Analysis

This alternatives analysis is constrained in part due to the fact that alternative design elements and configurations have already been incorporated by the District as a result of findings and recommendations of technical studies conducted during the planning processes for the Recovery Project, with a goal to limit environmental impacts of the Recovery Project. The alternatives initially considered are summarized below.

5.6.1 Landowner Recovery Alternative

The District considered an alternative groundwater recovery option to provide flexibility by allowing private pumping in lieu of surface water deliveries. Under this alternative, landowners would have the

option, in addition to surface water delivery, to utilize on-farm wells to pump water for irrigation needs or continue to receive surface water deliveries through the District canals and pipelines. No additional District facilities would need to be constructed for this alternative delivery option. Landowners interested in this optional delivery method would be required to sign up for the District program, and participation would be limited by the amount of water available for recovery, no more than 25,000 AFY. It was anticipated that water users south of Perral Road in the Buttonwillow Service Area would be eligible to participate in the program. The water pumped from landowner wells would be treated as recovered water, leaving a similar amount of water (SWP, Kern River, or other water) available for a different beneficial use.

This alternative delivery option would have allowed wider participation and flexibility for water users. However, this delivery option would not meet the Recovery Project objectives to improve conveyance of previously stored water throughout the District and to neighboring districts. Therefore, this alternative was not evaluated in detail because it cannot feasibly attain most of the Recovery Project's objectives.

5.6.2 Alternative Project Layouts

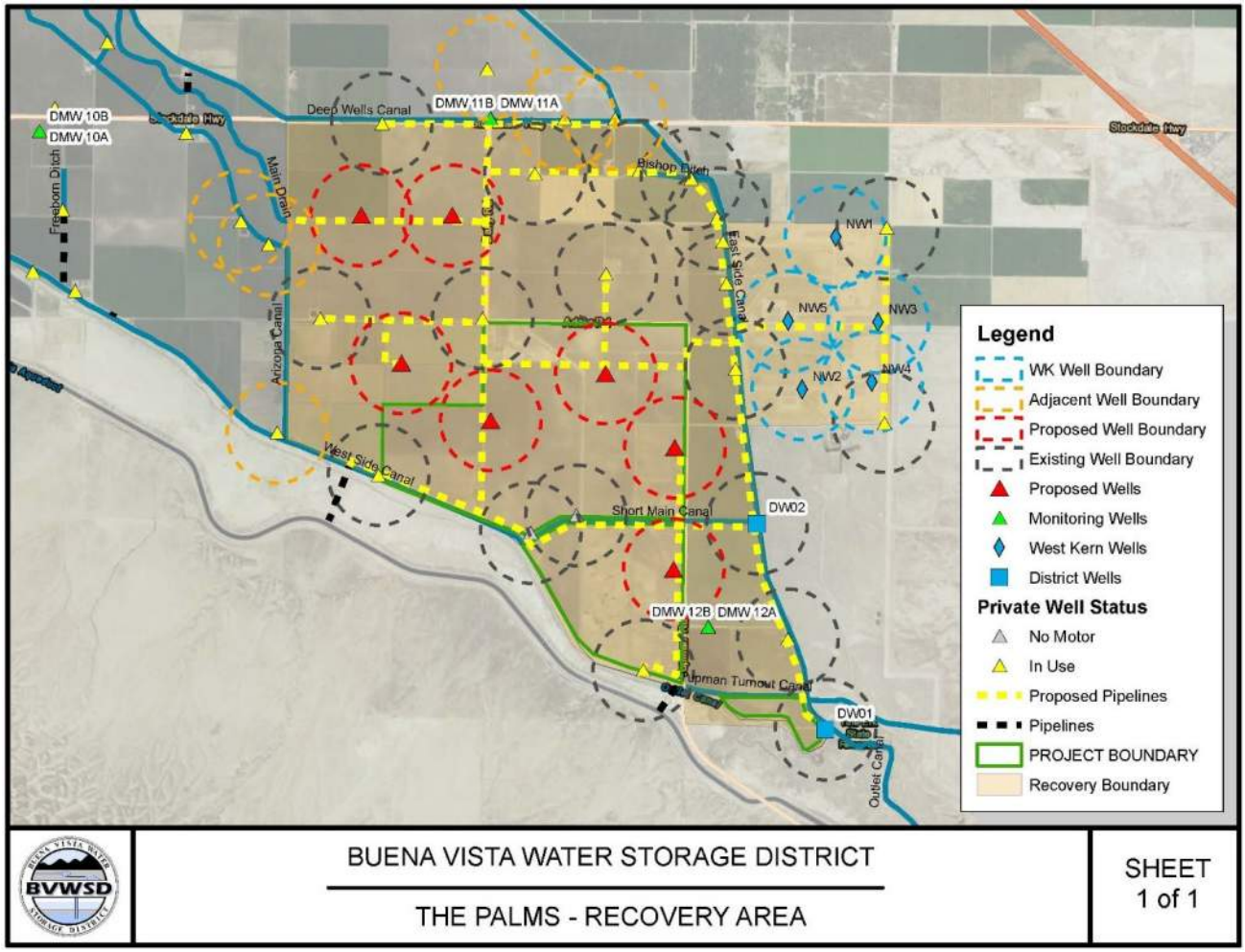
5.6.2.1 Palms Area-Only Layout

An alternative to extract banked water solely within the Palms Groundwater Bank was evaluated by the District. This alternative would utilize a suite of 34 wells: seven proposed, new wells; 17 existing private wells; two currently inactive wells on District property (to be rehabilitated); and five wells within the neighboring WKWD (**Figure 5-1**). No more than 25 of these wells would have been used for groundwater recovery in any given year. Conveyance pipes (90,000 feet) would connect new and existing wells for the Recovery Project water delivery system.

Water quality data from wells within the recharge area and outside of this area indicate that the quality of water is such that allows the water to be put to beneficial use. The addition of wells outside the recovery area provides the ability to blend water recovered from within the recharge area with water recovered from wells outside this area and thus increase the range of uses the water may serve. Therefore, the most effective use of resources available to the BVGSA is to recharge surface water in areas suited to recharge while distributing recovery facilities to produce groundwater from the array of recovery wells of a quality that will require no or minimal treatment to meet a broad range of beneficial uses. The evaluation of water quality data for wells in the Palms area found that it may not be possible to meet water quality standards for pump-in to the Aqueduct without treatment. Therefore, this alternative was not evaluated in detail because, although this alternative would produce water of suitable quality for irrigation use, it cannot feasibly attain the Recovery Project's objective of meeting water quality standards by blending, if necessary.

In addition, potential impacts to groundwater levels would be potentially greater with this alternative. Therefore, this alternative was not evaluated in detail because it did not avoid or substantially lessen an identified significant adverse environmental impact of the Recovery Project.

Figure 5-1. Alternative Recovery Project Layout - Palms Area Only



5.6.2.2 Alternative Northeastern Area Layout

An alternative layout in the northeastern area of the Recovery Project (**Figure 5-2**) included wells and pipelines immediately adjacent to bush seepweed scrub habitat that could support sensitive biological resources. Biological surveys in this area found evidence of kangaroo rat presence, possibly including two endangered species (giant kangaroo rat and Tipton kangaroo rat). Surveys also documented suitable habitat for blunt-nosed leopard lizard (state and federally endangered) and San Joaquin kit fox (state endangered and federally threatened), and burrowing owls (California species of special concern) were observed in the survey area.

In addition, the alternative pipeline alignment may impact cultural resource P-15-005984. Resource P-15-005984 is a large, prehistoric archaeological site. The site, first recorded in 1997, was described as a large lithic scatter measuring 400 meters north to south by 500 meters east to west. Identified artifacts included flakes of chert, chalcedony and basalt, a large side notched projectile point, an obsidian biface, scraper, and a shell bead. Human skulls were also reported in a plowed portion of the site.

The location of wells and pipeline in the northeastern area was revised in response to these survey results. The revised project layout, which is now the Recovery Project (*refer to* **Figure 2-2**), provides a minimum buffer of 50 feet between the anticipated construction disturbance corridor and bush seepweed scrub

habitat. In addition, the pipeline route was adjusted to avoid cultural resource P-15-005984. Therefore, the alternative northeastern project layout was not evaluated in detail, because it did not avoid or substantially lessen an identified significant adverse environmental impact of the Recovery Project.

5.7 Alternatives Evaluated in Detail

5.7.1 No-Project Alternative

Under the no project alternative, the District would not construct a groundwater recovery system to recover water banked at the Palms. The District would not recover banked groundwater except with existing wells and would not have a conveyance system to deliver recovered water.

5.7.2 Reduced Recovery Alternative (also known as Scenario B)

As described in Chapter 3.4.3.4 – Groundwater Level Impact Analysis, two operational scenarios were setup and run using the Superposition Model to assess changes in groundwater conditions. The original project description (also known as Scenario A) included an assumption of 100 percent recovery of the recharged water as a worst-case scenario with respect to groundwater level impacts. The recovery pumping occurs at a rate of 25,000 AFY over a 6-month period over 4 consecutive years. This scenario was modeled as a worst-case scenario for impact analysis purposes, actual recovery would likely extend over a longer time period and therefore have less impact.

In the Reduced Recovery Alternative (also known as Scenario B), the Recovery Project would recover 90 percent of the recharged water. The simulated recovery pumping would occur at a rate of 25,000 AFY over a 6-month period over 3 consecutive years. During Year 4, the recovery pumping would occur at a rate of 15,000 AFY. The same pumping rate occurs during the first 3 months, reduced pumping occurs in the 4th month, and no pumping during the final 2 months of Year 4 of the extraction period. As described for Scenario A, this recovery schedule is anticipated to be the worst-case scenario, with actual recovery extending over a longer time period, with less impact to groundwater levels.

Under the Reduced Recovery Alternative, groundwater recovery would be limited to 90 percent of the banked groundwater supplies. Recovery would be limited to 25,000 AFY but could not exceed 90 percent of the total amount of recharged groundwater.

5.8 Comparison of Impacts of the Alternatives

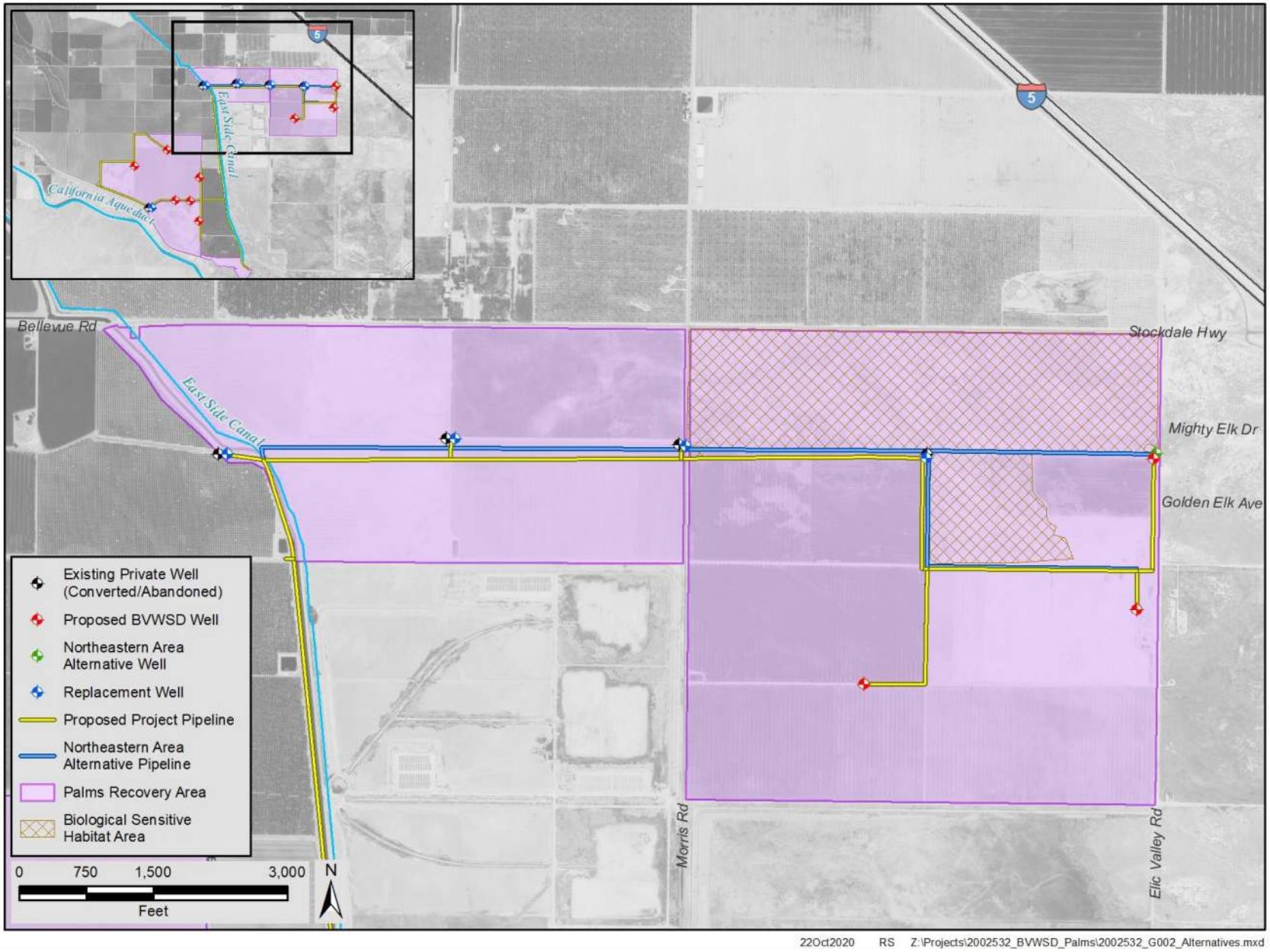
5.8.1 No-Project Alternative

The no project alternative would avoid new construction and would therefore have no impact on aesthetics, air quality, biology, cultural resources, forestry, geology, hydrology and water quality, energy, hazards and hazardous materials, land use/planning, population and housing, public services, mineral resources, noise, recreation, transportation, utilities and services, and wildfire.

The no project alternative would have a potentially significant impact on agriculture, as it would eliminate the recovery and delivery of up to 25,000 AFY of previously banked surface water for irrigation. Groundwater banked at the Palms would not be delivered to water users in dry years when there is inadequate surface supply to meet agricultural water demands.

No mitigation is available to lessen this potential impact. Therefore, this is a significant impact which cannot be mitigated to a less-than-significant level.

Figure 5-2. Alternative Recovery Project Layout – Northeastern Area



[This page intentionally left blank.]

5.8.2 Reduced Recovery Alternative

Figure 5-3 shows the distribution of the cumulative groundwater level change for the Reduced Recovery Alternative (Scenario B), which assumes 90 percent recovery of the Palms Project recharge. The contours show the maximum cumulative groundwater level change of 20 to 30 feet occurs near the recovery wells. Because groundwater pumping is reduced during Year 4 of recovery of this alternative, the cumulative groundwater level declines are 0 to 2 feet less than those in Scenario A which includes recovery of 100 percent of recharged groundwater (*refer to* **Figure 3-8**).

Figure 5-4 shows the hydrographs for the Reduced Recovery Alternative (Scenario B) at the same locations shown on **Figure 3-8**. The difference between the two alternatives (Scenarios A and B) is Year 4 of pumping during which the Reduced Recovery Alternative (Scenario B) pumps 10,000 AF less. As a result, the graphs are identical until the end of Year 4 of pumping when groundwater levels are about 2 to 3 feet higher in the Reduced Recovery Alternative due to the reduced pumping.

Figure 5-5 shows the hydrographs for the Reduced Recovery Alternative (Scenario B) at the simulated monitoring points[11]. The change after Year 4 of pumping is generally 0 to 2 feet, with the range being a function of the distance from the Recovery Project wells.

[11] Appendix D, Figure 18 shows the locations of the simulated monitoring points placed in the Superposition Model to help with understanding the spatial distribution of response to the Palms Project operations. These do not reflect actual monitoring points; however, future simulations would include monitoring points at specific locations of interest for the groundwater impacts assessment

Figure 5-3. Groundwater Level Change After Four Years of Pumping, Reduced Recovery Alternative (Scenario B)

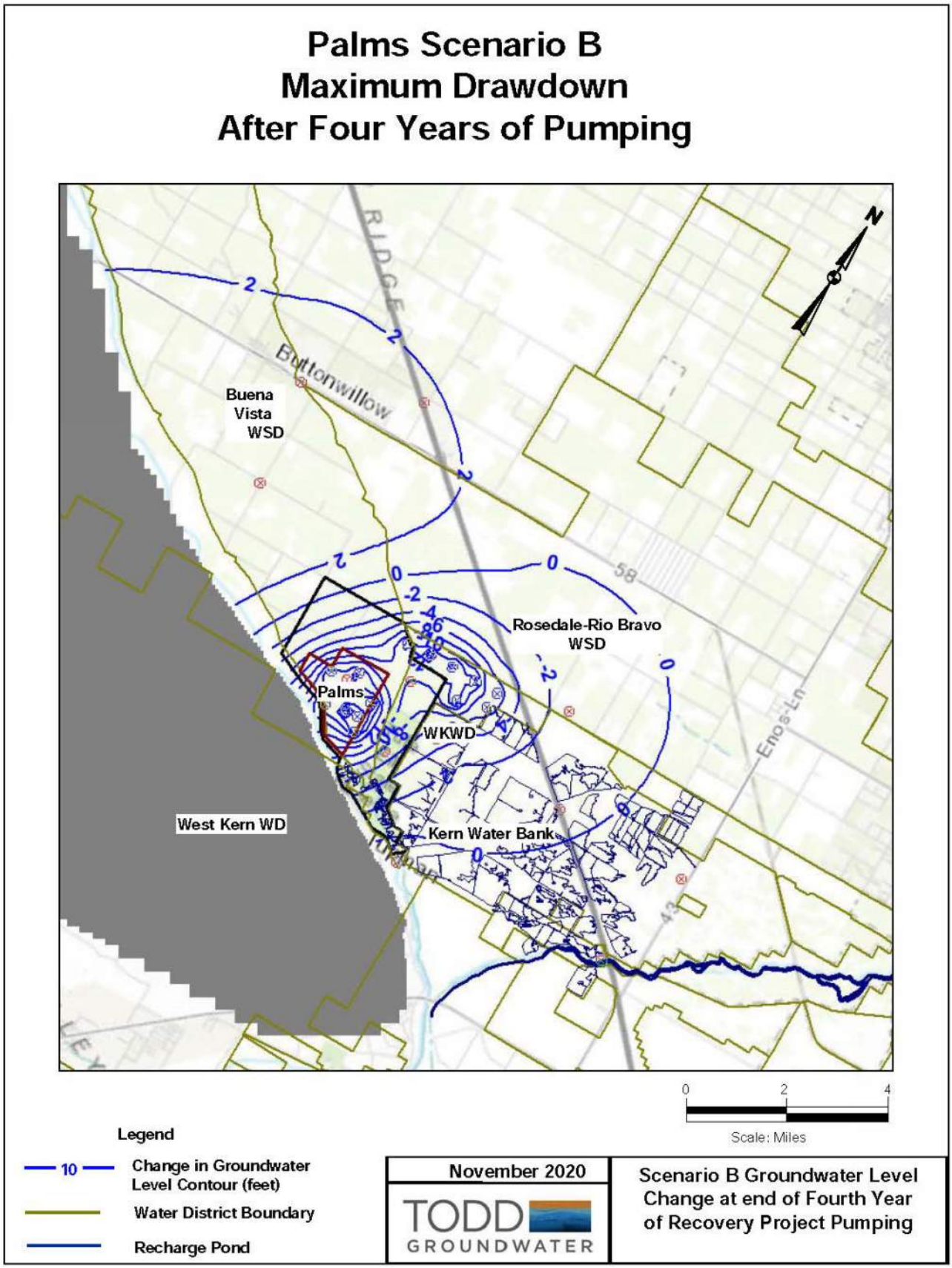


Figure 5-4. Groundwater Level Change in Recovery Project Wells, Reduced Recovery Alternative (Scenario B)

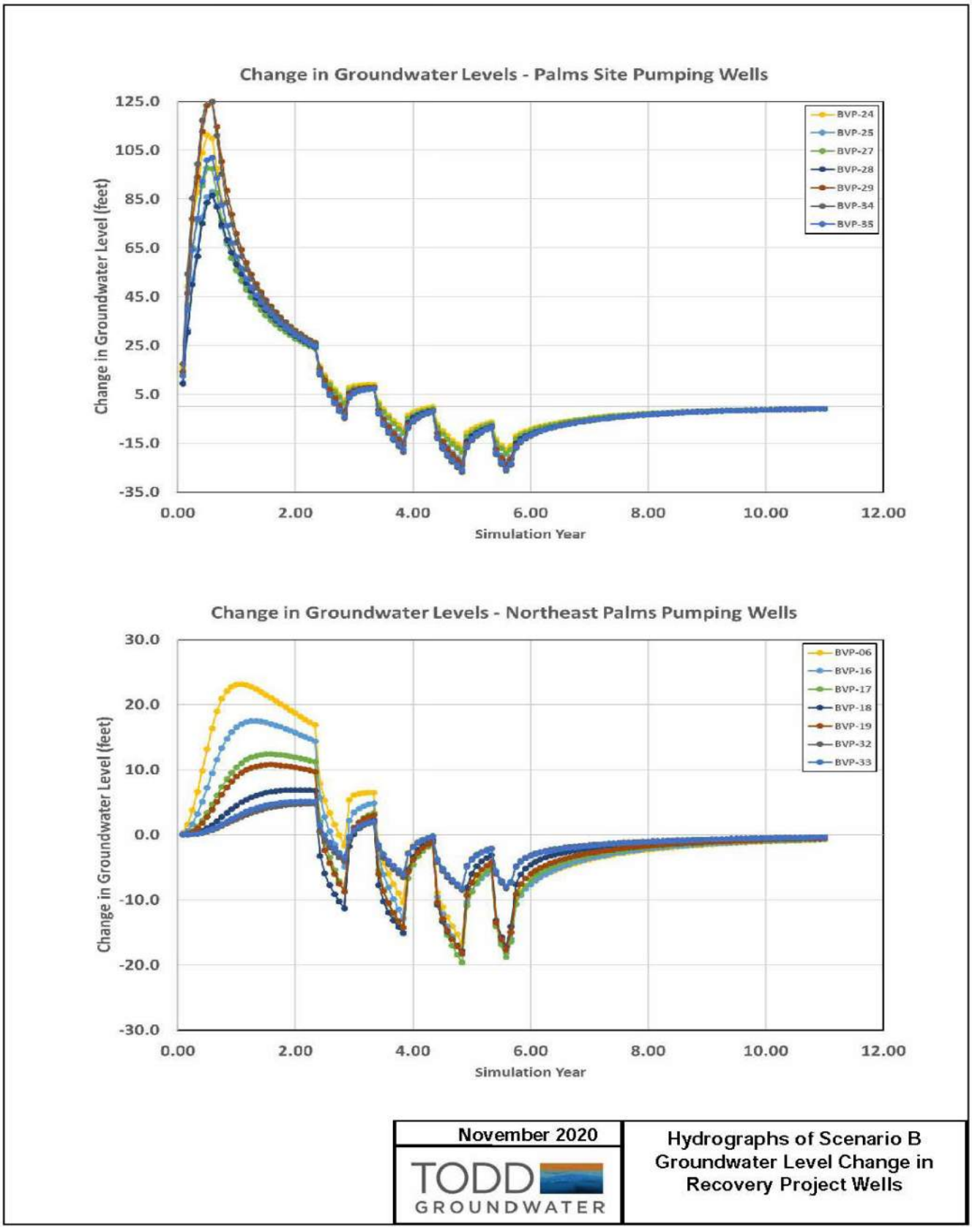
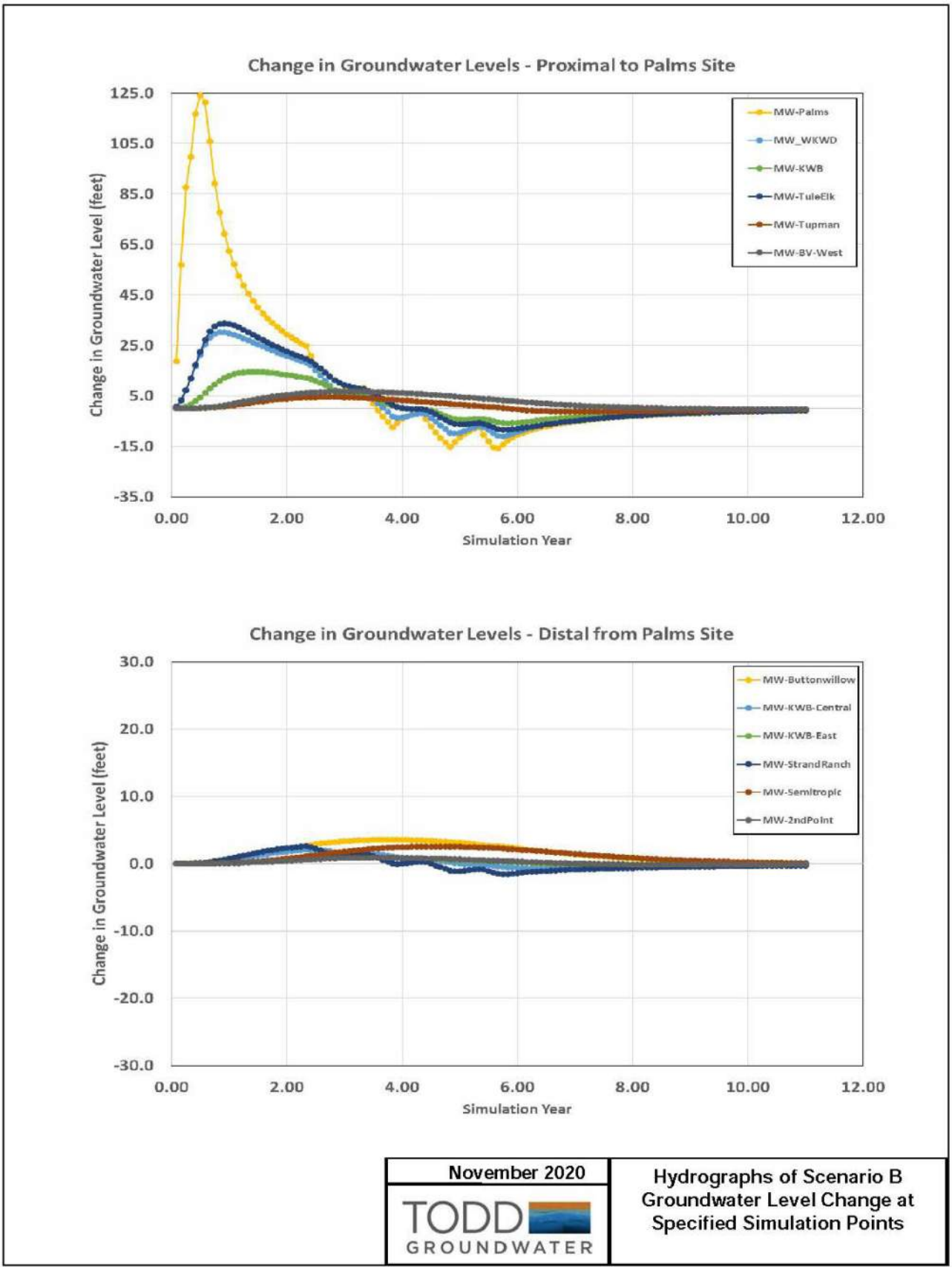


Figure 5-5. Groundwater Level Change at Specified Simulation Points, Reduced Recovery Alternative (Scenario B).



Reduced Recovery Alternative Superposition Hydrographs

Superposition hydrographs provide a means to assess the effect of the Recovery Project at various locations. For this analysis, the simulated groundwater elevation change is added, or superimposed, onto the measured groundwater elevation data to evaluate Recovery Project-related impacts relative to historical groundwater elevation data. This analysis evaluates the scale of the impacts of the Recovery Project compared to the historical variation in groundwater levels in the Study Area over time. The superposition hydrographs add the change in groundwater levels from the Reduced Recovery Alternative (Scenario B) to the measured historical water levels for the selected wells.

For the superposition hydrographs assessment, the recharge event is assumed to occur in 2011, which was a wet hydrologic year where water was available for potential recharge. The recovery pumping is assumed to occur during 2013 through 2016, which was a period of critically dry drought conditions. This period was selected because if represents a recent period where extreme conditions were experienced in the Kern County Subbasin.

A representative selection of wells that have periods of measurements over the 2011 to 2016 period were selected to provide an assessment of the relative change resulting from the Recovery Project relative to the historical groundwater level variations observed at these locations[12]. Impacts to groundwater levels are a function of distance from the Recovery Project. Monitoring wells near to the Recovery Project show the greatest groundwater level changes, with less impact seen at greater distance from the Recovery Project. **Figure 5-5** shows hydrographs for BVWSD wells, where early mounding as a result of the recharge increases groundwater levels about 60 feet relative to the historical levels. Maximum drawdown from recovery pumping is about 10 feet at these locations. **Figure 5-6** shows monitoring wells in the Pioneer and the WKWD South wellfield. Due to the distance of the wells from the Recovery Project, the change in groundwater levels is negligible. Negligible impacts are also seen at the central RRBWSD monitoring wells, due to their distance from the Recovery Project.

Monitoring wells in the western RRBWSD near to the Recovery Project experience increased groundwater levels of about 2 to 10 feet relative to historical levels as a result of recharge. Maximum drawdown from recovery pumping ranges from about 1 to 5 feet at these locations. The KWBA monitoring wells along the western margin of KWB (nearest to the Recovery Project) show increased groundwater levels of about 5 to 20 feet relative to historical levels as a result of recharge. Maximum drawdown from recovery pumping is about 1 to 4 feet. The hydrographs for these sites can be found in **Appendix D**, Figures 23 through 26.

[12] A map of these locations can be found in Appendix D, Figure 21.

Figure 5-6. Superposition Hydrographs at BVWSD Wells

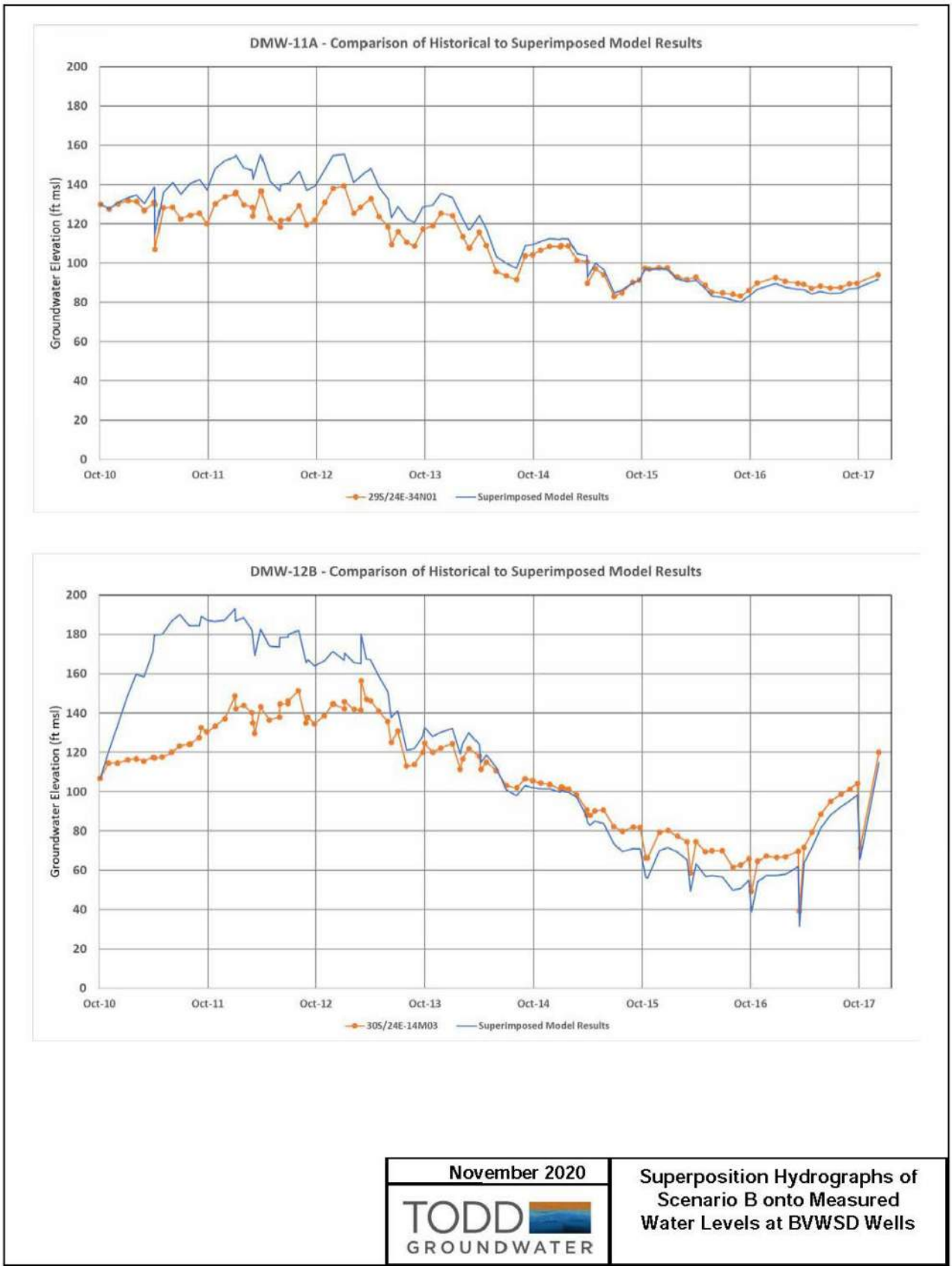
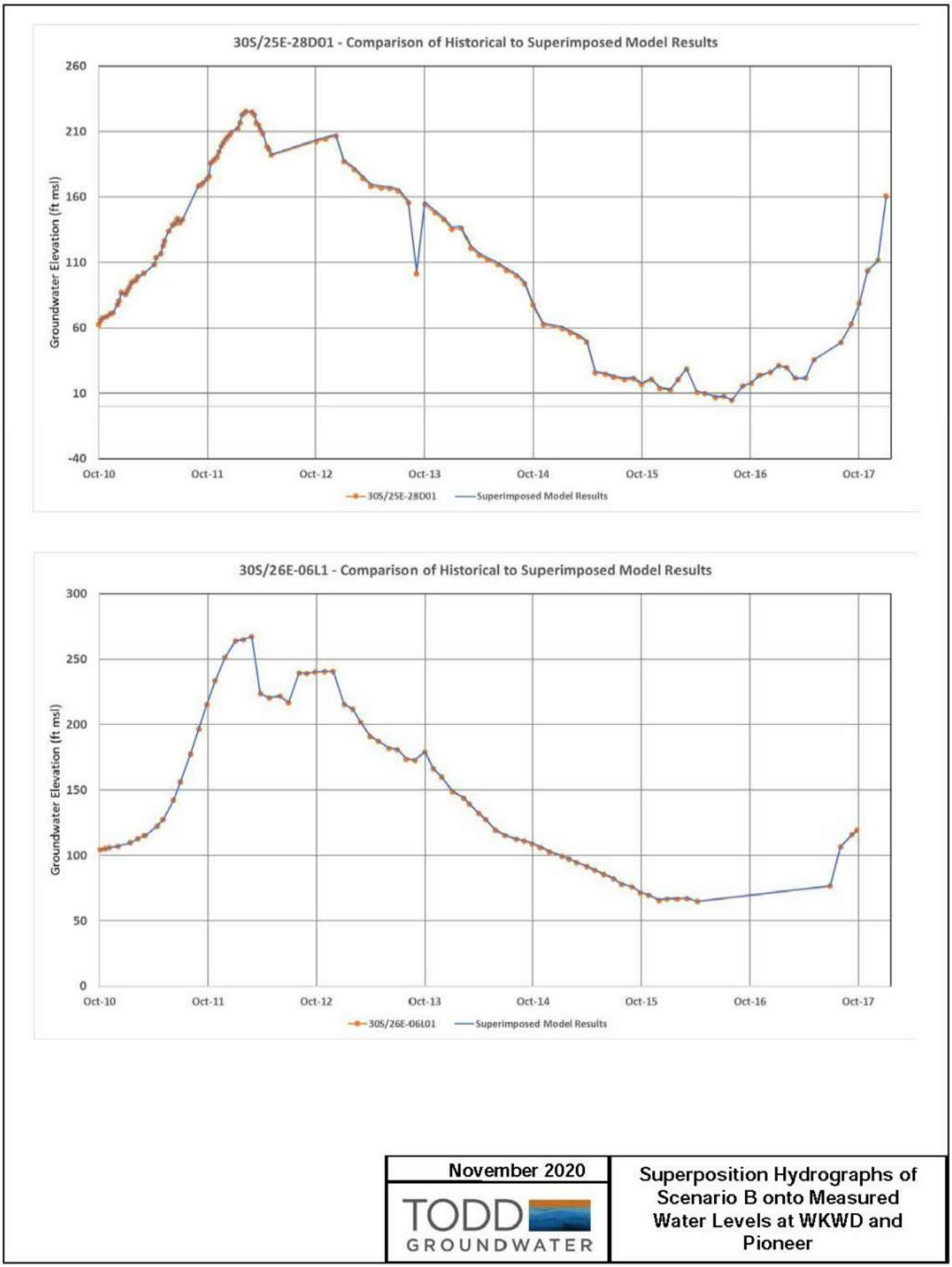


Figure 5-7. Superposition Hydrographs at WKWD and Pioneer Wells



5.9 Environmentally Superior Alternative

The no action alternative results in a significant impact which cannot be mitigated to less-than-significant to agricultural resources. In addition, the no action alternative does not meet any of the Recovery Project objectives.

The Reduced Recovery Alternative does not have any impacts which cannot be mitigated to a level of less-than-significant, and it meets all project objectives. Because groundwater pumping is reduced during Year 4 of recovery of this alternative, the cumulative groundwater level declines are 0 to 2 feet less than would occur with Scenario A, 100 percent recovery. In addition, at the end of Year 4 of pumping, groundwater levels are about 2 to 3 feet higher in the Recovery Project wells in Reduced Recovery Alternative, due to the reduced pumping. Therefore, the reduced recovery alternative is the environmentally superior alternative.

BVWSD intends to implement the Reduced Recovery Alternative.

6.0 Mitigation Summary

6.1 Introduction

In accordance with CEQA, the District is the Lead Agency for preparation of the EIR and the incorporated [draft] MMRP contained within this chapter (PRC §21081.6). As the Lead Agency, the District is responsible for ensuring the mitigation program is implemented.

The mitigation program has been designed to avoid, minimize, rectify, reduce, eliminate or compensate for potentially significant impacts caused by construction, operation or maintenance of the Recovery Project. (CEQA Guidelines §10597, 15126.4 & 15370). Implementation of the recommended mitigation program would reduce potentially significant impacts to a less than significant level, (*refer to* Chapter 3.0 – Environmental Setting, Impact Analysis, and Mitigation Measures and Chapter 4.0 – Other CEQA Required Sections, for complete discussion).

Potential Recovery Project impacts are listed in **Table 6-1**, by resource area. **Table 6-1** includes the level of significance prior to the implementation of mitigation, the mitigation measures proposed, and the level of significance after mitigation is incorporated. The timing of mitigation implementation and the party responsible for monitoring or reporting are also included. The FEIR will include a final MMRP designed to ensure compliance during Recovery Project implementation and will be incorporated into the District's conditions of approval for the proposed Recovery Project. **Table 6-1** includes impacts and mitigation measures described in the IS, as well as those described for resources covered in detail in this FEIR.

[This page intentionally left blank.]

Table 6-1. Summary of Project Impacts, Mitigation Program, and Residual Effect

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Air Quality – Project construction of more than 5 acres will generate dust and particulate emissions.	Less-than-significant	**Mitigation Measure AQ-1: District Regulation VIII Fugitive PM_{10} (particulate matter less than 10 microns in diameter) Prohibitions Best Management Practices** All projects are subject to San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.) rules and regulations in effect at the time of construction. Control of fugitive dust is required by S.J.V.A.P.C.D. Regulation VIII. The District shall implement or require its contractor to implement all of the following measures as identified by S.J.V.A.P.C.D.: • Apply water to unpaved surfaces and areas • Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas • Limit or reduce vehicle speed on unpaved roads and traffic areas • Maintain areas in a stabilized condition by restricting vehicle access • Install wind barriers • During high winds, cease outdoor activities that disturb the soil • Keep bulk materials sufficiently wet when handling • Store and hand material in a three-sided structure • When storing bulk material, apply water to the surface or cover the stage pile with a tarp • Don't overload haul trucks. Overlanded trucks are likely to spill bulk materials • Cover haul trucks with a tarp or other suitable cover. Or, wet the top of the load enough to limit visible dust emissions • Clean the interior of cargo compartments on emptied haul trucks prior to leaving the site • Prevent track-out by installing a track-out control device	Less-than-significant	During construction	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		• Clean up track-out at least once a day. If along a busy road or highway, clean up track-out immediately • Monitor dust-generating actives and implement appropriate measures for maximum dust control			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-1: Implement Measures to Educate On-site Construction Personnel and Maintain a Minimum 50-foot No-disturbance Buffer from Blunt-nosed Leopard Lizard Habitat during Project Construction**. The District will implement the following measures to minimize potential effects on blunt-nosed leopard lizard during project construction. • Before project activities begin, all on-site project personnel shall attend a Worker Environmental Awareness Program conducted by a qualified biologist. The program shall address special-status species that could occur in the project area and include a discussion of species identification, life history, general behavior, habitat, distribution and sensitivity to human activities; state and federal legal protections; and required avoidance and minimization measures. A handout containing the information provided in the training shall be provided to all personnel. Upon completion of the training, all personnel in attendance shall sign a form stating they received the training and understand all topics discussed. • Before project activities begin east of Morris Road, temporary fencing shall be installed to create and maintain a minimum 50-foot no disturbance buffer between the construction area and bush seepweed scrub habitat that supports burrows suitable for blunt-nose leopard lizard. The fencing shall be installed at least 50 feet from suitable blunt-nose leopard lizard habitat. • A qualified biologist shall determine where fencing will be installed, conduct a pre-installation survey of the fence alignment to confirm no suitable burrows for blunt-nose leopard lizard are present in or	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		within 50 feet of the fence alignment, and be present during all fence installation and removal to ensure that no special-status species are harmed. • All project-related construction activities, construction personnel, and vehicles shall be prohibited from the bush seepweed and 50-foot no-disturbance buffer. Fencing shall be inspected and repaired, as necessary, each day before work begins adjacent to the fencing. Fencing shall be removed after all construction activities adjacent to the bush seepweed habitat are complete.			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-2a: Conduct Focused Surveys for Burrowing Owls and Avoid Loss of Occupied Burrows and Failure of Active Nests**. To minimize potential effects of project construction on burrowing owl, the District will ensure that the following measures are implemented, consistent with the Staff Report on Burrowing Owl Mitigation (California Department of Fish and Game [CDFG] 2012). • A burrowing owl take avoidance survey shall be conducted within 14 days before project activities begin. • If any occupied burrows are observed, protective buffers shall be established and implemented. A qualified biologist shall monitor the occupied burrows during project activities to confirm effectiveness of the buffers. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the owls to disturbance. If it is not feasible to implement a buffer of adequate size and it is determined, in consultation with CDFW, that passive exclusion of owls from the project site is an appropriate means of minimizing impacts, an exclusion and relocation plan shall be developed and implemented in coordination with CDFW. However, passive exclusion cannot be conducted during the breeding season (February 1–August 31), unless a qualified biologist verifies through	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		noninvasive means that either (1) the birds have not begun egg laying or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.			
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-2b: Conduct Focused Surveys for Other Nesting Special-status Birds and Implement Buffers Around Active Nests**. To minimize potential effects of project construction on special-status birds other than burrowing owl, the District will ensure that the following measures are implemented: • A qualified biologist shall conduct surveys of potential Swainson's hawk nesting trees within 0.25 mile of the project site. To the extent practicable, depending on timing of project initiation, surveys will be conducted in accordance with the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000). At a minimum, a survey shall be conducted within 14 days before project activities begin near suitable nest trees during the nesting season (April-August). • A qualified biologist shall conduct surveys of suitable nesting habitat for tricolored blackbird, white-tailed kite, northern harrier, and loggerhead shrike within 500 feet of project activities. Surveys shall be conducted within 14 days before project activities begin near suitable nesting habitat during the nesting season (February-August). • If any active nests are observed, protective buffers shall be established and implemented until the nests are no longer active. A qualified biologist shall monitor the nest during project activities to confirm effectiveness of the buffer. The size of the buffer will depend on type and intensity of project disturbance, presence of visual buffers, and other variables that could affect susceptibility of the nest to disturbance.	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Impact BIO-1: Cause a substantial adverse effect, either directly or through habitat modifications, on special-status species	Potentially significant	**Mitigation Measure BIO-3: Conduct Pre-Construction Surveys and Implement Measures during Construction to Minimize Potential Impacts on American Badger and San Joaquin Kit Fox**. To minimize potential effects of project construction on American badger and San Joaquin kit fix, the District will ensure that the following measures are implemented, consistent with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011): • No more than 30 days before project activities begin in a given area, a qualified biologist will conduct a pre-construction survey to determine the potential for American badger or San Joaquin kit fox to occur in the area. If potential or known dens for either species are found, exclusion zones will be established and maintained, in accordance with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011). • If project activity would occur within 50 feet of a potential den (i.e., a den that is not known to be occupied), monitoring will be conducted at the potential den for 4 consecutive days. If no badger or kit fox activity is documented, project activities can proceed. If San Joaquin kit fox activity is documented, the appropriate exclusion zone will be established and maintained, in accordance with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011). If it is infeasible to implement the prescribed exclusion zone, USFWS will be consulted and alternative measures will be implemented to ensure impacts are adequately minimized. If American badger activity is documented during the natal denning season, an appropriate buffer shall be established by a qualified biologist and maintained until the kits are no longer dependent on the den. • To prevent entrapment during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered with	Less than significant	Before and during construction	The District and its contractors

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		plywood or similar material at the end of each workday. If the trenches cannot be closed, one or more escape ramps of no more than a 45-degree slope will be constructed of earthen fill or created with wooden planks. All covered or uncovered excavations will be inspected at the beginning, middle, and end of each day. Before trenches are filled, they will be inspected for trapped animals. If a trapped badger or kit fox is discovered, project activities will stop, and escape ramps or structures will be installed immediately to allow the animal to escape. • All construction pipes or similar structures with a diameter of 4 inches or greater that are stored on the ground at a construction site for one or more overnight periods will be thoroughly inspected for wildlife before the pipe is buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight will be capped. If a potential San Joaquin kit fox is discovered inside a pipe, all project activities that could result in take will stop, a qualified biologist will be summoned to identify the species, and USFWS will be notified. If a San Joaquin kit fox is unable to escape voluntarily, USFWS will be contacted immediately to determine what actions should be taken to adequately minimize potential impacts. • All food-related trash items such as wrappers, cans, bottles or food scraps generated during project activities will be disposed of in closed containers and removed daily from the project site. No deliberate feeding of wildlife will be allowed, and no pets associated with project personnel will be permitted on the project site.			
Impact CUL-1: Cause a substantial adverse change in the significance of	Potentially significant	**Mitigation Measure CUL-1: Implement a Worker Environmental Awareness Program** (Program) Prior to project-related, ground-disturbing activities, the Program will be implemented which will include all construction personnel. Once the project begins, any new personnel will undergo the Program prior to beginning work. The Program will include information regarding what	Less than significant	Prior to construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
a historical resource or an archaeological resource pursuant to CCR Section 15064.5		constitutes cultural resources, what procedures to follow if there is an inadvertent cultural resources find, who to contact if there is an inadvertent find, brief description of applicable laws, and all participants will receive a brochure summarizing the Program with appropriate contact information. The Program may be delivered either in person, remotely *via* teleconferencing, or electronic format.			
Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5	Potentially significant	**Mitigation Measure CUL-2: Address Previously Undiscovered Historical, Archaeological, and Tribal Cultural Resources** BVWSD shall implement measures to reduce or avoid impacts on undiscovered historic properties, archaeological resources, and tribal cultural resources. If buried or previously unidentified historic properties or archaeological resources are discovered during project construction, all work within a 100-foot-radius of the find shall cease. BVWSD shall retain a professional archaeologist meeting the Secretary of the Interior's Professional Standards for Archaeologists to assess the discovery and recommend what, if any, further treatment or investigation is necessary for the find. Interested Native American Tribes will also be contacted. Avoidance is the preferred CEQA treatment for cultural resources. If avoidance is not possible, any necessary treatment/investigation shall be developed in coordination with interested Native American Tribes providing recommendations to BVWSD and shall be completed before project activities continue in the vicinity of the find.	Less than significant	During construction activities	District
Impact CUL-2: Disturb any human remains, including remains interred outside of	Potentially significant	**Mitigation Measure CUL-3: Avoid potential effects on undiscovered burials.** If human remains are found, BVWSD will be immediately notified. The California Health and Safety Code requires that excavation be halted in the immediate area and that the county coroner be notified to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code,	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
dedicated cemeteries		§ 7050.5[b]). If the coroner determines that the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) by telephone within 24 hours of making that determination (Health and Safety Code, § 7050.5[c]). Once notified by the coroner, the NAHC shall identify the person determined to be the Most Likely Descendant (MLD) of the Native American remains. With permission of the legal landowner(s), the MLD may visit the site and make recommendations regarding the treatment and disposition of the human remains and any associated grave goods. This visit should be conducted within 24 hours of the MLD's notification by the NAHC (PRC § 5097.98[a]). If a satisfactory agreement for treatment of the remains cannot be reached, any of the parties may request mediation by the NAHC (PRC § 5097.94[k]). Should mediation fail, the landowner or the landowner's representative must reinter the remains and associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance (PRC § 5097.98[b]).			
Impact CUL-3: Cause a substantial adverse change in the significance of a historical resource or an archaeological resource pursuant to CCR Section 15064.5 in project areas		**Mitigation Measure CUL-4: Investigate for the presence of historical resource or an archaeological resource pursuant to CCR § 15064.5 and for the presence of human remains, including remains interred outside of dedicated cemeteries.** Prior to commencement of ground-disturbing, project-related activities, a cultural resources pedestrian survey will be conducted in all project areas that could not be accessed earlier. The records search that was originally conducted for the project covers the un-accessed areas, therefore an additional records search is not necessary. If cultural resources or human remains are identified during the pedestrian survey, then Mitigation Measures CUL-2 and CUL-3 will be implemented, as appropriate.			

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
that have not been analyzed					
Impact HYDRO-2: Violate any water quality standards or waste discharge requirements (WDRs) or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-1: Isolation aquifer zone testing or installation of nested monitoring wells will be conducted to identify aquifers with poor quality water prior to new well construction until the aquifers and water quality is better understood and then may be discontinued**.	Less than significant	During construction activities	District
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-2: If needed, patches will be installed into a constructed well to improve water quality from the well.** The depth of the pump may also be modified to improve water quality.	Less than significant	During construction activities	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-3: To develop the Pump-In Proposal, the District will conduct water quality sampling of all the wells quarterly for 1 year.** Sampling will include Division of Drinking Water's Title 22 constituents along with DWR's "Constituents of Concern" that are not included in Title 22.	Less than significant	During construction activities	District
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality	Potentially significant	**Mitigation Measure HYDRO-4: When water quality data becomes available on the Recovery Project's production wells (both existing and new wells), blending calculations will be updated.** The final blending scenario will be selected to ensure that the final, blended water quality, meets DWR requirements.	Less than significant	During construction activities	District
Impact HYDRO-2: Violate any water quality standards or WDRs or otherwise substantially	Potentially significant	**Mitigation Measure HYDRO-5: The District will follow the water quality monitoring and reporting requirements in the Pump-In Agreement with DWR.**	Less than significant	During project operations	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
degrade surface or ground water quality					
Impact GEO-2: Possible Damage to or Destruction of Previously Unknown Unique Paleontological Resources during Construction-Related Activities	Potentially significant	**Mitigation Measure GEO-1: Avoid Potential Effects on Paleontological Resources.** In the event that a paleontological resource is uncovered during Recovery Project implementation, all ground-disturbing work within 165 feet of the discovery shall be halted. A qualified paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts will occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, a qualified paleontologist shall evaluate the resource and determine whether it is "unique" under CEQA, Appendix G, part VII. The determination and associated plan for protection of the resource shall be provided to the District for review and approval. If the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the paleontologist shall consult with the District staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation in place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources and shall be required unless there are other equally effective methods. Other methods may be used but must ensure that the fossils are recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of a qualified paleontologist. All recovered fossils shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology standard guidelines; typically, the Natural History Museum of Los Angeles County and University of California, Berkeley accept paleontological collections at no	Less than significant	During construction	District

Potential Environmental Impact	Level of Significance	Mitigation Program	Level of Significance After the Implementation of Mitigation	Implementation Timing	Party Responsible for Implementation of Mitigation
		cost to the donor. Work may commence upon completion of treatment, as approved by the District.			
Impact CUM-1: Have an impact that is individually limited, but cumulatively considerable for groundwater levels	Potentially significant	**Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their minimum thresholds (MTs) at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD.** Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90% of the recharged amount.	Less than significant	During project operation	District
Impact CUM-2: Have an impact that is individually limited, but cumulatively considerable for subsidence		**Mitigation Measure CUM-1: Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD.** Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90% of the recharged amount.	Less than significant	During project operation	District

7.0 Comment Letters Received on Draft EIR

Comments on the DEIR were submitted by the WKWD, KCWA, KGA, CDFW, and KWBA.

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

January 18, 2021

To: Buena Vista Water Storage District
525 North Main Street
Buttonwillow, CA 93206
Attn: Tim Ashlock, Engineer-Manager
Sent via email (tim@bvh2o.com)

Cc: Mr. Greg Hammett
General Manager
West Kern Water District
Sent via email (GHammett@wkwd.org)

RCS Job No. 369-KRN22

From: Anthony Hicke and Richard Slade
Richard C. Slade & Associates LLC (RCS)

Re: Comments Regarding Draft Environnemental Impact Report (DEIR)
Palms Groundwater Recovery Project (SCH# 2020060315)
Prepared by others for Buena Vista Water Storage District
Dated December 2020
Kern County, California

Introduction

Provided herein are comments related to the basic hydrogeologic elements discussed in the referenced DEIR for the Palms Groundwater Recovery Project (Palms Project), as proposed by the Buena Vista Water Storage District (BVWSD). On behalf of West Kern Water District (WKWD), RCS reviewed the DEIR documentation and has prepared this Memorandum with hydrogeologic comments.

RCS and WKWD have previously submitted comments on the project after attending a public meeting and reviewing the Notice of Preparation (NOP) for the project. As a result of those meetings and comments, RCS provided hydrogeologic data derived from the development and testing of the WKWD North Wellfield. Page 3-72 of the DEIR discusses inclusion of the WKWD wells, and refers to the DEIR Appendices for details on how the data were included as part of the modeling work by others for the Palms Project. WKWD appreciates the use of those data by BVWSD as part of the analyses for the proposed project.

Comments

1. The assessment of drawdown impacts described in Section 3.4.3 of the DEIR relies on the assumption that two years of recharge operations will occur before extraction begins in year 3 (page 3-74). Then, after 4 years of pumping (simulation year 6), "The simulations results indicate that drawdowns of 0 to 10 feet would be expected at areas adjacent to

1

MEMORANDUM

1 (con't) BVWSD as a result of the Recovery Project recovery wells after 4 years of full recovery of a recharge volume of 100,000 AF" (page 3-84). This 10-foot water level drawdown impact is considered to be "less-than-significant" by the DEIR. It is unclear how the value was determined to be "less- than-significant". In years past, during times of drought and regional recovery operations, WKWD has had to lower pumps in its North Wellfield wells, and some of those wells cannot accommodate lower (deeper) pump settings.

2 2. Are two years of recharge required to occur before any project-related extraction occurs in order for the project to operate in accordance with the DEIR?

3 3. Page 8-84 states that "drawdowns of 0 to 10 feet would be expected at areas adjacent to BVWSD as a result of the Recovery Project recovery wells after 4 years of full recovery of a recharge volume of 100,000 AF." However, the hydrograph on Figure 3-15 shows a simulated monitoring point named (MW_WKWD), for which the simulated change in water levels at the end of year 6 reaches -15 ft. Would this be considered a significant impact because simulated impacts exceed 10 ft of water level drawdown at the WKWD property?

4 4. With respect to the assumption that recovery operations for the Palms Project begin in year three, following two years of recharge operations, do the project impacts become significant if that specific condition is not met? For example, assume recharge operations occur for two years, but recovery operations cannot begin in year three. Presumably, the mounding effect from recharge would dissipate, and the 8- to 12-foot water level rise projected for the WKWD North Wellfield (shown on DEIR Figure 3-11) may be less. The total change in water levels for the simulated MW_WKWD monitoring point on Figure 3-15 shows an absolute water level decrease of roughly 35 feet between year 2 and year 6 of the simulation (the recovery portion of the simulation). Hence, the overall impact to water levels at the WKWD could be greater than 10 feet. Would this be considered a significant impact because simulated impacts could exceed 10 ft of water level drawdown at the WKWD property in the possible scenario? Further, what mitigation could be provided if an existing pump in a WKWD well cannot be lowered any deeper than it currently is?

5a 5. The Cumulative Impact Analysis for the BVWSD Palms considers projects included as part of a prior modeling effort, as referenced in Table 4-1 of the DEIR. Appendix D, Groundwater Modeling Report, has an Attachment D, "Recovery Project Cumulative Scenario Project Lists". Attachment D lists the projects and management actions that were considered as part of the groundwater-surface water model (C2VSimFG-Kern), as referred to in the Kern County Subbasin Coordination Agreement. Table 4-1 in Attachment D lists the Rosedale Rio Bravo Management Area, Kern Fan Groundwater Storage Project (KFGSP). Based on the language in Table 4-1, the project was conceptual at the time of the creation of the C2VSimFG-Kern model. It is therefore unclear if the subject DEIR considers the modeling work presented in the recent DEIR for the Kern

MEMORANDUM

5a (con't)

Fan Groundwater Storage Project[1]. Does the cumulative analyses presented in the BVSWD Palms Project DEIR explicitly consider the effects on neighboring wells if the BVSWD Palms Project wells were to recover stored groundwater at the same time that groundwater recovery operations were occurring at: the subject Kern Fan Groundwater Storage Project (KFGSP), the nearby Rosedale Rio Bravo Drought Relief Project (DRP) and the Stockdale Integrated Banking Project?

The WKWD North Wellfield is not only bordered on the west and north by the proposed Palms Project wells, but is also determined to be in the zone of influence of the KFGSP extraction wells. Provided on the next page is an overlay drawing prepared by RCS using figures from both the subject BVWSD Palms Project DEIR and the KFGSP DEIR. The drawing illustrates the fact that the BVWSD Palms Project extraction wells surround the WKWD North Wellfield Property, and that the WKWD lies in an area of groundwater level impacts from the KFGSP (signified by the yellow-shaded area). If extraction is occurring in the BVWSD Palms project at the same time extractions are occurring at the Kern Fan Groundwater Storage Project, at the Drought Relief Project (DRP), and at the Stockdale Integrated Banking Project, the impacts to WKWD North Wellfield wells could be greater than anticipated by the modeling presented in the subject DEIR.

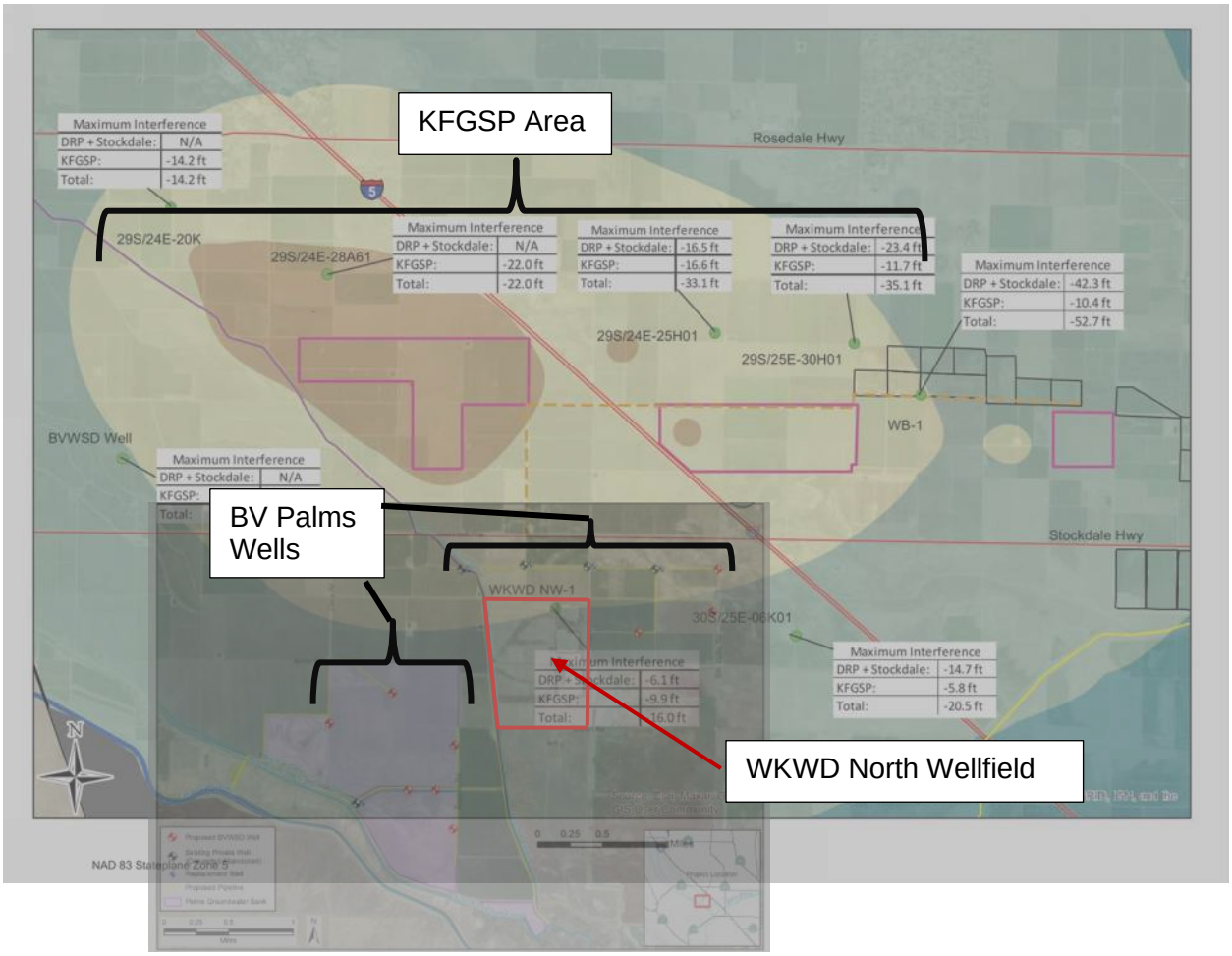
5b

The KFGSP DEIR (2020) stated in Appendix H, page 9 “Project groundwater pumping is predicted to result in up to ten feet of additional drawdown at the nearest banking project well (WKWD NW-1) and a cumulative impact of up to 16 feet of drawdown at this well when… [multiple projects] are taken into account.” Further, as stated in Page 3.10-35 of the KFGSP DEIR (2020), “effects of water level drawdown would be additive when considering that multiple projects in the region could be pumping simultaneously.” Hence, based on the modeling work in the two-separate project DEIRs, WKWD may experience significant water level drawdown impacts (of 26 ft or greater) if both projects were to operate at the same time.

WKWD is concerned that without clear direction in the DEIR in the case of a cumulative impact on WKWD, mitigation of a water level drawdown impact to WKWD may be drawn into a situation where the various entities that operate the four projects mentioned above may not agree on the cause of the impact on WKWD, and this may inhibit timely mitigation response(s). No mitigation efforts by BVWSD are presented Chapter 6 of the DEIR with respect to water level impacts. As discussed above, cumulative impacts to WKWD may be significant, and therefore mitigation responses with respect to water level drawdown impacts on the WKWD North wellfield should be included in the DEIR.

[1] *Draft Environmental Impact Report (DEIR), Kern Fan Groundwater Storage Project (SCH# 2020049019), Prepared for Groundwater Banking Joint Powers Authority, Dated October 2020*

MEMORANDUM



Project Overlay drawing above adapted from the subject DEIR Appendix A, Figure 1-1, and from Figure 3.10-11 Kern Fan Groundwater Storage Project DEIR[2]"

[2] *Draft Environmental Impact Report (DEIR), Kern Fan Groundwater Storage Project (SCH# 2020049019), Prepared for Groundwater Banking Joint Powers Authority, Dated October 2020*

MEMORANDUM

6. Section 3.1.4 describes the impacts related to energy to be "less-than-significant", however, the DEIR does not address recovery cost impacts (i.e., energy costs) due to increased drawdown in adjacent wells (specifically those operated by WKWD) caused by operation of Project wells. 6

7. It is noted in the Impact CUM-1 described on Page 4-14 does state that a cumulative impact to WKWD is potentially significant. The proposed Mitigation Measure CUM-1 "would minimize the potential that groundwater levels will decline below the MT [WKWD SGMA GSP Minimum Threshold]". While the mitigation minimizes the potential, hydrographs on Figure 4-2 show head values that are below the MTs even with the Palms Deferred Recovery scenario. What specific mitigations can be applied to address site-specific impacts on the WKWD operations? 7

8. The general groundwater flow direction shown on Figure 3-7 of the DEIR appears to be a reasonable interpretation based on regional data. Closer to the proposed project however, in the southern portion of the BVSWD service area, groundwater flow directions are reported to vary in response to recharge and recovery operations by WKWD, the Kern Water Bank, and other factors. Were variable groundwater flow directions considered as part of the analyses? Would groundwater flow directions other than northwest to southeast result in significantly different simulation outcomes? 8

9. Table 3-7 shows representative values of groundwater quality within the project area on the east side and west side of the East Side Canal. A February 17, 2017 Memorandum[3] prepared for the BVWSD by GEI may suggest poorer groundwater quality in the area of the Palms Project than is reflected in Table 3-7. The GEI memo (2017) states "Wells that represent the [BVWSD Palms] Project area are District wells 01 and 02, and Monitoring Wells 10 at the northern Project boundary and 12 near the southern boundary." In the 2017 GEI memo, excessive concentrations of iron, manganese, TDS, and other constituents are presented, and these values that are higher than the values presented on DEIR Table 3-17. Wells D01 and D02, as examples, were reported to have arsenic concentrations of 13 and 13.5 ppb, respectively, in the 2017 GEI memo. Were the data presented in the 2017 GEI Memo considered as part of the preparation of Table 3-7? 9

10. Does the water quality analysis consider changes that may occur to water quality as water levels decrease? As an example, WKWD has experienced an increase in concentrations of select constituents during periods of deeper water levels. If the expected water quality parameters presented in Table 3-7 were to increase in concentration as water levels decreased over time in the area, could the Palms Project still operate as proposed? 10

[3] *Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, GEI Project No. 1506650, prepared for BVSWD, Dated February 17, 2017.*

MEMORANDUM

11. The Project proposes to recharge high quality surface water in an area where groundwater is documented to be of much poorer quality (see GEI 2017 memo). The DEIR states the Project has a potential beneficial impact on groundwater quality… (pg 4-14). Further, the DEIR states that a total of approximately 27,000 AF was recharged in the Project Property during 2017 and 2019 (pg 1-2), however there is no information provided in the DEIR to demonstrate whether that recharge improved water quality in the area.

11

12. Section 5.6.2 presents the "Palms Area-Only" Project Alternative in which the proposed project wells located to the north of the WKWD North Wellfield are removed from consideration. The DEIR states on page 5-5 that "The evaluation of water quality data for wells in the Palms area found that it may not be possible to meet water quality standards for pump-in to the Aqueduct without treatment." Table 3-7 suggests that, except for manganese, groundwater in wells located east of the East Side Canal has generally higher concentrations of constituents than that in wells on the west side of the East Side canal (where the Palms Project is located). If Table 3-7 is representative of water quality conditions, then is manganese the only constituent that prevents the Palms Area-Only project alternative from being feasible? If Table 3-7 is representative, wouldn't the Palms project wells located to the north of WKWD (east of the East Side canal) make the water quality less desirable after blending?

12

13. In general, if groundwater quality conditions at the Palms Project recharge site are poor and water pumped from that site can not be placed back into the aqueduct without blending from other offsite wells, is spreading higher quality Kern River Water and State Water Project water in the Palms Project area a reasonable use of the resource?

13

Phone No. (661) 634-1400

Mailing Address
3200 Rio Mirada Drive
Bakersfield, CA 93308

January 18, 2021

50 - Environmental

Mr. Tim Ashlock
Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206

Re: Draft Environmental Impact Report for the Palms Groundwater Recovery Project

Dear Mr. Ashlock:

The Kern County Water Agency (Agency) would like to thank you for the opportunity to review and comment on the Draft Environmental Impact Report (DEIR) for the Palms Groundwater Recovery Project (Project) proposed by Buena Vista Water Storage District (Buena Vista).

Intro The Agency was created by the California State Legislature in 1961 to contract with the California Department of Water Resources (DWR) for State Water Project (SWP) water. The Agency has contracts with water districts throughout Kern County to deliver SWP water. The Agency also manages and/or is a participant in multiple groundwater banking projects, including the Kern Water Bank (KWB), Pioneer Property and Berrenda Mesa banking projects. Additionally, the Agency maintains and operates the Cross Valley Canal. Therefore, the Agency is uniquely qualified to provide comments.

Comment 1: The DEIR lacks a complete and meaningful analysis of the potential water quality impacts.

1 The DEIR fails to provide a complete analysis of the potential water quality impacts that may arise from implementation of the Project. The DEIR incorrectly uses drinking water MCLs as the benchmark for water quality comparisons (pg. 3-85) when the appropriate benchmark for comparing water quality impacts of future Pump-in programs is historic California Aqueduct (Aqueduct) water quality. The Project has the potential to produce greater water quality impacts than discussed in the DEIR. In Table 3-5, several of the upstream Aqueduct water quality values appear to be high (pg. 3-52). Given the higher values, the potential impacts to water quality may be greater than what is discussed in the DEIR.

2 It is difficult to evaluate the potential impacts to Aqueduct water quality based on representative wells as the results are highly variable and the DEIR includes no additional analysis of how to minimize water quality impacts outside of the limited discussion on blending water and construction modifications (pg. 3-86). Additionally, the Project should not rely upon water banked by adjoining entities, such as the Kern Water Bank, West Kern Water District or Pioneer Project, to blend water to improve water quality.

3 The proposed Mitigation Measures may not sufficiently reduce water quality impacts to meet the requirements of the Aqueduct Pump-in program. Therefore, the DEIR should be amended to include a meaningful and complete analysis of the potential water quality impacts from the Project.

Comment 2: The DEIR fails to adequately identify and discuss the aspects and limitations of the potential future water sales.

4 The DEIR indicates water may be "sold to other industrial or municipal users" in which the district may enter into future "water contracts [with] other public water agencies" (pg. 2-6). The DEIR does not identify or discuss any anticipated aspects of future potential water sales nor does it place any limitations on the district to remain in balance before water sales could occur. There is no discussion of the amount of water, potential public water agencies or the duration of any future water contracts. The DEIR does not identify whether the industrial or municipal users would be located in Kern County or if there is potential to sell water out of Kern County. Furthermore, the DEIR makes uncorroborated claims that there would be no impact to population and housing and that the Project would not be growth inducing (pg. 3-4). Without adequate discussion on the quantity of water, potential public water agencies or contract duration there is no way to substantiate the claim of no population or growth inducing impacts. Therefore, the DEIR should be amended to identify and discuss the aspects and limitations of potential future water sales and demonstrate Buena Vista will commit to remaining in balance prior to selling any water.

Comment 3: The DEIR Discretionary Permits and Approvals Required section is incomplete.

5 The DEIR Discretionary Permits and Approvals Required section incorrectly limits the Project's approvals to the DWR (pg. 2-7). The Agency has discretionary approval over the Project and therefore, the DEIR should amend the project approvals to include the Agency for approval of agreements to modify BV8 and approval of and agreements for authorizing use of the Aqueduct to deliver, exchange and convey water.

Comment 4: The DEIR does not discuss the need for a hydraulic analysis to evaluate impacts to surface elevation in the Aqueduct.

6 The DEIR lacks a hydraulic analysis to determine the potential impacts to water surface elevations in the Aqueduct. The DEIR discusses coordination with DWR for the turn-in agreement (pg. 2-6); however, there is no discussion on the need for hydraulic analyses for the anticipated modifications to BV8. Therefore, the DEIR should be amended to include discussion of the need for hydraulic analyses and whether additional environmental documents may be prepared to analyze the results of a hydraulic analysis by DWR.

Comment 5: The Project should operate consistent with the existing Kern Fan Monitoring Committee Memorandum of Understanding.

Based on Figure 2-2, the Project recovery facilities are located up fan of the Palms Groundwater Banking Project facilities (pg. 2-3); it is common knowledge that all banked water is recovered down fan from the recharge area; however, the Project violates this "golden rule" of recovery. The Kern Fan Monitoring Committee (KFMC) Memorandum of Understanding (MOU) states in Section 2(b)(11) that "Recovery of banked water shall be from the project site and recovery facilities shall be located therein." The DEIR indicates that Buena Vista will join the Kern Water Bank Authority Joint Operating Committee (JOC) or amend or enter into a new MOU (pg. 2-7). Should Buena Vista be permitted to join the JOC, it will still be required to enter into a new MOU that demonstrates the Project is in the spirit of the KFMC MOU. While the KFMC MOU allows for recovery of banked water outside of the project site, it requires consent of both the KFMC and the district or entity with jurisdiction over the recovery area. 7

If the Project intends to rely on previously banked water through seepage from district canals or other means to justify recovery outside of the district's boundaries, the Project must maintain a positive balance and demonstrate no borrowing of water for recovery from the basin, consistent with KFMC MOU Section 2(b)(15). Therefore, the DEIR should be amended to include discussion of the KFMC MOU's provisions and how the Project will meet those requirements.

Comment 6: The DEIR's use of a superposition model is not the appropriate method for analyzing groundwater impacts.

The DEIR is based upon a superposition model which simplifies groundwater level impacts by determining the change in water levels. This type of modeling is not the appropriate approach to adequately assess the potential groundwater impacts, including impacts to the Aqueduct. The model fails to fully capture the potential swings in recharge and recovery and does not address subsidence along the Aqueduct or how the Project may further exasperate existing subsidence. Therefore, the DEIR should be amended to include an updated modeling approach that considers geologic factors, including local operations, water projects and Kern River hydrology. 8

Agency staff are available to work with Buena Vista to ensure the Agency's concerns are adequately addressed. If you have any questions, please contact Monica Tennant of my staff at (661) 634-1419.

Sincerely,

Holly Melton
Water Resources Manager

KERN
GROUNDWATER AUTHORITY

January 27, 2021

Mr. Tim Ashlock
Buena Vista Water Storage District
tim@bvh2o.com

RE: Palms Groundwater Recovery Project

Introduction

The Kern Groundwater Authority (KGA) reviewed Draft Environmental Impact Report (DEIR) for the Palms Groundwater Recovery Project (Proposed Project) and provides the following comments. As the comments below reflect, the KGA is concerned the Proposed Project is unlawful, violating the California Constitution and the Water Code. In addition, the DEIR is deficient for not disclosing components of the Proposed Project and not evaluating its environmental impacts. The KGA requests that Buena Vista Water Storage District (BV) revise the Proposed Project to ensure it complies with applicable law and revise and recirculate the DEIR to address the deficiencies demonstrated in the comments below.

(1) Violations of the California Constitution and the Water Code

(a) Waste and Unreasonable Use

1a

Both the California Constitution and the Water Code prohibit the waste and unreasonable use of water. Article X, section 2 of the California Constitution prohibits the "waste or unreasonable use or unreasonable method of use of water." (Cal. Const., art. X, § 2.) Water Code section 100, similarly prohibits the waste and unreasonable use of water, requiring all water be put to beneficial use and that no right shall allow the waste or unreasonable use of water. (Water Code, 100.)

The Proposed Project is unlawful because it proposes to use water in a wasteful and unreasonable manner. The Proposed Project proposes to recharge high-quality surface water in an area where groundwater is documented to be of much poorer quality (see GEI 2017). If read carefully, the DEIR acknowledges that the water quality in the recharge area prevents BV from extracting water where it has been recharged. The DEIR discloses that the Palms Area-Only Layout, which was a project alternative that would extract water in the same area in which water was banked (Palms Area), was not feasible because "the evaluation of water quality data for wells in the Palms area found that it may not be possible to meet water quality standards for pump-in to the Aqueduct without treatment. Therefore, this alternative was not evaluated in detail because it cannot feasibly attain the Recovery Project's objective of meeting water quality standards by blending, if necessary." (DEIR, at ES-iv.) Therefore, the DEIR disclosed that it was not possible to extract water from the Palms Area, where water was being recharged, because that water would be of such impaired quality that it could not meet the pump-in Aqueduct standards without treatment. (*Id.*) The DEIR further concluded that extraction of water in the Palms Area could not meet water quality standards by blending. (*Id.*) The DEIR acknowledges that because of these conclusions, it did not further analyze the quality of water in the Palms Area. (*Id.*)

1b

The DEIR states that the Proposed Project must be recovered from an area of better groundwater quality (proposed wells east of the Eastside canal, aka off-site wells) and blended with project water in order to meet DWR pump-back requirements to the CA Aqueduct. (DEIR , at 3-85.) The DEIR presents a theoretical blending calculation of 50/50 (amount of recovered Project water to that recovered from off-site wells) based on historic water quality data, that fails to meet pump-back requirements for several constituents. (*Id.*) However, the DEIR does not evaluate how BV will ultimately meet the water quality requirements of the pump-back program. It

follows that BV's only recourse will be to pump the off-site wells more and/or drill additional off-site wells to improve the quality of the blended water.

The recharge of groundwater is a beneficial use, only if the recharged water is later extracted and put to beneficial use. (Water Code, § 1242, 7075; *Los Angeles v. San Fernando* (1975) 14 Cal.3d 199, 260; *City of Santa Maria v. Adam* (2012) 211 Cal.App.4th 266, 302.) The DEIR does not analyze whether the water being recharged in the Palms Area is of such quality that it
1a can extracted and applied to beneficial uses. The information provided in the DEIR is limited to the issue of whether the Proposed Project is able to extract the water recharged in the Palms Area and put it to beneficial use for the Proposed Project – and the DEIR answers that question in the negative. (DEIR, ES-iv.) Without the disclosure and evaluation of data that shows the water recharged by the Proposed Project will later be extracted and put to beneficial use, the Proposed Project amounts to an unreasonable use of water. Because the DEIR does not establish that the water recharged will be or can be later extracted and put to beneficial use, the Proposed Project proposes to use water in a wasteful and unreasonable manner and the Proposed Project cannot be approved as lawful.

(b) <u>Violation of Water Code Provisions</u>

The Water Code authorizes the storage of water underground. Section 1242 of the Water Code states:

> The storing of water underground, including the diversion of streams and the flowing of water on lands necessary to the accomplishment of such storage, constitutes a beneficial
2 use of water if the water so stored is thereafter applied to the beneficial purposes for which the appropriation for storage was made.

In addition, Water Code section 7075 allows:

Water which has been appropriated may be turned into the channel of another stream, mingled with its water, and then reclaimed; but in reclaiming it the water already appropriated by another shall not be diminished.

The judiciary interprets the above sections to allow the storage and recapture of water from an underground aquifer. However, the quantity of water recaptured is limited to the amount of water by which the natural supply of the basin is augmented. For example, in *Los Angeles v. San Fernando* (1975) 14 Cal.3d 199, 245-55 ("*San Fernando*") the Court described the quantity of water that a banking party is allowed to recapture as the quantity "equal to the net amount by which the reservoir is augmented by such deliveries." (*San Fernando*, at 262.) The *San Fernando* court had been referring to the basin as an underground reservoir; in the quote above the word reservoir is used in the context of an underground reservoir or basin. Similarly, in *Los Angeles v. Glendale* (1943) 23 Cal.2d 68, 75-79 ("*Glendale*"), the Court provided a similar definition describing the quantity of water available for recapture. The *Glendale* Court held that there is a "right to recapture the amount by which the available conglomerated ground supply has been augmented." (*Glendale* , at 76-77.)

2 (con't)

The DEIR fails to analyze whether any of the water recharged in the Palms Area could be later extracted and put to beneficial use. As noted above, the legal basis for extracting recharged water limits the recharger to extract only the quantity of water that augments the supply. The DEIR provides no data establishing that the recharge from the Proposed Project augments the usable supply. In fact, the only data disclosed by the DEIR is that recharge from the Proposed Project does not augment the supply of useable water. Without further analysis and disclosure, the Proposed Project has not established that the proposed recharge would result in any valid right to extract groundwater outside the Palms Area.

(2) Violations of the Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) requires that each subbasin develop a groundwater sustainability plan (GSP) to achieve sustainability. In empowering agencies to achieve the sustainability set forth in their respective GSPs, SGMA prohibits one

3

agency from impacting existing conjunctive use or storage programs. (Water Code, 10726.2(b).) In the cumulative impact section of the DEIR, BV discloses that the Proposed Project will, in fact, affect existing storage programs and conjunctive use projects. (DEIR, at 4-13.) Specifically, the DEIR discloses that the Proposed Project proposes to extract water out of a neighboring groundwater sustainability agency. The Proposed Project proposes to install new wells in the KGA boundary and extract water from these wells. The DEIR discloses that this extraction may result in the violation of minimum thresholds set by KGA members and included in the KGA GSP. Because this impact is prohibited by SGMA, the Proposed Project is unlawful and cannot be approved.

(3) Violations of the California Environmental Quality Act

(a) Insufficient Project Description

The California Environmental Quality Act, Pub. Res. Code, § 21000 *et seq.* ("CEQA"), requires a governmental agency to evaluate the environmental impacts whenever it considers approval of a discretionary project. (*California Sportfishing Protection Alliance v. State Water Resources Control Bd.*) (2008) 160 Cal.App.4th 1625, 1642). The purpose of environmental review is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, environmental review protects not only the environment but also informed self-government. (*Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 355.) An accurate, stable and finite project description is essential for an informative and legally sufficient environmental review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.) "[O]nly through an accurate view of the project may the public and interested parties and public agencies balance the proposed project's benefits against its environmental cost, consider appropriate mitigation measures, assess the advantages of terminating the proposal and properly weigh other alternatives." (*City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1454.)

4

Judicial review of CEQA analyses of non-adjudicative decisions extends only to whether there was a prejudicial abuse of discretion: "an agency may abuse its discretion under CEQA

either by failing to proceed in the manner CEQA provides or by reaching factual conclusions unsupported by substantial evidence." (*Save Tara v. City of West Hollywood* (2008) 45 Cal.4th 116, 131, as modified (Dec. 10, 2008) [citing Pub. Res. Code, § 21168.5].)

"[T]he ultimate decision of whether to approve a project, be that decision right or wrong, is a nullity if based upon an EIR [environmental impact report] that does not provide the decision-makers, and the public, with the information about the project that is required by CEQA. The error is prejudicial if the failure to include relevant information precludes informed decision making and informed public participation, thereby thwarting the statutory goals of the EIR process." (*Napa Citizens for Honest Government*, 91 Cal.App.4th at 355–356 (citation omitted) (internal quotation omitted); *see also California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219, 1237 [citing *Concerned Citizens of Costa Mesa, Inc. v. 32nd Dist. Agricultural Assn.* (1986) 42 Cal.3d 929, 935].)

4 (con't)

The project description section of the DEIR violates CEQA because it fails to provide a accurate description of the Proposed Project such that public participation is thwarted, informed decision making is precluded, and environmental analysis cannot be supported by substantial evidence. Specifically, the portions of the Proposed Project that are deficient include:

- Failure to disclose that the Proposed Project would require the drilling of new groundwater extraction wells in the KGA service area;
- Failure to disclose that the Proposed Project will extract water in a different location from where water will be recharged;
- Failure to disclose that the recharge and extraction locations are different because the water quality is not sufficient in the Palms Area to allow extraction and use;
- Failure to identify regulatory authority and approvals for drilling new wells outside the BV jurisdictional area in the service area of a neighboring groundwater sustainability agency.

4 (con't) Because the project description fails to describe the Proposed Project in an accurate manner, it is deficient and must be revised.

(b) Failure to Disclose and Analyze Environmental Impacts of Diverting Additional Surface Water

CEQA requires the lead agency identify and evaluate all potential significant environmental impacts of a project prior to approving any project. (*Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 517; *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412; *In re Bay-Delta Programmatic Envt'l Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1162.)

The Proposed Project proposes to recharge up to 100,000 acre feet of additional surface water per year into the Kern subbasin. The DEIR fails to identify where this water will come from and/or analyze any impacts from importing this additional water. The DEIR discloses that BV obtains water from both the Kern River and from the State Water Project (SWP). (DEIR, 1-4 to 1-5.) However, the DEIR does not identify which source of water will supply the additional water that the Proposed Project will recharge. Nor does the DEIR evaluate the years or frequency in which such SWP or Kern River supply would be available. An EIR is required to identify water sources that will be used by a Proposed Project. (*Napa Citizens for Honest Gov't v. Napa County Board of Supervisors* (2001) 91 Cal.App.4th 342, 371.) If a water sources is not certain, an EIR is required to examine the various sources of water available and describe the environmental consequences that would result from using each source. (*Id.*)

5

The DEIR does not provide the requisite information and fails to analyze the impacts of diverting increased Kern River water or importing additional water. For example, if the Proposed Project assumed the Kern River would supply the additional 100,000 acre feet of water, the DEIR would need to evaluate whether BV's diversion and storage of such supply would reduce supplies to other water users, reduce supply to environmental or instream uses, impact flood control releases, result in any seepage from increased flows in the Kern River,

impact conveyance facilities, or otherwise increase likelihood of flood impacts. The DEIR did not identify the source of the additional recharge water and therefore failed to disclose or evaluate any of these environmental impacts of the Proposed Project. The KGA requests the DEIR be revised to identify the source of the additional recharge water, the anticipated years in which such water would be available, and evaluate the environmental impacts from the increased diversion to recharge.

5 (con't)

(c) Failure to Disclose and Analyze Water Quality Impacts

The DEIR section on water quality is deficient and fails to provide the public with the ability to evaluate the impacts of the Proposed Project. The DEIR fails to disclose and analyze the water quality in the different areas of the Proposed Project; specifically, the area in which water will be recharged compared to the area in which water will be extracted for use. (DEIR, at 3-59 to 3-60.) Rather, the DEIR evaluates the groundwater quality in the "Recovery Project Area" more generally.

In addition, the DEIR does not provide sufficient data to support its analysis. The DEIR relies on water quality data from only one well, stating that there is limited water quality data available. (DEIR, at 3-60.) However, there is a significant amount of water quality data that is available for the Recovery Project Area that the DEIR did not include or otherwise analyze. Specifically, there is a GEI water quality study performed in 2017 that includes water quality data for the Recovery Project Area. (Attached as Attachment A.) The existing data that was ignored by the DEIR indicates that the recharge area has poor water quality and extraction area has significantly better and more usable water quality. Because this data has not been disclosed, the DEIR did not sufficiently identify or evaluate the water quality impacts of the Proposed Project. The KGA requests the DEIR be revised to disclose all the water quality data and evaluate the impacts of the Proposed Project on water quality.

6

(d) Failure to Disclose and Analyze Subsidence Impacts

The DEIR's environmental analysis of the Proposed Project impact on subsidence is not sufficient. The DEIR summarily determines that the Proposed Project will have less than a significant impact on subsidence by stating:

"Future subsidence will depend on whether water levels decline below previous low levels and remain low for a considerable length of time (BVGSA 2020). The range of groundwater elevations at monitoring locations due to project operation is expected to be similar to the range of elevations that has been experienced in the past (see Figure 5-5)." (DEIR, at 3-97.)

This statement contradicts other analysis in the DEIR which discloses the Propose Project will affect groundwater elevations, even causing the violation of minimum thresholds of groundwater elevations for KGA members. (DEIR, at 4-13.) In addition, the statement is conclusory and is not supported by analysis related to the soils, geology, project design, timing of extractions, location of extraction, frequency of extraction, or other components of the Proposed Project. The Department of Water Resources (DWR) provided a comment on the notice of preparation and initial study stating that the subsidence evaluation was inadequate and suggesting the DEIR include specific information. (DEIR, at p. 315-16 ["DWR finds the subsidence evaluation in the NOP/IS inadequate for our responsible agency purposes. DWR requests the EIR include a Geology and Soils section which includes the reports and analysis which are the basis for the conclusion that, due to the project design feature where recovery wells would not be constructed below the E-clay, the risk of subsidence in Basin 5-022 is less than significant."].) The DEIR does not include any of the information or analysis required by DWR. For this reason, the DEIR is deficient and must be revised and recirculated.

7

(e) Failure to Consult with Responsible Agencies

CEQA defines a "responsible agency" as "a public agency, other than the lead agency, which has responsibility for carrying out or approving a project." (Pub. Resources Code, § 21069; See also 14 CCR, § 15381.) Pursuant to this definition, both Kern County and the KGA

8

are responsible agencies because they would be required to approve and/or register extraction facilities required by the Proposed Project. (Water Code, 10725.6; 10726; 10726.4.)

As the lead agency, BV is required to solicit comments from responsible agencies regarding the choice and content of environmental documents. (Pub. Resources Code, §§ 21080.4(a) [requiring solicitation of comments on "the scope and content of the environmental information that is germane to the statutory responsibilities of that responsible agency" when the lead agency determines an environmental impact report is required for the proposed project]; 21104(a) [requiring consultation with, and solicitation of comments from, responsible agencies prior to completing an environmental document]; See also 14 CCR, §§ 15082(a), 15086.) Because BV failed to provide notice and solicit input from responsible agencies, it violated the requirements of CEQA. The KGA requests BV provide it and other responsible agencies with notice and an opportunity to comment prior to revising and recirculating the DEIR.

8 (con't)

Conclusion

The KGA is committed to serving its members and achieving sustainability for the Kern subbasin. The KGA supports the development of projects and management actions consistent with the subbasin's groundwater sustainability plans and looks forward to working with BV on the revision of the Proposed Project and DEIR.

9

Kern Groundwater Authority

Chair

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4005
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

January 19, 2021

Tim Ashlock, General Manager
Buena Vista Water Storage District
Post Office Box 756
Buttonwillow, California 93206
tim@bvh2o.com

Subject: Palms Groundwater Recovery Project (Project)
DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR)
State Clearinghouse No. 2020060315

Dear Mr. Ashlock:

The California Department of Fish and Wildlife (CDFW) received a Notice of Availability of a DEIR from the Buena Vista Water Storage District (BVWSD), as Lead Agency, for the Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), related authorization as provided by the Fish and Game Code will be required.

CDFW has jurisdiction over fully protected species of birds, mammals, amphibians and reptiles, and fish, pursuant to Fish and Game Code sections 3511, 4700, 5050, and 5515. Take of any fully protected species is prohibited and CDFW cannot authorize their incidental take.

PROJECT DESCRIPTION SUMMARY

Proponent: BVWSD is the Project applicant and CEQA Lead Agency .

Objective: The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County by improving the BVWSD's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies.
- Improve conveyance of previously stored water throughout the BVWSD area and to neighboring districts.
- Install recovery facilities to attract new banking partners in order to increase groundwater in the Kern Subbasin for District use.
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the Aqueduct.

Project Description: The Project is the construction of nine new wells and replacement of 14 wells. Additionally, conveyance pipelines would be installed to connect these wells to the water delivery system. Construction activities would include excavation and trenching to install the wells, and approximately 11.9 miles of conveyance pipe. The total area of disturbance would be approximately 72 acres. The new and replacement wells would be drilled to a depth of up to 500 feet and include an 18-inch diameter casing. Staging areas for the construction equipment and materials would be adjacent to the Project area on previously disturbed land. The water pipelines will be connected to BVWSD's existing turnout at the California Aqueduct at BV8, which can be used to either input water to, or withdraw water from, the California Aqueduct.

Location: The Project is located in the BVWSD service area, approximately four miles south of the unincorporated community of Buttonwillow, Kern County, California, within Sections 2 to 5, 8 to 11, 14, and 15; Township 30 South; Range 24 East; Mount Diablo Base & Meridian.

Timeframe: Anticipated construction activities are expected to begin in the spring of 2021 and be completed within 11 months.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist BVWSD in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the CEQA document.

Aerial imagery of the Project boundary and its surroundings within the Project boundary shows nearby riparian corridors, riparian-lined canal corridors, large trees, Valley saltbush and Great Valley mesquite scrub habitat, upland grassland, and agricultural habitats. Tule Elk State Natural Reserve, managed by the California Department of Parks and Recreation, is located adjacent to the Project boundary. Based on a review of the Project description, a review of California Natural Diversity Database (CNDDB) records, and the surrounding habitat, several special-status species could potentially be impacted by Project activities.

Project-related construction activities within the Project boundary including but not limited to construction and operation of additional water banking facilities and introduction of surface water flows for storage could impact the following special-status plant and wildlife species and habitats known to occur in the area: the State threatened and federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*); the State and federally endangered Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*); the State and federally endangered giant kangaroo rat (*Dipodomys ingens*); the State and federally endangered and State fully protected blunt-nosed leopard lizard (*Gambelia sila*); the State threatened Swainson's hawk (*Buteo swainsoni*), Nelson's antelope squirrel (*Ammospermophilus nelsoni*), and tricolored blackbird (*Agelaius tricolor*); the State fully protected white-tailed kite (*Elanus leucurus*); the California Rare Plant Rank (CRPR) 1B.1 alkali-sink goldfields (*Lasthenia chrysantha*), oil nest straw (*Stylocline citroleum*), and slough thistle (*Cirsium crassicaule*); the CRPR 1B.2 recurved larkspur (*Delphinium recurvatum*); and the State species of special concern American badger (*Taxidea taxus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), San Joaquin pocket mouse (*Perognathus inornatus*), burrowing owl (*Athene cunicularia*), Le Conte's thrasher (*Toxistoma lecontei*), western pond turtle (*Emys marmorata*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), California glossy snake (*Arizona elegans occidentalis*), western spadefoot (*Spea hammondi*), and coast horned lizard (*Phrynosoma blainvillii*). 1

Please note that the CNDDB is populated by and records voluntary submissions of species detections. As a result, species may be present in locations not depicted in the CNDDB but where there is suitable habitat and features capable of supporting species. Therefore, a lack of an occurrence record in the CNDDB is not tantamount to a negative species finding. In order to adequately assess any potential Project related impacts to 2

biological resources, surveys conducted by a qualified wildlife biologist/botanist during the appropriate survey period(s) and using the appropriate protocol survey methodology are warranted in order to determine whether or not any special-status species are present at or near the Project area.

CDFW recommends that the following modifications and/or edits be incorporated into the DEIR.

I. Mitigation Measure or Alternative and Related Impact Shortcoming

Would the Project 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 CDFW or the United States Fish and Wildlife Service (USFWS)?

COMMENT 1: San Joaquin Kit Fox (SJKF)

Issue: SJKF occurrences have been documented within the Project boundary (CDFW 2020). The Project has the potential to temporarily disturb and permanently alter suitable habitat for SJKF and directly impact individuals if present during construction, recharge, and other activities.

In addition to grasslands and shrublands, SJKF den in a variety of areas such as rights-of-way, agricultural and fallow or ruderal habitat, dry stream channels, and canal levees, and populations can fluctuate over time. SJKF are also capable of occupying urban environments (Cypher and Frost 1999). SJKF may be attracted to Project areas due to the type and level of ground-disturbing activities and the loose, friable soils resulting from intensive ground disturbance. In addition to grasslands and shrublands, SJKF will forage in fallow and agricultural fields and utilize streams and canals as dispersal corridors. As a result, there is potential for SJKF to occupy all suitable intact habitat, agricultural lands, and urban areas within the Project boundary and surrounding area. The DEIR has determined that suitable SJKF habitat occurs within the Project area and confirmed known occurrences for SJKF within the Project and surrounding area using the CNDDB (CDFW 2020). The DEIR acknowledges the potential to temporarily disturb and permanently alter suitable habitat for special status species including SJKF, and to directly impact individuals if present during construction activities. 3

The DEIR Mitigation Measure (MM) BIO-3 describes monitoring to occur for four consecutive days for potential dens found within 50 feet of Project activity, and developing an exclusion zone in accordance with the Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox (USFWS 2011) if SJKF activity is documented. If it is infeasible to implement the prescribed exclusion zone, USFWS will be consulted and alternative measures will be implemented to ensure that impacts are adequately minimized. The measure also

describes consultation with USFWS in the event a SJKF is found inside a pipe on the Project site and is unable to escape.

The DEIR defers identifying mitigation for impacts to SJKF until potentially after Project activity has begun, and does not specify consultation with CDFW for activities that may impact SJKF. Given the size and scope of the Project and the prevalence of SJKF adjacent to and within the Project area, CDFW has concluded it is likely that impacts to SJKF, potentially including take, may occur during all phases of the Project.

Specific impact: Without appropriate avoidance and minimization measures for SJKF, potential significant impacts associated with construction include habitat loss, den collapse, inadvertent entrapment, reduced reproductive success, reduction in health and vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from land conversion to agricultural, urban, and industrial development is the primary threat to SJKF (Cypher et al. 2013). Western Kern County supports relatively large areas of high suitability habitat and one of the largest remaining populations of SJKF (Cypher et al. 2013). The Project area is within this remaining highly suitable habitat, which is otherwise intensively managed for agriculture. Therefore, ground-disturbing activities have the potential to significantly impact local SJKF populations.

Recommended Mitigation Measure 1: SJKF Habitat Assessment
For all Project-specific components including construction and land conversion, CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJKF.

Recommended Mitigation Measure 2: SJKF Surveys and Minimization
CDFW recommends assessing presence or absence of SJKF by having qualified biologists conducting surveys of Project areas and a 500-foot buffer of Project areas for SJKF and their sign. CDFW also recommends following the USFWS (2011) "Standardized recommendations for protection of the San Joaquin kit fox prior to and during ground disturbance".

Recommended Mitigation Measure 3: SJKF Take Authorization
SJKF detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible or likely, to acquire a State Incidental Take Permit (ITP) for SJKF prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 2: Blunt-nosed Leopard Lizard (BNLL)

Issue: The DEIR acknowledges that BNLL have been documented in suitable habitat within and adjacent to the Project (CDFW 2020). Suitable BNLL habitat

4

includes areas of grassland and upland scrub that contain requisite habitat elements such as small mammal burrows. BNLL also use open space patches between suitable habitats, including disturbed sites, unpaved access roadways, and canals. DEIR MM BIO-1 specifies the installation of temporary exclusion fencing between the Project site and bush seepweed scrub habitat to prevent potential encroachment of small animals, including BNLL, into the Project work area during construction. The fencing would be installed within existing roads or road shoulders or agricultural fields to reduce habitat disturbance and fragmentation, and fence locations would be selected by a qualified biologist who is present during all fence installation. Fencing would be removed after all construction activities adjacent to the fenced area are complete. Fencing design, alignment, construction, and removal are not described in the DEIR, and the potential impacts of fencing are not addressed.

Specific impact: Without appropriate avoidance and minimization measures for BNLL, potentially significant impacts associated with ground-disturbing activities include habitat loss, burrow collapse, reduced reproductive success, reduced health and vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss resulting from cultivation, agricultural, urban, industrial development, petroleum and mineral extraction, and construction of communication and irrigation infrastructure is the primary threat to BNLL (ESRP 2020a). The range for BNLL now consists of scattered parcels of undeveloped land within the valley floor and the foothills of the Coast Range (USFWS 1998). Some undeveloped areas with suitable BNLL habitat occur within the Project and surrounding area; therefore, ground disturbance and conversion of suitable habitat has the potential to significantly impact local BNLL populations.

Recommended Mitigation Measure 4: BNLL Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for BNLL.

Recommended Mitigation Measure 5: BNLL Surveys
If suitable habitat is present, then prior to initiating any vegetation- or ground-disturbance activities, including those associated with avoidance and minimization measures, CDFW recommends conducting surveys in accordance with the "Approved Survey Methodology for the Blunt-nosed Leopard Lizard" (CDFW 2019). This survey protocol, designed to optimize BNLL detectability, reasonably assures CDFW that ground disturbance will not result in take of BNLL.

CDFW advises that BNLL surveys be completed no more than one year prior to initiation of ground disturbance. Please note that protocol-level surveys must be conducted on multiple dates during late spring, summer, and fall of the same calendar year, and that within these time periods, there are specific protocol-level date, temperature, and time parameters that must be adhered to. As a result, protocol-level surveys for BNLL are not synonymous with 30-day "preconstruction

surveys" often recommended for other wildlife species. In addition, the BNLL protocol specifies different survey effort requirements based on whether the disturbance results from maintenance activities or if the disturbance results in habitat removal (CDFW 2019).

Recommended Mitigation Measure 6: BNLL Take Avoidance
BNLL detection during protocol-level surveys warrants consultation with CDFW to discuss whether take of BNLL can be avoided during ground-disturbing Project activities. Incidental take of BNLL may not be authorized by CDFW.

COMMENT 3: San Joaquin Antelope Squirrel (SJAS)

Issue: SJAS have been documented to occur within areas of suitable habitat within the Project vicinity (CDFW 2020). Suitable SJAS habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

DEIR MM BIO-1 states that temporary exclusion fencing would be installed between the Project site and bush seepweed scrub habitat to prevent potential encroachment of small animals into the work area during construction. The DEIR does not include a description or impact analysis of the proposed exclusion fencing.

Specific impact: Without appropriate avoidance and minimization measures for SJAS, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals. 5

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to SJAS. Little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020b). Areas of suitable habitat within the Project represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of SJAS.

Recommended Mitigation Measure 7: SJAS Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJAS.

Recommended Mitigation Measure 8: SJAS Surveys
In areas of suitable habitat, CDFW recommends that a qualified biologist conduct focused daytime visual surveys for SJAS using line transects with 10- to 30-meter spacing of Project areas and a 50-foot buffer around those areas. CDFW further advises that these surveys be conducted between April 1 and September 20, during

daytime temperatures between 68° and 86° F (CDFG 1990a), to maximize detectability.

Recommended Mitigation Measure 9: SJAS Avoidance
If suitable habitat is present and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances until the completion of Project activities, and monitoring of Project activity by a qualified biologist.

Recommended Mitigation Measure 10: SJAS Take Authorization
SJAS detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire a State ITP for SJAS prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 4: Tipton Kangaroo Rat (TKR)

Issue: TKR have been documented to occur within areas of suitable habitat within and adjacent to the Project (CDFW 2020). Suitable TKR habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Section 3.2 of the DEIR states that haystacks and burrows of suitable size for TKR were observed within areas of suitable habitat located adjacent to the Project boundary. DEIR MM BIO-1 specifies that temporary exclusion fencing will be installed between the project site and bush seepweed scrub habitat to prevent potential encroachment of small animals into the work area during construction. The DEIR does not include a description or impact analysis of the proposed exclusion fencing.

6

Specific impact: Without appropriate avoidance and minimization measures for TKR, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to TKR. Little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020c). Areas of suitable habitat within the Project represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of TKR.

Recommended Mitigation Measure 11: TKR Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for TKR.

Recommended Mitigation Measure 12: TKR Avoidance
If suitable habitat is present, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances of suitable size for TKR use.

Recommended Mitigation Measure 13: TKR Surveys
If burrow avoidance is not feasible, CDFW recommends that focused protocol-level trapping surveys be conducted by a qualified wildlife biologist that is permitted to do so by both CDFW and USFWS, to determine if TKR occurs in the Project area. CDFW advises that these surveys be conducted in accordance with the USFWS (2013) "Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats," well in advance of ground-disturbing activities in order to determine whether impacts to TKR could occur.

Recommended Mitigation Measure 14: TKR Take Authorization
TKR detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire a State ITP for TKR prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 5: Giant Kangaroo Rat (GKR)

Issue: GKR have been documented within areas of suitable habitat adjacent to the Project area (CDFW 2020). Suitable GKR habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Section 3.2 of the DEIR states that haystacks and burrows of suitable size for GKR were observed within areas of suitable habitat located adjacent to the Project boundary. DEIR MM BIO-1 specifies that temporary exclusion fencing will be installed between the project site and bush seepweed scrub habitat to prevent potential encroachment of small animals into the work area during construction. The DEIR does not include a description or impact analysis of the proposed exclusion fencing.

Specific impact: Without appropriate avoidance and minimization measures for GKR, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals. 7

Evidence impact is potentially significant: Habitat loss resulting from agricultural and petroleum development is the primary threat to GKR. Little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020d). Areas of suitable habitat within the Project vicinity represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of GKR.

Recommended Mitigation Measure 15: GKR Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for GKR.

Recommended Mitigation Measure 16: GKR Surveys
In areas of suitable habitat, CDFW recommends that a qualified biologist conduct focused daytime visual surveys for GKR using line transects with 10- to 30-meter spacing of Project areas and a 50-foot buffer around those areas. Surveys should focus on the identification of their characteristic habitat types and burrow systems (burrow openings 50 to 55 mm in diameter) (CDFW 1990b).

Recommended Mitigation Measure 17: GKR Avoidance
If suitable habitat is present and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances until the completion of Project activities.

Recommended Mitigation Measure 18: GKR Take Authorization
GKR detection or presence of characteristic habitat or burrow systems warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire a State ITP for GKR prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 6: Swainson's Hawk (SWHA) and White-Tailed Kite (WTKI)

Issue: SWHA have been documented within the Project area (CDFW 2020). Review of recent aerial imagery indicates that trees capable of supporting nesting SWHA and WTKI occur along nearby waterways and Tule Elk Reserve. Landscape trees may also provide suitable nesting habitat. In addition, grassland and agricultural land in the surrounding area provide suitable foraging habitat for SWHA, increasing the likelihood of SWHA occurrence within the vicinity.

The DEIR MM BIO-2b specifies that a qualified biologist will conduct surveys of potential Swainson's hawk nesting trees within ¼ mile of the Project site within 14 days before Project activities begin during the nesting season of April through August. Surveys for WTKI shall be conducted within a minimum 500-foot radius of the Project activities. If any active nests are observed, protective buffers will be established by a qualified biologist who will monitor the nest during project activities to confirm effectiveness of the buffer. 8

The DEIR analysis does not provide a biological basis for employing a ¼-mile survey radius for SWHA nests without a robust protocol to maximize detection, or for how no-disturbance buffers would be determined as adequate to avoid significant impacts, including but not limited to take ("take" defined pursuant to Fish & G. Code section 86) of individuals through nest failure or other means, as a result of Project implementation. SWHA nesting activity typically commences prior to April.

Specific impact: The DEIR states that SWHA and WTKI are known to the Project area and have the potential to nest in riparian habitat and other mature trees located within the Project site and within ½ mile of the Project. In addition, suitable foraging habitat for these species exists within the vicinity of the Project site; annual grassland, alfalfa or grain fields, and livestock pasture that may be used for foraging are present in the Project vicinity. Without appropriate avoidance and minimization measures for SWHA and WTKI, potential significant impacts include nest abandonment and reduced reproductive success that includes mortality of young, and reduced health and vigor of eggs and/or young.

Evidence impact would be significant: The trees and riparian habitat within the Project area represent some of the only remaining suitable nesting habitat in the local vicinity. Depending on the timing of construction, activities including noise, vibration, and movement of workers or equipment could affect nests and have the potential to result in nest abandonment, significantly impacting local nesting SWHA. In addition, agricultural cropping patterns can directly influence distribution and abundance of SWHA. For example, SWHA can forage in grasslands, pasture, hay crops, and low growing irrigated crops; however, other agricultural crops such as orchards and vineyards are incompatible with SWHA foraging (Estep 2009, Swolgaard et al. 2008).

In the San Joaquin Valley, suitable nest trees may be a limiting factor for SWHA occupation and reproduction. As a result, loss of suitable nest trees, particularly in proximity to foraging habitat, has the potential to significantly impact local SWHA (CDFW 2016). CDFW considers removal of known bird-of-prey nest trees, even outside of the nesting season, a potentially significant impact under CEQA, and, in the case of SWHA, it could also result in take under CESA during active nesting. Project activities near the nest that differ from baseline disturbance regimes in type, timing, and/or magnitude can affect adults caring for eggs and young in the nest, and can affect nestling behavior. Project activities including noise, vibration, odors, visual disturbance, and movement of workers or equipment could affect nesting individuals and have the potential to result in nest abandonment or reduced nesting success, significantly impacting local nesting SWHA and WTKI.

Recommended Mitigation Measure 19: Focused SWHA and WTKI Surveys
To reduce potential Project-related impacts to SWHA and WTKI, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting birds of prey, including SWHA and WTKI, following the survey methodology developed by the SWHA Technical Advisory Committee (SWHA TAC 2000) prior to Project initiation, within the Project area and a ½-mile buffer around the Project area. In addition, if Project activities will take place during the typical breeding season (February 1 through September 15), CDFW recommends that additional preconstruction surveys for active nests be conducted by a qualified biologist no more than 10 days prior to the start of construction.

Recommended Mitigation Measure 20: SWHA and WTKI Avoidance
CDFW recommends that if Project-specific activities will take place during the SWHA nesting season (i.e., March 1 through August 31), and active SWHA nests are present, a minimum ½-mile no-disturbance buffer be delineated and maintained around each nest, regardless if when it was detected by surveys or incidentally, until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, to prevent nest abandonment and other take of SWHA as a result of Project activities.

Recommended Mitigation Measure 21: Tree Removal
CDFW recommends that the removal of known raptor nest trees, even outside of the nesting season, be replaced with an appropriate native tree species planting at a ratio of 3:1 at or near the Project area or in another area that will be protected in perpetuity. This mitigation would offset the local and temporal impacts of nesting habitat loss.

Recommended Mitigation Measure 22: SWHA Take Authorization
If SWHA are detected and a ½-mile no-disturbance nest buffer is not feasible, consultation with CDFW is warranted to determine if the Project can avoid take. If SWHA take cannot be avoided, issuance of a State ITP for SWHA prior to Project activities is warranted to comply with CESA. Pursuant to Fish and Game Code section 3511, CDFW cannot authorize incidental take of WTKI.

COMMENT 7: Tricolored Blackbird (TRBL)

Issue: TRBL are known to occur in the Project vicinity (CDFW 2020, UC Davis 2020). Review of aerial imagery indicates that the Project boundary includes flood-irrigated agricultural land, which is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2017).

Specific impact: Without appropriate avoidance and minimization measures for TRBL, potential significant impacts associated subsequent development include nesting habitat loss, nest and/or colony abandonment, reduced reproductive success, and reduced health and vigor of eggs and/or young.

9

Evidence impact would be significant: As mentioned above, flood-irrigated agricultural land is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2014). This nesting substrate is present within the Project vicinity. TRBL aggregate and nest colonially, forming colonies of up to 100,000 nests (Meese et al. 2014). Approximately 86% of the global population is found in the San Joaquin Valley (Kelsey 2008, Weintraub et al. 2016). In addition, TRBL have been forming larger colonies that contain progressively larger proportions of the species' total population (Kelsey 2008). In 2008, for example, 55% of the species' global population nested in only two colonies, which were located in silage fields (Kelsey 2008). Nesting can occur

synchronously, with all eggs laid within one week (Orians 1961). For these reasons, depending on timing, disturbance to nesting colonies can cause nest entire colony site abandonment and loss of all unfledged nests, significantly impacting TRBL populations (Meese et al. 2014).

Recommended Mitigation Measure 23: TRBL Surveys
CDFW recommends that construction be timed to avoid the typical bird-breeding season of February 1 through September 15. If Project activity that could disrupt nesting must take place during that time, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting TRBL no more than 10 days prior to the start of implementation to evaluate presence/absence of TRBL nesting colonies in proximity to Project activities and to evaluate potential Project-related impacts.

Recommended Mitigation Measure 24: TRBL Colony Avoidance
If an active TRBL nesting colony is found during preconstruction surveys, CDFW recommends implementation of a minimum 300-foot no-disturbance buffer, in accordance with CDFW's "Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015" (CDFW 2015), until the breeding season has ended or until a qualified biologist has determined that nesting has ceased and the young have fledged and are no longer reliant upon the colony or parental care for survival. It is important to note that TRBL colonies can expand over time and for this reason, CDFW recommends that an active colony be reassessed to determine its extent within 10 days prior to Project initiation.

Recommended Mitigation Measure 25: TRBL Take Authorization
In the event that a TRBL nesting colony is detected during surveys, consultation with CDFW is warranted to discuss whether the Project can avoid take; if take avoidance is not feasible, to acquire a State ITP for TRBL, pursuant to Fish and Game Code section 2081(b) prior to any Project activities.

COMMENT 8: Special-Status Plants

Issue: Special-status plant species meeting the definition of rare or endangered under CEQA section 15380 are known to occur within the Project and surrounding area. The DEIR acknowledges that alkali-sink goldfields, oil nest straw, slough thistle, and recurved larkspur, and other special-status plant taxa have been documented within the Project area. Section 3.2 of the DEIR (Biological Resources page 3-12) states that recurved larkspur and other special-status plant taxa were not observed during field surveys, but surveys were conducted very late in the blooming season and it is not clear if plants that may be present were identifiable. Measures to avoid special-status plants are not included in the DEIR. 10

Specific impact: Without appropriate avoidance and minimization measures for special-status plants, potential significant impacts associated with subsequent

construction include loss of habitat, loss or reduction of productivity, and direct mortality.

Evidence impact would be significant: Alkali-sink goldfields, oil nest straw, slough thistle, recurved larkspur, and many other special-status plant species are threatened by grazing and agricultural, urban, and energy development. Many historical occurrences of these species are presumed extirpated (CNPS 2019). Though new populations have recently been discovered, impacts to existing populations have the potential to significantly impact populations of plant species.

Recommended Mitigation Measure 26: Special-Status Plant Surveys
CDFW recommends that individual Project sites be surveyed for special-status plants by a qualified botanist following the "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities" (CDFW 2018). This protocol, which is intended to maximize detectability, includes the identification of reference populations to facilitate the likelihood of field investigations occurring during the appropriate floristic period.

Recommended Mitigation Measure 27: Special-Status Plant Avoidance
CDFW recommends that special-status plant species be avoided whenever possible by delineating and observing a no-disturbance buffer of at least 50 feet from the outer edge of the plant population(s) or specific habitat type(s) required by special-status plant species. If buffers cannot be maintained, then consultation with CDFW may be warranted to determine appropriate minimization and mitigation measures for impacts to special-status plant species.

Recommended Mitigation Measure 28: Listed Plant Species Take Authorization
If a State-listed plant species is identified during botanical surveys, consultation with CDFW is warranted to determine if the Project can avoid take. If take cannot be avoided, take authorization is warranted. Take authorization would occur through issuance of a State ITP, pursuant to Fish and Game Code section 2081(b).

COMMENT 9: Burrowing Owl (BUOW)

Issue: BUOW occur within and in the vicinity of the Project (CDFW 2020). BUOW inhabit open grassland containing small mammal burrows, a requisite habitat feature used by BUOW for nesting and cover. Habitat both within and surrounding the Project supports grassland habitat. Therefore, there is potential for BUOW to occupy or colonize the Project.

11

Specific impact: Potentially significant direct impacts associated with subsequent activities and land conversion include habitat loss, burrow collapse, inadvertent entrapment, nest abandonment, reduced reproductive success, reduction in health and vigor of eggs and/or young, and direct mortality of individuals.

Evidence impact is potentially significant: BUOW rely on burrow habitat year-round for their survival and reproduction. Habitat loss and degradation are considered the greatest threats to BUOW in California's Central Valley (Gervais et al. 2008). The Project and surrounding area contain remnant undeveloped land but is otherwise intensively managed for agriculture; therefore, subsequent ground-disturbing activities associated with subsequent constructions have the potential to significantly impact local BUOW populations. In addition, and as described in CDFW's "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), excluding and/or evicting BUOW from their burrows is considered a potentially significant impact under CEQA.

Recommended Potentially Feasible Mitigation Measure(s) (Regarding Environmental Setting and Related Impact)
To evaluate potential impacts to BUOW associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 29: BUOW Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its vicinity contains suitable habitat for BUOW.

Recommended Mitigation Measure 30: BUOW Surveys
If suitable habitat is present on or in the vicinity of the Project area, CDFW recommends assessing presence or absence of BUOW by having a qualified biologist conduct surveys following the California Burrowing Owl Consortium's "Burrowing Owl Survey Protocol and Mitigation Guidelines" (CBOC 1993) and the "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), which suggest three or more surveillance surveys conducted during daylight with each visit occurring at least three weeks apart during the peak breeding season (i.e., April 15 to July 15), when BUOW are most detectable. In addition, CDFW advises that surveys include a minimum 500-foot buffer area around the Project area.

Recommended Mitigation Measure 31: BUOW Avoidance
CDFW recommends that no-disturbance buffers, as outlined in the "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), be implemented prior to and during any ground-disturbing activities. Specifically, CDFW's Staff Report recommends that impacts to occupied burrows be avoided in accordance with the following table unless a qualified biologist approved by CDFW verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1-Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting sites	Oct 16-Mar 31	50 m	100 m	500 m

* meters (m)

Recommended Mitigation Measure 32: BUOW Passive Relocation and Mitigation
If BUOW are found within these recommended buffers and avoidance is not possible, it is important to note that according to the Staff Report (CDFG 2012), excluding birds from burrows is not a take avoidance, minimization, or mitigation method and is instead considered a potentially significant impact under CEQA. If it is necessary for Project implementation, CDFW recommends that burrow exclusion be conducted by qualified biologists and only during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirmed empty through non-invasive methods, such as surveillance. CDFW recommends replacement of occupied burrows with artificial burrows at a ratio of one burrow collapsed to one artificial burrow constructed (1:1) to mitigate for evicting BUOW and the loss of burrows. BUOW may attempt to colonize or re-colonize an area that will be impacted; thus, CDFW recommends ongoing surveillance at a rate that is sufficient to detect BUOW if they return.

COMMENT 10: Other State Species of Special Concern

Issue: Tulare grasshopper mouse, San Joaquin pocket mouse, San Joaquin coachwhip, western spadefoot, coast horned lizard, California glossy snake, Le Conte's thrasher, and American badger can inhabit grassland and upland scrub habitats (Shuford and Gardali 2008, Thomson et al. 2016). All the species mentioned above have been documented to occur in the vicinity of the Project, which supports requisite habitat elements for these species (CDFW 2020a).

Specific impact: Without appropriate avoidance and minimization measures for these species, potentially significant impacts associated with ground disturbance include habitat loss, nest/den/burrow abandonment, which may result in reduced health or vigor of eggs and/or young, and direct mortality. 12

Evidence impact is potentially significant: Habitat loss threatens all of the species mentioned above (Thomson et al. 2016). Habitat within and adjacent to the Project represents some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground- and vegetation-disturbing activities associated with development of the Project have the potential to significantly impact local populations of these species.

Recommended Mitigation Measure 33: Habitat Assessment
CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if project areas or their immediate vicinity contain suitable habitat for the species mentioned above.

Recommended Mitigation Measure 34: Surveys
If suitable habitat is present, CDFW recommends that a qualified biologist conduct focused surveys for applicable species and their requisite habitat features to evaluate potential impacts resulting from ground and vegetation disturbance.

Recommended Mitigation Measure 35: Avoidance
Avoidance whenever possible is encouraged via delineation and observance a 50-foot no-disturbance buffer around dens of mammals like the American badger as well as the entrances of burrows that can provide refuge for small mammals, reptiles, and amphibians.

Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS?

COMMENT 11: Wetland and Riparian Habitats

Issue: The Project area is in the immediate vicinity of numerous waterways and riparian and wetland areas. Development within the Project has the potential to involve temporary and permanent impacts to these features.

Specific impact: Project activities have the potential to result in the loss of riparian and wetland vegetation, in addition to the degradation of wetland and riparian areas through grading, fill, and related development.

13

Evidence impact is potentially significant: The Project vicinity includes stream and wetland features within an agricultural landscape that also maintains undeveloped habitats. Riparian and associated floodplain and wetland areas are valuable for their ecosystem processes such as protecting water quality by filtering pollutants and transforming nutrients; stabilizing stream banks to prevent erosion and sedimentation/siltation; and dissipating flow energy during flood conditions, thereby spreading the volume of surface water, reducing peak flows downstream, and increasing the duration of low flows by slowly releasing stored water into the channel through subsurface flow. Within the San Joaquin Valley, modifications of streams to accommodate human uses has resulted in damming, canalizing, and channelizing of many streams, though some natural stream channels and small wetland or wetted areas remain (Edminster 2002). The Fish and Game Commission policy regarding wetland resources discourages development or conversion of wetlands that results in any net loss of wetland acreage or habitat value. Construction activities within these features also has the potential to impact

downstream waters as a result of Project site impacts leading to erosion, scour, and changes in stream morphology.

Recommended Mitigation Measure 36: Stream and Wetland Mapping
CDFW recommends that formal stream mapping and wetland delineation be conducted by a qualified biologist or hydrologist, as warranted, to determine the baseline location, extent, and condition of streams (including any floodplain) and wetlands within and adjacent to the Project area. Please note that while there is overlap, State and Federal definitions of wetlands differ, and complete stream mapping commonly differs from delineations used by the United States (U.S.) Army Corps of Engineers specifically to identify the extent of Waters of the U.S. Therefore, it is advised that the wetland delineation identify both State and Federal wetlands in the Project area as well as the extent of all streams including floodplains, if present, within the Project area. CDFW advises that site map(s) depicting the extent of any activities that may affect wetlands, lakes, or streams be included with any Project site evaluations, to clearly identify areas where stream/riparian and wetland habitats could be impacted from Project activities.

Recommended Mitigation Measure 37: Stream and Wetland Habitat Mitigation
CDFW recommends that the potential direct and indirect impacts to stream/riparian and wetland habitat be analyzed according to each Project activity. Based on those potential impacts, CDFW recommends that the DEIR include measures to avoid, minimize, and/or mitigate those impacts. CDFW recommends that impacts to riparian habitat (i.e., biotic and abiotic features) take into account the effects to stream function and hydrology from riparian habitat loss or damage, as well as potential effects from the loss of riparian habitat to special-status species already identified herein. CDFW recommends that any losses to stream and wetland habitats be offset with corresponding riparian and wetland habitat restoration incorporating native vegetation to replace the value to fish and wildlife provided by the habitats lost from Project implementation. If on-site restoration to replace habitats is not feasible, CDFW recommends offsite mitigation by restoring or enhancing in-kind riparian or wetland habitat and providing for the long-term management and protection of the mitigation area, to ensure its persistence.

Editorial Comments and/or Suggestions

Small Mammal and BNLL Exclusion Fencing: DEIR MM BIO-1 states that temporary exclusion fencing will be installed between the project site and bush seepweed scrub habitat to prevent potential encroachment of small animals, including BNLL, into the work area during construction. The fencing will be installed within existing roads/road shoulders or agricultural fields to avoid habitat disturbance and fragmentation. A qualified biologist will determine at a later time where fencing will be installed and will be present during all fence installation to ensure that no special-status species are harmed. Fencing will be removed after all construction activities adjacent to the fenced area are complete.

14

The DEIR does not include an impact analysis or description for the ground disturbing and other activities related to the installation, maintenance, and removal of proposed exclusion fencing. It is not clear if fencing that is proposed would prevent species such as SJAS from climbing over or burrowing under the fence line to enter the Project site. It also is not clear if the Project site would be surveyed to determine whether the site is occupied by any special status species prior to fence installation. Fencing construction and other ground disturbing activity could impact underground burrow systems and result in indirect or direct impacts to special status species, including lethal take. In order for CDFW to determine whether the installation of exclusion fencing is an appropriate avoidance and minimization measure for special status species, CDFW recommends the DEIR include an adequate description and impact analysis of the proposed exclusion fencing, including details regarding its alignment, methods of install and removal, and how the design would prevent special status species from entering work areas.

Federally Listed Species: CDFW recommends consulting with USFWS regarding potential impacts to federally listed species. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. Consultation with the USFWS in order to comply with FESA is advised well in advance of any Project activities. 15

Lake and Streambed Alteration: Project activities have the potential to substantially change the bed, bank, and channel of lakes, streams, and associated wetlands onsite and/or substantially extract or divert the flow of any such feature that is subject to CDFW's regulatory authority pursuant Fish and Game Code section 1600 et seq. Fish and Game Code section 1602 requires an entity to notify CDFW prior to commencing any activity that may (a) substantially divert or obstruct the natural flow of any river, stream, or lake; (b) substantially change or use any material from the bed, bank, or channel of any river, stream, or lake (including the removal of riparian vegetation): (c) deposit debris, waste or other materials that could pass into any river, stream, or lake. "Any river, stream, or lake" includes those that are ephemeral or intermittent as well as those that are perennial. 16

CDFW is required to comply with CEQA in the issuance of a Lake or Streambed Alteration Agreement (LSAA); therefore, if the CEQA document approved for the Project does not adequately describe the Project and its impacts to lakes or streams, a subsequent CEQA analysis may be necessary for LSAA issuance. For information on notification requirements, please refer to CDFW's website (https://wildlife.ca.gov/Conservation/LSA) or contact the Central Region Lake and Streambed Alteration Program at (559) 243-4593 or R4LSA@wildlife.ca.gov.

Nesting Birds: CDFW has jurisdiction over actions with potential to result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections that protect birds, their eggs and nests include sections 3503 17

(regarding unlawful take, possession or needless destruction of the nest or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird).

CDFW encourages Project implementation to occur during the bird non-nesting season; however, if Project activities must occur during the breeding season (i.e., February through mid-September), the Project applicant is responsible for ensuring that implementation of the Project does not result in violation of the Migratory Bird Treaty Act or relevant Fish and Game Codes as referenced above.

To evaluate Project-related impacts on nesting birds, CDFW recommends that a qualified wildlife biologist conduct pre-activity surveys for active nests no more than 10 days prior to the start of ground disturbance to maximize the probability that nests that could potentially be impacted by the Project are detected. CDFW also recommends that surveys cover a sufficient area around the work site to identify nests and determine their status. A sufficient area means any area potentially affected by a project. In addition to direct impacts (i.e., nest destruction), noise, vibration, and movement of workers or equipment could also affect nests. Prior to initiation of construction activities, CDFW recommends that a qualified biologist conduct a survey to establish a behavioral baseline of all identified nests. Once construction begins, CDFW recommends that a qualified biologist continuously monitor nests to detect behavioral changes resulting from the project. If behavioral changes occur, CDFW recommends that the work causing that change cease and CDFW be consulted for additional avoidance and minimization measures.

If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, CDFW recommends a minimum no-disturbance buffer of 250 feet around active nests of non-listed bird species and a 500-foot no-disturbance buffer around active nests of non-listed raptors. These buffers are advised to remain in place until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. Variance from these no-disturbance buffers is possible when there is compelling biological or ecological reason to do so, such as when the construction area would be concealed from a nest site by topography. CDFW recommends that a qualified wildlife biologist advise and support any variance from these buffers and notify CDFW in advance of implementing a variance.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database, which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to the CNDDB. The CNNDB field survey form can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDB_FieldSurveyForm.pdf. The

completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the DEIR to assist BVWSD in identifying and mitigating Project impacts on biological resources.

If you have questions regarding these comments, please contact Annette Tenneboe, Senior Environmental Scientist (Specialist), at the address on this letterhead, or by email at Annette.Tenneboe@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Julie Vance
FA83F09FE08945A...

Julie A. Vance
Regional Manager

Attachment

ec: Office of Planning and Research
State Clearinghouse
state.clearinghouse.opr.ca.gov

Annette Tenneboe
California Department of Fish and Wildlife

REFERENCES

California Burrowing Owl Consortium (CBOC). 1993. Burrowing owl survey protocol and mitigation guidelines. Pages 171-177 *in* Lincer, J. L. and K. Steenhof (editors). 1993. The burrowing owl, its biology and management. Raptor Research Report Number 9.

California Department of Fish and Game (CDFG). 1990a. Approved Survey Methodologies for Sensitive Species. San Joaquin Antelope Squirrel, *Ammospermophilus nelsoni*. California Department of Fish and Game, Region 4.

CDFG. 1990b. Approved Survey Methodologies for Sensitive Species. Giant Kangaroo Rat, *Dipodomys ingens* California Department of Fish and Game, Region 4.

CDFG. 2012. Staff Report on Burrowing Owl Mitigation. California Department of Fish and Game. March 7, 2012.

California Department of Fish and Wildlife (CDFW). 2015. Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015. March 19, 2015.

CDFW. 2016. Status Review on Swainson's Hawk (*Buteo swainsoni*) in California. California Department of Fish and Wildlife. April 11, 2016.

CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. California Department of Fish and Wildlife. March 20, 2018.

CDFW. 2019. Approved Survey Methodology for the Blunt-Nosed Leopard Lizard. California Department of Fish and Wildlife, October 2019 (Revised).

CDFW. 2020. Biogeographic Information and Observation System (BIOS). https://www.wildlife.ca.gov/Data/BIOS. Accessed July 9, 2020.

California Native Plant Society (CNPS). 2019. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org. July 6, 2020.

Cypher, B. and N. Frost. 1999. Condition of San Joaquin kit foxes in urban and exurban habitats. Journal of Wildlife Management 63: 930-938.

Cypher, B.L., S.E. Phillips, and P.A. Kelly. 2013. Quantity and distribution of suitable habitat for endangered San Joaquin kit foxes: conservation implications. Canid Biology & Conservation 16(7): 25-31. http://www.canids.org/CBC/16/San_Joaquin_kit_fox_habitat_suitability.pdf

Edminster, R.J. 2002. Streams of the San Joaquin. Second Edition. Quercus Publications, Los Banos, California.

Endangered Species Recovery Program (ESRP). 2020a. Blunt-nosed leopard lizard. http://esrp.csustan.edu/speciesprofiles/profile.php?sp=gasi . Accessed July 10, 2020.

ESRP. 2020b. San Joaquin antelope squirrel. http://esrp.csustan.edu/speciesprofiles/profile.php?sp=amne . Accessed July 10, 2020.

ESRP. 2020c. Tipton kangaroo rat. https://esrp.csustan.edu/speciesprofiles/profile.php?sp=dinin. Accessed July 10, 2020.

ESRP. 2020d. Giant kangaroo rat. https://esrp.csustan.edu/speciesprofiles/profile.php?sp=diin. Accessed July 9, 2020.

Estep, J. 2009. The influence of vegetation structure on Swainson's hawk (*Buteo swainsoni*) foraging habitat suitability in Yolo County, California. Prepared for the Yolo Natural Heritage Program, Woodland, CA.

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. 2008. Burrowing Owl (*Athene cunicularia*) *In* California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California (W. D. Shuford and T. Gardali, editors). Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Kelsey, R. 2008. Results of the tricolored blackbird 2008 census. Report submitted to U.S. Fish and Wildlife Service, Portland, OR, USA.

Meese, R. J., E. C. Beedy, and W. J. Hamilton, III. 2014. Tricolored blackbird (*Agelaius tricolor*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna-org.bnaproxy.birds.cornell.edu/Species-Account/bna/species/tribla. Accessed December 15, 2017.

Meese, R. J. 2017. Results of the 2017 Tricolored Blackbird Statewide Survey. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report 2017-04, Sacramento, CA. 27 pp. + appendices.

Orians, G. H. 1961. The ecology of blackbird (*Agelaius*) social systems. Ecological Monographs 31(3): 285–312.

Shuford, W. D. and T. Gardali (editors). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Published by Western Field Ornithologists and California Department of Fish and Game.

Swainson's Hawk Technical Advisory Committee (SWHA TAC). 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the Central Valley of California. Swainson's Hawk Technical Advisory Committee. May 31, 2000.

Swolgaard, C. A, K. A. Reeves, and D. A. Bell. 2008. Foraging by Swainson's Hawks in a Vineyard-Dominated Landscape. Journal of Raptor Research 42(3), 188-196. https://doi.org/10.3356/JRR-07-15.1

Thomson, R. C., A. N. Wright, and H. B. Shaffer. 2016. California Amphibian and Reptile Species of Special Concern. California Department of Fish and Wildlife and University of California Press: 84-92.

University of California, Davis (UC Davis). 2020. Tricolored blackbird portal. https://tricolor.ice.ucdavis.edu/. Accessed May 1, 2020.

United States Fish and Wildlife Service (USFWS). 1998. Blunt-nosed leopard lizard *In* Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

USFWS. 2011. Standard Recommendations for the Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance. United States Fish and Wildlife Service. January 2011.

USFWS. 2013. Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats. United States Fish and Wildlife Service. March 2013.

Weintraub, K., T. L. George, and S. J. Dinsmore. 2016. Nest survival of tricolored blackbirds in California's Central Valley. The Condor 118(4): 850–861.

Attachment 1

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
RECOMMENDED MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

PROJECT: Palms Groundwater Recovery Project
State Clearinghousehouse No.: 2020060315

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Before Disturbing Soil or Vegetation	
Recommended Mitigation Measure 1: SJKF Habitat Assessment	
Recommended Mitigation Measure 2: SJKF Surveys and Minimization	
Recommended Mitigation Measure 3: SJKF Take Authorization	
Recommended Mitigation Measure 4: BNLL Habitat Assessment	
Recommended Mitigation Measure 5: BNLL Surveys	
Recommended Mitigation Measure 7: SJAS Habitat Assessment	
Recommended Mitigation Measure 8: SJAS Surveys	
Recommended Mitigation Measure 10: SJAS Take Authorization	
Recommended Mitigation Measure 11: TKR Habitat Assessment	
Recommended Mitigation Measure 13: TKR Surveys	
Recommended Mitigation Measure 14: TKR Take Authorization	
Recommended Mitigation Measure 15: GKR Habitat Assessment	
Recommended Mitigation Measure 16: GKR Surveys	
Recommended Mitigation Measure 18: GKR Take Authorization	
Recommended Mitigation Measure 19: Focused SWHA and WTKI Surveys	

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Recommended Mitigation Measure 21: Tree Removal	
Recommended Mitigation Measure 22: SWHA Take Authorization	
Recommended Mitigation Measure 23: TRBL Surveys	
Recommended Mitigation Measure 25: TRBL Take Authorization	
Recommended Mitigation Measure 26: Special-Status Plant Surveys	
Recommended Mitigation Measure 28: Listed Plant Species Take Authorization	
Recommended Mitigation Measure 29: BUOW Habitat Assessment	
Recommended Mitigation Measure 30: BUOW Surveys	
Recommended Mitigation Measure 32: BUOW Passive Relocation and Mitigation	
Recommended Mitigation Measure 33: Habitat Assessment (Other Species of Special Concern)	
Recommended Mitigation Measure 34: Surveys (Other Species of Special Concern)	
Recommended Mitigation Measure 36: Stream and Wetland Mapping	
Recommended Mitigation Measure 37: Stream and Wetland Habitat Mitigation	
During Construction	
Recommended Mitigation Measure 2: SJKF Surveys and Minimization	
Recommended Mitigation Measure 6: BNLL Take Avoidance	
Recommended Mitigation Measure 9: SJAS Avoidance	
Recommended Mitigation Measure 12: TKR Avoidance	
Recommended Mitigation Measure 17: GKR Avoidance	
Recommended Mitigation Measure 20: SWHA and WTKI Avoidance	

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Recommended Mitigation Measure 24: TRBL Colony Avoidance	
Recommended Mitigation Measure 27: Special-Status Plant Avoidance	
Recommended Mitigation Measure 31: BUOW Avoidance	
Recommended Mitigation Measure 35: Avoidance (Other Species of Special Concern)	

KERN WATER BANK AUTHORITY

VIA EMAIL AND FIRST CLASS MAIL

January 18, 2021

Tim Ashlock, Engineer Manager
Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206
Email: tim@bvh2o.com

Re: Kern Water Bank Authority's Comments on Palms Groundwater Recovery Project Draft Environmental Impact Report;
State Clearinghouse #2020060315

Dear Mr. Ashlock,

1. INTRODUCTION AND SUMMARY.

The Kern Water Bank Authority ("KWBA") submits the following comments on the Draft Environmental Impact Report ("DEIR") for the Palms Groundwater Recovery Project ("Project") (SCH No. 2020060315) proposed by the Buena Vista Water Storage District ("Buena Vista" or "BV"). The DEIR fails to comply with the California Environmental Quality Act ("CEQA") for multiple, independent reasons. KWBA objects to certification of the EIR and the approval of the Project based on the legal and factual errors identified in this letter and attachments.

The purpose of the DEIR is to serve as an informational document for the public and for the decision maker by providing both quantitative and qualitative analysis of a proposed project's impacts on the environment.[1] An EIR that complies with CEQA allows the public to understand the basis on which the lead agency approved or rejected an environmentally significant action, so that the public, being duly informed, can respond accordingly to an action with which it disagrees.[2] An EIR that fails to provide sufficient information subverts the purposes of CEQA where it omits the material necessary to informed decision making and informed public participation.[3]

The DEIR is fundamentally flawed and violates CEQA informational standards. The inadequacies in the DEIR infect nearly every section of the document, including the Project description, alternatives, hydrology and water quality, biological resources, and the cumulative effects analysis.

---

[1] Pub. Resources Code, § 21061; Cal. Code Regs., tit. 14 ("CEQA Guidelines"), § 15003, subds. (b)-(e).

[2] *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 515.

[3] *Id.*

The DEIR's fatal defects include, but are not limited to, the following:

- The DEIR presents a misleading evaluation of the direct, indirect and cumulative effects of the Project because DEIR does not evaluate the entire "project" as required by CEQA;

- Buena Vista has engaged in a classic invalid "piecemealing" analysis of Project effects. It first analyzed and evaluated recharge ponds using a negative declaration. It is those recharge ponds that Buena Vista relies on in this Project to supply the groundwater that would be extracted by this Project using recovery wells. This separates the analysis of the groundwater recharge ponds from the recovery wells, analyzing the two components entirely separately in violation of CEQA;

- The Project purpose includes attracting additional, yet-to-be defined partners; mixing water to meet the California Department of Water Resources' ("DWR") water quality standards for pump-in of non-State Water Project water, e.g., groundwater, into DWR's California Aqueduct ("Aqueduct") for the State Water Project ("SWP"); moving water through the Aqueduct but does not identify the purposes for which the water is being moved; and vaguely describes the sources of water recharge that the Project will rely on.

- The evaluation of the Project's water quality effects is misleading and uninformative because it is based on incorrect and incomplete water quality data, and there is no degradation or other adequate analysis of cumulative effects of the pump-in of poorer quality Project groundwater into the Aqueduct or whether Project pump-ins will impact other existing or future reasonably foreseeable banking projects' ability to meet DWR's standards;

- Because the Project will not recharge water in the lands outside the District, it will result in a significant and unreasonable reduction in groundwater storage within the Kern Groundwater Authority GSA ("KGAGSA") and West Kern Water District GSA ("WKGSA");

- The water quality impact analysis *does not consider* the environmental impacts of removing better quality groundwater located outside the BV District and Buena Vista GSA ("BVGSA") and within another GSA, without replenishment or replacement, or the impacts of blending such mined water with the poorer quality groundwater that will be recovered within the District where recharge occurs;

- The DEIR does not evaluate a reasonable range of alternatives including: alternative locations and configurations of the Project; an alternative that limits use of the Project water to the District; and alternative Project operations to minimize potential effects on groundwater, water quality, and biological resources;

- The DEIR fails to evaluate the significance of the effects of the Project as compared against valid CEQA existing condition and future baselines;

- The DEIR fails to include quantitative data on impacts to biological resources derived from protocol survey methodologies established by state and federal wildlife agencies;

- The DEIR does not include adequate mitigation and avoidance measures, and defers adequate definition of mitigation measures to the results of future studies;

- The DEIR does not disclose material assumptions in the groundwater model used for the Project which render the model fundamentally misleading and uninformative; and

- The DEIR improperly constrains cumulative impacts analysis to include only three other projects, and excludes the impacts of other past, present, and reasonably foreseeable future projects including, but not limited to, the Kern Fan Groundwater Storage Project and associated final EIR (State Clearinghouse #2020049019) approved and certified by the Groundwater Banking Joint Powers Authority on or about December 28, 2020.

These and other significant and fatal defects of the DEIR are described in further detail, below and in the attachments to this letter.

2. THE PROJECT DESCRIPTION IS INADEQUATE, INCONSISTENT AND INDEFINITE.

A. "Piecemealing" of the Project Description.

CEQA prohibits an agency from "piecemealing" the analysis of potential effects by dividing a larger project into smaller units. CEQA defines the term "project" to include the "whole of the action" being undertaken.[4] Here, the "whole of the action" includes: the construction, operation, and maintenance of the recharge ponds; the construction, operation, and maintenance of recovery facilities; the annexation of lands outside of the District, the sources of Project water, transmission of water within and outside the District, and uses of water surface and groundwater stored and recovered by the Project; and all ancillary facilities and activities.[5]

1

An "accurate, stable and finite project description, [which] is the *sine qua non* of an informative and legally sufficient EIR.'"[6] "A project description that gives conflicting signals to decision makers and the public about the nature of the project is fundamentally inadequate and

[4] CEQA Guidelines, §§ 15124, 15126.6.

[5] CEQA Guidelines, § 15124.

[6] *South of Market Community Action Network v. City and County of San Francisco* (2019) 33 Cal.App.5th 321, 332, citation omitted.

misleading." [7] The Project description provided by the DEIR is inadequate for multiple separate and independent reasons.

The description of the Project violates CEQA because it does not describe and evaluate the "whole of the action." Buena Vista first analyzed and evaluated the Palm's recharge ponds (not including any groundwater recharge via BV's existing canal system) using a negative declaration.[8] It is those recharge ponds that Buena Vista relies on in this Project to supply the groundwater that would be extracted by this Project using recovery wells. This separates the analysis of the effects of the groundwater recharge ponds from the recovery wells, analyzing the two components entirely separately in violation of CEQA. To the extent the DEIR is adding a third component – recharge via BV's existing canal system, in addition to such component not being adequately described or evaluated in the DEIR, there is a further segmentation problem since that component of recharge was not described or evaluated as part of the Palm's recharge in the negative declaration. Such a change would represent a substantial change and/or significant new information with respect to the project or circumstances described therein and would necessitate that recharge to be evaluated in this DEIR.

1 (con't)

In the DEIR, the project description provides an uncertain and shifting description of the sources of banked water. The DEIR does not provide any description whatsoever of the participants in this banking and recovery project. The Project is designed to attract unidentified partners, and to transfer water outside of the District and outside of Kern County. The DEIR, however, does not identify or evaluate the uses, and effects of the uses, of the water outside of the District and Kern County. The DEIR does not include detail on the sources of Project water sufficient to allow for a detailed analysis of the effects on the water sources. (DEIR, p. 2-5.)

2

The DEIR fails entirely to describe the groundwater mixing elements of the Project. There is no description of the mixing facilities, process, or the location at which mixing would occur. The DEIR states that the purpose for the mixing is to allow the Project water to meet DWR's standards applicable to pump-in of non-SWP water into and movement through the Aqueduct. (DEIR, pp. ES-i, ES-ii, 2-5.) The Project description must identify the location of any facilities at which water would be mixed, and the ultimate destination and uses of the mixed water, so that the effects of the Project are analyzed and mitigated.

3

The DEIR indicates that parties other than Buena Vista may participate in the Project, but fails to identify who those parties would be, what the nature of their involvement would be, and whether the involvement of these third parties would alter Project operations or result in impacts resulting from such parties' use of banked supplies for growth or otherwise. (DEIR, p. 2-5 [identifies a Project objective as "Install recovery facilities to attract new banking partners in order to increase the groundwater in the Kern Subbasin for District use"].) As this is both an objective of the Project and is identified as part of the Project itself, the DEIR must identify, evaluate, and

4

[7] *Ibid.*

[8] SCH #2020060092, Corn Camp Groundwater Recharge Pond Project (Mitigated Negative Declaration Approved June 3, 2020).

4 (con't) disclose any environmental impacts this might have, including disclosing the foreseeable use of Project water provided by the unidentified "partners."[9]

5 The Project description fails to describe the recovery capacity of the extraction wells that the Project would rely on. Rather, the Project description relies on a bare identification of the number of new and existing wells that would be used, and their approximate locations to satisfy CEQA's requirements. (DEIR, p. 2-6.)

6 The Project Description does not clearly identify that at least half of Project recovery will occur outside the BVGSA and within the KGAGSA. Neither the text nor Figure 2-2 identify the District boundary or the locations of the BVGSA, the West Kern Water District Banking project or GSA, the Kern Water Bank, or the KGAGSA.[10] All of these facilities/agencies are directly adjacent to the Project and significant stakeholders in the groundwater basin where that portion of the recovery project outside the District is located.

7 Section 2.3.2 (Operation) includes the following statement: "Available surplus water supply will continue to be recharged at the Palms Project during wet years. The District anticipates recharging up to 100,000 AFY through the Palms Project when surplus water supply is available. *The District also recharges groundwater through their existing canal system during wet years, a District practice for many decades*." [Emphasis added] Historic canal seepage in the District is not part of a bona fide groundwater banking program that has not undergone public review under CEQA. This water cannot be included in the Palms Project bank account without CEQA analysis. The canal system with the District extends over 20 miles to the north-northwest from the project area, and the DEIR includes no evaluation of using canal seepage to support the Project.

B. Inaccurate, Incomplete, and Unstable Description of Water Sources.

8 The Project description is inaccurate, incomplete, and unstable, particularly with regard to Buena Vista's description of the source of the water to be diverted for use by the Project and the nature and extent of Buena Vista's rights to divert and use such water. Water rights are economic entitlements or rights that, when exercised, have physical effects. CEQA requires the description and analysis of the physical effects associated with the exercise of claimed water rights.

Buena Vista asserts that it "controls an average entitlement of approximately 150,000 acre-feet per year (AFY) of surface water from the Kern River, based on the Miller-Haggin Agreement of 1888." (DEIR, p. 3-50.) It further asserts that it "has a net irrigated acreage maximum of about 40,000 acres." (DEIR, p. 1-6.) Buena Vista further asserts that this Kern River supply, in conjunction with its State Water Project ("SWP") supply, is sufficient to meet its water demand: "Conjunctive management within the District begins with deliveries of surface

[9] *Laurel Heights Improvement Assn. v. Regents of the Univ. of California* (1988) 47 Cal.3d 376, 394 n. 6 [finding that the failure to accurately describe the extent and cumulative impact of anticipated future plans rendered the project description inadequate, and rendered the EIR's discussion of future environmental effects inadequate].

[10] See Attachment N [Annotated DEIR Figure 2-2].

water from the Kern River and the Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands." (DEIR at 2-1.)

The DEIR states that Buena Vista will divert and recharge up to 100,000 AFY of water when "surplus water" is available. (DEIR at Appendix D, Groundwater Model Report, at 3 ["The District anticipates recharging up to 100,000 AFY when *surplus water supply is available* through the Palms Project and their existing canal system during wet years, a District practice for many decades."].) It further states that Buena Vista will use this water "to partner with others to help meet their water supply needs." (DEIR, p. ES-ii.) The DEIR, however, contains no description or analysis of the basis for Buena Vista's claimed right to "surplus water," or the physical impacts associated with the diversion and use of "surplus water" on other water right holders and the environment. 8 (con't)

The Project description fails to quantify Buena Vista's Kern River water supply, including the specific quantity that Buena Visa is relying on under its alleged right and any limitations thereon. In fact, the Project description contains no description of the Kern River water supply that the Project relies upon. (DEIR, pp. 2-5 to 2-6.) Instead, the Project description characterizes the water that would supply the Project as only that which is already banked. As this is a fundamental delimiter on the amount of recharged or banked water that would be available to the Project, it is integral to the Project description. Accordingly, the DEIR must be revised to properly identify the sources of the water for the Project (including water recharge that is subject to Buena Vista's Kern River water rights and any limitations thereon) in order to comply with CEQA.

C. Incomplete and Inaccurate Description of Water Rights.

The DEIR fails to disclose that Buena Vista lacks a water right for diversion of water to the Project. The DEIR asserts the right to divert "surplus water" from the Kern River. This claim is unsupported by water rights on the Kern River and California water rights law and is contrary to recent water rights orders of the State Water Resources Control Board.

The U.S. Army Corps of Engineers constructed the Kern River-California Aqueduct Intertie ("Intertie") as a flood control project in 1977. On October 2, 2008, the Water Board recognized that water was diverted "through the Intertie in six different years between 1978 and 1988, in 1997 and 1998, and again in 2006."[11] On these grounds, the Water Board determined that: 9

> [D]iversion of water to the California Aqueduct via the intertie on numerous occasions since its construction in 1977 confirms that there has been a change in circumstances since D1196. Kern River flows in excess of the established uses of historical water

[11] Attachment A [Memorandum from V. Whitney, Chief Division of Water Rights at State Water Resources Control Board to Katherine Mrowka, Chief Watershed Unit 3, Division of Water Rights, State Water Resources Control Board Re Petitions to Revise Status of Kern River on State Water Board Fully Appropriated Streams List, October 2, 2008].

> right holders have been available, and excess water has been put to beneficial use through the SWP.[12]

As a result of these changed circumstances, the Water Board found there was "sufficient information" to conduct a hearing on whether the Kern River's Fully Appropriated Stream designation should be lifted.[13] The Water Board held an evidentiary hearing on October 26 and 27, 2009, on the issue of whether Kern River water was in fact available for appropriation and the Water Board ultimately lifted the Kern River Fully Appropriated Stream Declaration. In so deciding, the Water Board cited, among other things, the following evidence presented by the "North Kern Petitioners," a group comprised of the Kern Water Bank Authority, Buena Vista Water Storage District, North Kern Water Storage District, Kern County Water Agency and the City of Shafter.

Likewise, the North Kern Petitioners presented a graph; exhibit JE 67, showing Kern River water "undistributed to existing entitlements" in several years. Daniel Easton, witness for the North Kern Petitioners, explained in his written and oral testimony that there was what he calls "undistributed release" water in at least eight months since 1964. Mr. Easton testified that water diverted into the Intertie is in excess of traditionally held and exercised rights and claims of right to Kern River water, and that whenever water has been released into the Intertie in the past, all Kern River water right claims had already been satisfied. This water is, by definition, unappropriated water. (Emphasis added.)[14]

9 (con't)

This finding was based on evidence of "water diversions via the Kern River/California Aqueduct Intertie" which showed "Kern River water being diverted into the Intertie in nine separate years since 1978." (*Id.*) The State Water Board concluded, based on evidence presented during an evidentiary hearing, that Kern River water that reached and flowed past Second Point to the Intertie is available for appropriation.

Following the adjudicatory hearing that culminated in Water Board Order WR 2010-0010, certain parties filed petitions for reconsideration. In the Water Board's order on reconsideration, the Board re-analyzed the evidence supporting its finding that water is available for appropriation on the Kern River.[15] The Board affirmed that Kern River water is available for appropriation. (*Id.* ["the agreement [between DWR, the Kern County Water Agency and other water districts asserting water rights on the Kern River] limits Intertie diversions to flood flows *in excess of the needs of the districts claiming water rights on the Kern River*. Evidence presented at the hearing…directly supports this conclusion."].)

Orders WR 2010-0010 and WR 2010-0016 were challenged in the Kern County Superior Court. The trial court ruled that there was substantial evidence in the record to support the

---

[12] *Id.*

[13] *Id.*

[14] Attachment B [Order WR-2010-0010: Order Amending Declaration of Fully Appropriated Streams to Remove Designation of the Kern River as Fully Appropriated].

[15] Attachment C [Order WR-2010-0016: Order Denying Reconsideration].

Water Board's finding that there may be unappropriated water in the Kern River.[16] The trial court's ruling was subsequently challenged in the Fifth District Court of Appeal. Orders WR 2010-0010 and 2010-0016 were affirmed on appeal, with that court noting:

> The evidence was clear, and essentially uncontroverted, that during occasional flood years water that is unappropriated—not physically claimed by any entity with a right to the water—has been diverted into the California Aqueduct….[17]

9 (con't)

The Water Board's Orders 2010-0010 and 2010-0016, the Kern County Superior Court ruling, and the Fifth District Court of Appeal opinion all confirm that unappropriated water exists on the Kern River, as evidenced by water being diverted into the Intertie and in excess of the needs of the districts claiming water rights on the Kern River, including Buena Vista. Buena Vista does not have a water right to all Kern River water that reaches Second Point of Measurement, and Buena Vista is not entitled to rely upon such claimed flows for the project as discussed in the DEIR. This concern is more fully expressed in the KWBA's water rights Complaint against Buena Vista filed on August 8, 2019, with the Water Board, enclosed as Attachment F. That Buena Vista lacks a right to unappropriated water Kern River water is not disclosed, discussed, or evaluated in the DEIR. This constitutes a violation of CEQA.

D. Failure to Disclose that Buena Vista is Seeking—But has not obtained—a Water Right to Surplus Water the Project Relies Upon.

The DEIR fails to disclose that Buena Vista is seeking—but has not yet obtained—a water right to the Surplus Water it relies on for the Project. In 2007, following the State Water Board's determination that water is available for appropriation on the Kern River, Buena Vista filed Application No. A031675 with the State Water Resources Control Board to appropriate surplus Kern River water. This application seeks a permit to appropriate 180,000 acre-feet annually of Kern River Water by direct diversion and 520,000 acre-feet annually of water for collection to storage, for a total maximum combined diversion amount of 700,000 acre-feet in any year.[18]

10

To date, Buena Vista has not secured this right or any other right to surplus Kern River water, which is subject to the law and procedures of the State Water Resources Control Board governing the appropriation of water in California. The DEIR fails to disclose, discuss or evaluate Application A031675 or the environmental effects of the increased Kern River diversions contemplated by that application. This constitutes a violation of CEQA.

---

[16] Attachment D [*North Kern Water Storage District v. State Water Resources Control Board*, Case No. S-1500-CV 270613 NFT, Judgment Denying Petition for Writ of Administrative Mandate (July 21, 2011)].

[17] Attachment E [*North Kern Water Storage District v. State Water Resources Control Board*, F063989, Opinion (April 18, 2013)].

[18] Attachments G-1, G-2 [Application No. A0301675 of the Buena Vista Water Storage District to the State Water Resources Control Board.

3. THE HYDROLOGY/WATER QUALITY ANALYSIS IS MISLEADING AND INADEQUATE.

The Palms Groundwater Recovery Project as described in the DEIR fails to disclose critical data regarding both groundwater levels and quality, is poorly conceived, and may in fact be infeasible.[19] The primary objective of the project is to "Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the California Aqueduct (Aqueduct)." (DEIR p. ES-I and 2-5.) Recharge for the Palms Project only occurs in recharge ponds within the District (and the Buena Vista Groundwater Sustainability Agency (BVGSA)). However, in order to meet the stated objective, the District intends to recover better quality water from lands outside the District and within the Kern Groundwater Authority GSA (KGAGSA) to blend with the poorer quality water recovered within the District. Importantly, there is no intent to recharge water on the lands outside the District or replace the good quality groundwater extracted by the Project from KGAGSAS's portion of the groundwater subbasin. The Project, by its very design, will result in both significant environmental impacts to water resources and lead to undesirable results as defined by the Sustainable Groundwater Management Act, Water Code section 10720 *et seq.* ("SGMA"). 11

A. Utilization of Limited and/or Incorrect Data and Nondisclosure of Existing Critical Data

Much of the analysis for the Project is conducted with limited and/or incorrect data and without disclosure of substantial existing data.[20] These data sets include water level and flow direction information, groundwater quality information within the District, and water quality information within the California Aqueduct. Concealment of relevant data from the public and decision makers is contrary to CEQA's full disclosure requirements and precludes informed decision making.

(i) Groundwater Level and Flow Directions

With respect to groundwater levels and flow directions, the DEIR describes flow directions as generally in a southeasterly direction using data from a single map from January 2015. Abundant groundwater data for the area is available but is not disclosed in the DEIR. For example, a discussion of groundwater flow directions provided in the Negative Declaration for the Palms Project Recharge Phase, but not disclosed or referenced in the DEIR, stated: 12

> "Local groundwater flow direction near the Palms Project appears to be in a westerly direction and may indicate that the canal east of the project is currently providing recharge to the area. Three nearby wells with good records of groundwater level measurements were analyzed to determine the local flow direction (W-1, W-2, and DMW-12B). The three wells had 44

[19] Attachment H, Dr. E. John List, Technical Memorandum, p. 1.

[20] *Id.,* p. 1 ["there is a paucity of data describing in detail the water quality issues that will be associated with the project."]

12 (con't)

measurements that were taken simultaneously between 1994 and 2013, and the direction and gradient of the groundwater surface was calculated. Figure 12 shows the range of flow directions and the average flow direction to the west-southwest. The average gradient was 0.017 ft vertically/ft horizontally."[21]

Importantly, Figures 11 and 12 in IS/MND Assessment of Potential Groundwater Impacts clearly shows groundwater flow away from the proposed out-of-District recovery wells.

(ii) Groundwater Quality Information

The description of groundwater quality in the Project Area is misleading and does not disclose available information. (DEIR p.3-59 to 3-60). The discussion divided the area into a west and east area with the East Side Canal (the District boundary) serving as a dividing line. Table 3-6 is a list of wells in each area and is captioned "Wells used in Water Quality Analysis." Ten wells are listed for the area west of the East Side Canal. However, the text then states that, due to limited data, only one well is used as a "representative well." The text then goes on to state: "For *wells* located west of the East Side Canal, sulfate and TDS slightly exceeded the drinking water standards." (Emphasis added.) The DEIR also states "…the west side does not have arsenic…"

13 Table 3-7 (DEIR p. 3-60) lists water quality for the "representative well" located west of the Eastside Canal and the wells located east of the Eastside Canal. The water quality shown for most constituents is comparable in the two areas, and in fact for some, the water quality shown is better in the western area (e.g. for arsenic).[22] However, contrary to the information for the "representative well", GEI in 2017[23] conducted an evaluation of groundwater in the District "to provide California Environmental Quality Act (CEQA) compliance support services for the Palms Groundwater Bank – Recovery Phase (Project)." This evaluation (not included in the DEIR) documents groundwater quality in several wells west of the Eastside Canal, and these wells have concentrations of TDS, arsenic, and other constituents that are far greater than the limited data presented in the DEIR (e.g. TDS concentrations in well DMW12A and B reached 9,200 and 4,760 ppm, respectively). Yet the information from this study was not disclosed or referenced in the DEIR. Rather, the much more limited data from the "representative well" was provided.[24]

---

[21] Attachment K [Initial Study/Mitigated Negative Declaration, Assessment of Potential Groundwater].

[22] At face value, this data brings into question one of the primary objectives of the Project: "Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the California Aqueduct (Aqueduct)." If the water quality in both areas is comparable, it would seem there is no need to recover water east of the Eastside Canal (and outside the BVGSA) and induce or create the environmental impacts identified in these comments. This would also indicate that the Palms Area-Only Layout would be the far superior Alternative (DEIR p. 5-4).

[23] Attachment J [GEI, Water Quality Review of Groundwater Wells for the "Palms" Recovery Project, Feb. 17, 2017.]

[24] Attachment H [Dr. E. John List, Technical Memorandum, p. 1 (January 14, 2021)].

(iii) California Aqueduct Water Quality

Table 3-5 (DEIR p. 3-52) lists purported average and maximum concentrations of Total Dissolved Solids ("TDS") and other constituents in the Aqueduct upstream and downstream of the Project. For example, the concentration of TDS is listed as 416 ppm and 436 ppm upstream and 263 ppm and 434 ppm downstream, respectively, for average and maximum values. The upstream average is clearly erroneous. The background value used for current recovery programs is 239 ppm. The DEIR references the DWR Pump-in Policy which also lists upstream TDS values. None of these values approach 416 ppm. The clearly incorrect values for TDS and other constituents in the DEIR results in an incorrect blending evaluation later in the document (DEIR p. 3-85) and a DEIR that does not comply with CEQA standards as an informational document.

14

In summation, the DEIR must be revised to disclose all available water level and quality data and provide a thorough evaluation of that data, so that the public and decisions makers can understand the potential impacts of the Project.

B. Impact Analysis

The impact analysis was conducted with the limited and/or incorrect data discussed above. As a result, the analysis cannot reliably predict the environmental impacts of the Project.

(i) Groundwater Levels

A superposition groundwater model was used to evaluate groundwater level changes expected from the Project. The model is intended to simulate the impacts of the project. However, there are several weaknesses in the application of this type of model for this Project.

- Use of a superposition model should be limited to a linear aquifer system with relatively uniform thickness and linear boundary conditions (such as aquifer pumping tests). Use of a superposition model with non-linear boundary conditions such as transient recharge and recovery operations at many locations surrounding the Project may yield unreliable results.

- The Palms Project MODFLOW model was derived from the USGS Central Valley Hydrologic Model (CVHM) and is re-districitized to a refined model grid with fewer model layers and averaged hydraulic properties. It is a completely new MODFLOW model that should be calibrated to existing site conditions and hydraulic stresses prior to use for predictive simulations. This did not occur.

15

- During model "validation" it became apparent that the Palms Project superposition model could not simulate historical long-term changes in head associated with recharge and recovery pumping without adding the significant operations of nearby water banking projects. This demonstrates that the boundary conditions are non-linear, and simulation

results are dependent on activities located away from the Palms Project site.

15 (con't)

- The Palms Project Recovery Scenarios A & B were then simulated using the superposition model without including the other water banking projects in the area. As such these results may overestimate recharge mounding and underestimate recovery drawdown.

A detailed review of the model is provided in Attachment L.

In addition to the listed weaknesses, the groundwater modeling report incorporates the inaccurate southeasterly flow directions described above, instead of relying on the more robust data provided in the Negative Declaration for the Palms Project Recharge Phase, which indicates a westerly flow direction. The operational scenario used to evaluate groundwater level changes is also unrealistic. It assumes the recharge of 100,000 AF of water in 8 months in the Palms recharge ponds. The recharge rate to accommodate the modeled scenario, 0.36 feet/day, 16 is too high for this area. The lower recharge rates that would be expected for the area are indicated by the much more limited volumes of water historically recharged in the ponds: 14,164 AF in 2017 and 13,002 AF in 2019. With respect to the modeling results, an exaggerated recharge volume overestimates the extent of the predicted groundwater mound, which then underestimates the extent of the ensuing drawdown during Project pumping. Incorporating this overstated recharge mound, the DEIR states that the maximum drawdown adjacent to the Project is no more than 10 feet after four years of pumping the 100,000 AF recharge volume. However, the actual absolute drawdown reaches at least 35 feet. The DEIR also lacks a survey 17 of wells in the area. A thorough evaluation of the likelihood of impacts to adjacent well owners cannot be conducted without this information. The DEIR should correct the deficiencies in the model discussed above, complete a survey of wells in the area, and then conduct more realistic banking scenarios.

(ii) Water Quality

The groundwater analysis does not consider the environmental impacts of recovering better quality groundwater outside the District and BVGSA, without replenishment, to blend with the poorer quality groundwater that will be recovered within the District where recharge occurs. As stated earlier, the District intends to recover water from lands within the KGAGSA in an area where no water has been or will be recharged or replaced by the District. Contrary to the limited 18 data provided in the DEIR, the groundwater quality in the area outside the District is much better quality that that within the District where the recharge for the project occurs (GEI, 2017 [Attachment J]). The Project, by pumping groundwater outside the District without replenishment or replacement, will essentially be mining good quality groundwater in an effort to make the project feasible. This aspect of the project will clearly create significant and unmitigated environmental impacts and contribute to undesirable results in conflict with SGMA.

(a) SGMA Considerations

SGMA regulations identify six sustainability indicators that Groundwater Sustainability Plans ("GSP") must consider. They are groundwater-level declines, groundwater storage reductions, water quality degradation, land subsidence, interconnected surface-water depletions, and seawater intrusion. The undesirable results pertinent to this Project are one or more of the following effects related to these indicators:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods;

2. Significant and unreasonable reduction of groundwater storage;

3. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

19

Because the Project will not replenish groundwater by recharging water on the lands outside the District where Project recovery will occur, it will result in a significant and unmitigated reduction in groundwater storage within the KGAGSA and West Kern Water District GSA ("WKGSA"). This reduction in storage is reflected in the hydrographs developed for the cumulative impact analysis for the Project. Water levels is wells RMW-89-WKWD, RMW-58-RRWSD, and RMW-059-RRWSD are all projected to drop below established Minimum Thresholds (DEIR Figures 4-2 and 4-3, p. 4-9 and 4-10) It should be noted that the recovery portion of the project within the KGAGSA is immediately adjacent to the Kern Water Bank and West Kern Water District recharge basins (DEIR, Figures 2-1 and 3-9, p. 2-2 and 3-71). Absent these facilities, the water level impacts from the Project would be even greater. The Project will also deplete good quality groundwater without replenishment. Even if this will not degrade groundwater quality within the KGSGSA and WKGSA, the Project will reduce the volume of good quality water available for beneficial uses within the KGAGSA and WKGSA.

The Project proponents may claim that the water they are recharging within the District will migrate into the recovery area outside the District thereby sustaining groundwater storage. However, if this were to occur, clearly the Project would be inducing the migration of poor-quality groundwater within the District into an area of better-quality groundwater outside the District, another significant and unmitigated environmental impact and an undesirable result under SGMA regulations.

(b) Surface Water Impacts

The potential for impacts resulting from the discharge of Project water into the California Aqueduct are described under Impact HYDRO-2, which states: "The Recovery Project could have impacts to the water quality of the Aqueduct, if drinking water standards are not met." This statement is misleading and incorrect. The standard for discharges to the Aqueduct include degradation standards. That is, discharges to the Aqueduct must not degrade the existing quality of water in the Aqueduct if unmitigated. For most, if not all constituents, these values are lower than drinking water standards. (For example, the background concentration of arsenic in the Aqueduct is typically 2 ppb, whereas the drinking water standard is 10 ppb). Under no circumstances are discharges to exceed drinking water standards. 20

With respect to the analysis of potential impacts to surface water in the Aqueduct, the results of blending calculations were used to determine the expected quality of delivered water. The calculations used the quality data from the "representative well" (Table 3.9. p 3-85) for water recovered west of the Eastside Canal. As stated earlier, several wells in the area west of the Eastside Canal exhibit much poorer water quality than the "representative well." As a result, the calculations significantly underestimate the resultant water quality. The blended Project water was then compared to upstream values in the Aqueduct. Because Project water exceeded the upstream values in the Aqueduct (incorrectly) reported in the DEIR, the following five (5) mitigation measures were proposed.

MM HYDRO-1 states: "Isolation aquifer zone testing or installation of nested monitoring wells will be conducted to identify aquifers with poor quality water prior to new well construction until the aquifers and water quality is better understood and then may be discontinued." 21

MM HYDRO-2 states: "If needed, patches will be installed into a constructed well to improve water quality from the well. The depth of the pump may also be modified to improve water quality."

MM HYDRO 3 through 5 consist of groundwater quality monitoring, updating blending calculations, and following monitoring and reporting requirements in DWR's pump-in policy. Note that MM HYDRO-2 is the only mitigation measure that has the potential to improve the quality of recovered Project water, but lacks performance standards. In addition, Project operations will alter groundwater conditions through time. As such, Project monitoring must not be discontinued. Notably, ongoing groundwater monitoring is a key facet of all the banking programs in Kern County.

There are several problems related to the analysis completed for this environmental impact. First, the blending calculations used the quality data from a single "representative well," which does not reflect the significantly worse quality conditions in the area. Second, the analysis assumes drinking water standards rather than more restrictive degradation standards apply. Third, Project water is compared to incorrect values for upstream Aqueduct quality. The result of these compounding errors is intended to suggest that the project is feasible with the mitigation measures listed above. However, an analysis using the water quality from most of the wells west 22

of the Eastside Canal indicates the TDS of the resultant blend would be nearly 1,000 ppm and the sulfate concentration would be over 300 ppm. Both of these high contaminant values exceed the respective drinking water standards for these constituents and would preclude the delivery of Project water to the Aqueduct. These compounding errors must be corrected and the analysis for this impact re-evaluated, taking into consideration relevant and representative quantitative data, to determine if the Project is even feasible, in addition to being necessary to adequately evaluate the Project's environmental effects, and to identify specific and enforceable mitigation measures that comply with CEQA standards. 22 (con't)

Finally, the data revealed in the GEI memo indicates very high concentrations of TDS underlying a portion of the Palms recharge basins. Recharging very good quality water from the Kern River and SWP may actually be a waste and unreasonable use under California water law in violation of Article X, Section 2 of the California Constitution, and SGMA. It should also be noted that groundwater pumping in the Palms Recharge Basin area could also induce the migration of extremely poor-quality western water to the east, another significant environmental impact not evaluated in the DEIR. 23

A detailed review of the DEIR regarding water quality impacts is provided in Attachment H, prepared by Dr. E. John List, Ph.D., P.E.

C. Memorandum of Understanding and Operating Plans

The District executed a *Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program* on January 1, 2003 (MOU). The MOU applies to planned banking facilities within the District, but specifically excludes wells located outside the District boundary.[25] The MOU also clearly states that: "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."[26] The Palms Project recovery wells located outside the District have not been reviewed or approved by the KGAGSA. 24

The MOU also prescribes minimum operating criteria, mitigation measures, and project monitoring requirements. Measures to prevent significant adverse impacts from occurring may include: (1) spreading out recovery areas; (2) providing buffer areas between recovery wells and neighboring overlying users; (3) limiting the monthly, seasonal, and/or annual recovery rate; (4) providing sufficient recovery wells to allow rotation of recovery wells or the use of alternate wells; (5) providing adequate well spacing; (6) adjusting pumping rates or terminate pumping to reduce impacts; and (7) imposing time restrictions between storage and extraction to allow for downward percolation of water to the aquifer. The MOU also stipulates water quality is to be at least maintained and, where possible, enhanced. Some of the measures prescribed in the MOU to protect water quality include: 1) giving storage priority to the best quality water available,

[25] Attachment M, ¶ 1.
[26] *Id.* ¶ 2(b)(11).

24 (con't)

2) removing more salts than are stored, 3) controlling the migration of poor quality water, and 4) extracting poorer quality groundwater where practicable (and where blending with excellent quality water from elsewhere in the project results in the water quality objectives of downstream users being met). None of these requirements have been described in the DEIR or evaluated for their effectiveness in eliminating significant impacts or consistency with the Project.

The Kern Water Bank, Pioneer and Rosedale water banking projects on the Kern Fan in the Project vicinity have also developed an Operating Plan that provides mitigation measures for impacts to landowner wells. The Plan designates measures to prevent, eliminate or mitigate significant adverse impacts resulting from water banking project recovery operations. The Plan includes, in part, the following components:

1. Formation of a Joint Operating Committee (JOC): The JOC consists of representatives of each of the banking projects and meets as needed during recovery years to evaluate groundwater conditions, model results, landowner claims, and any other topics of concern. The JOC evaluates all claims and approves or rejects such claims.

2. Evaluation of Groundwater Conditions: Groundwater models are used to evaluate With Project versus Without Project groundwater levels and predict potential groundwater impacts to nearby wells. The models are updated regularly and compared to actual conditions during years in which recovery occurs. The models are used to: 1) forecast with-project and without-project groundwater levels at the outset of recovery programs; 2) forecast any localized areas for special attention and/or monitoring; 3) attempt to identify domestic wells at risk of impacts; and 4) determine if mitigation triggers (thresholds) have been met.

25

3. Mitigation measures: The mitigation measures, if warranted, will include one or more of the following:

    a. Providing a short-term emergency water supply to domestic well owners. Short-term emergency supplies shall be provided as soon as reasonably possible, but in all cases within 14 days of notification to the JOC of such needs;

    b. Providing funds to lower a well pump;

    c. Providing funds to complete a connection to an M&I water provider;

    d. Supplying an equivalent water supply from an alternate source;

    e. Providing funds to replace the affected well with a deeper well that meets Kern County well ordinance standards;

f. Reducing or adjusting recovery pumping as necessary to avoid the impact; or

25 (con't)

g. With the consent of the affected landowner, providing other acceptable mitigation.

None of these requirements have been described in the DEIR or evaluated for impact mitigation or consistency with the Project.

4. INADEQUATE DESCRIPTION OF PROJECT BASELINES.

A fundamental goal of an EIR is to inform decision makers and the public of any significant impacts that a project is likely to have on the physical environment, as it exists at the time of the preparation of the DEIR, without the proposed project. In order to do so, an EIR must delineate in sufficient detail the environmental conditions that actually exist at the time of the preparation of the DEIR.

The EIR must define an existing conditions "baseline" against which project impacts can be described and quantified.[27] The physical conditions that exist at the time of the notice of preparation of the DEIR normally constitute the required environmental baseline against which the project's impacts are described and evaluated. In certain narrow conditions (e.g. where the physical conditions at the time of the notice of preparation for the DEIR would provide a
26 misleading analysis), the DEIR may also evaluate the effects of the projects against another, alternative baseline that would provide the public with an adequate evaluation of the project's effects against actual, and not hypothetical, conditions. Where the lead agency chooses an environmental baseline that does not reflect existing physical conditions, the lead agency must explain why the selected baseline is appropriate, and why an existing conditions baseline would not be appropriate or would be misleading.[28]

The DEIR here fails to describe the environmental baseline for each of the resource categories it addresses. In some cases this failure includes omission of any description of the relevant physical conditions at the time of the filing of the Notice of Preparation for the DEIR on June 16, 2020.

(i) The Biological Resources Baseline is Inadequate.

The biological resources section describes the environmental setting in terms of vegetation cover types, and listed observations of special status species and plant communities in the Project vicinity, as shown on state regulatory agency databases, and then summarily
27 indicates that "existing conditions" are the baseline. However, in doing so, the biological resources section fails to include any surveys that are at a sufficient level of detail to determine the actual presence or absence of threatened, endangered and other special status species in the Project vicinity. Rather, the DEIR relies on limited biological resource surveys, performed at

[27] CEQA Guidelines, § 15125.

[28] *Id.;* see also *Neighbors for Smart Rail v. Exposition Metro Line Construction Auth.* (2013) 57 Cal.4th 439, 447-448.

a time of the year which is not relevant to all of the potential species of concern, and fails to describe the survey methods at all.

27 (con't) Accordingly, the "existing conditions" are not adequately described in the DEIR. In the absence of adequate and complete biological surveys, the DEIR is unable to describe adequately actual conditions, or evaluate effects on biological resources. Rather they represent the theoretical conditions, assuming the data in state regulatory agency databases is sufficiently specific to derive conclusions regarding the exact Project location.

A review of biological resources portions of the DEIR by Biologist James W., Jones, Jr., dated January 11, 2021, is attached (Attachment O).

(ii) The Hydrology Baseline is Inadequate.

The DEIR does not appear to use conditions at the time of the Notice of Preparation for the DEIR on June 16, 2020. The DEIR addresses only the Buena Vista Groundwater Sustainability Agency's GSP, but acknowledges that there are no less than four others that affect the groundwater levels in the Kern Subbasin. As the Project is proposed in the Kern Subbasin, it is clear that any actions impacting the portion of the basin covered by the BVGSA's GSP, will also influence the groundwater levels in areas under the authority of other Groundwater Sustainability Agencies and Groundwater Sustainability Plans. Yet, the DEIR does not describe, let alone analyze, the Project's groundwater impacts in the context of those other agencies and
28 plans.

The Project proposes to recover and distribute water that is "banked" within the groundwater aquifer, thereby having an inherent effect on the groundwater levels within the Kern Subbasin. Because the DEIR describes the baseline as including only the portion of the Kern Subbasin under the authority of the BVGSA, the baseline provides an improper and artificially truncated geographic scope of the groundwater environmental baseline. Moreover, the Project proposes to extract water outside of the BVGSA, and within the jurisdiction of the KGAGSA. The DEIR must therefore discuss not only the BVGSA, but at a minimum must also discuss the KGAGSA, its current status and properly analyze any impacts the Project may have on achievement of SGMA standards within the KGAGSA.

The DEIR also fails to describe why it is reasonable for groundwater quality to limit the
29 baseline to conditions between Stockdale Highway on the north, BVWSD southern boundary on the south, Dunford Road on the west, and Morris Road on the east. While the DEIR recognizes that the groundwater aquifer can be effectively delineated into three discrete areas, but neither correlates those delineations with the chosen boundaries for groundwater quality analysis nor identifies whether those boundaries are reasonable on their own.

The baseline for the evaluation of impacts on hydrology and water quality should include
30 the identification of all landowner wells within the potential area of hydrologic influence of the Project. As BV is aware, the recovery of banked water has the potential to lower groundwater levels and impact the operation of individual domestic and agricultural wells. In the absence of

30 (con't) an identification of landowner wells, the DEIR is not able to evaluate adequately the potential impacts of the Project on domestic and agricultural water supplies.

In addition to a comparison of project effects against the existing conditions baseline, CEQA requires an evaluation of project impacts against a "no project" baseline. The no project baseline is required to be based on "what would be reasonably expected to occur in the foreseeable future if the project is not approved."[29] In evaluating the potential future impacts of the Project, the DEIR assumed a continuation of current surface water availability over a 50-year planning horizon under a range of climatic conditions." (DEIR, pp. 4- 6.). The assumption of continuation of current surface water availability over the next 50 years is unreasonable and misleading. 31

The DWR estimates that "[b]y the end of this century, California's Sierra Nevada snowpack is projected to experience a 48-65% loss from the historical April 1 average." (https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Change-and-Water [visited 4.29.20].) Reductions in the Sierra Nevada snowpack, and increasingly stringent environmental restrictions on State Water Project exports are projected to reduce materially the reliability of water deliveries from the State Water Project.

As is extensively documented in the 2010 Final EIR and 2016 Revised Final EIR[30] regarding the Monterey Amendments to the State Water Project water supply contracts, future additional water supplies from the SWP and CVP are constrained significantly by environmental regulations. SWP Table A water allocations have been restricted materially over the last decade. State Water Project contractors are requesting an allocation of their full Table A amounts. The 2010 and 2016 Revised Monterey Amendment EIRs projected that Article 21 water supplies will be increasingly limited because of environmental restrictions, climate change impacts, and because SWP contractors are now requesting all of their Table A water. 32

There is intense competition for Article 21 water when it is available. There are similarly material limitations on additional Kern River supplies. As Buena Vista is aware, there are multiple pending applications pending before the State Water Resources Control Board for the appropriation of unappropriated Kern River water. The CEQA documents for some of these applications describe the impacts of the use of Kern River water on the environment. The DEIR ignores this information in its unreasonable assumption that surface water supplies relied upon by the Project will remain unchanged for the next 50 years. The DEIR is required to describe a realistic no project baseline that takes into consideration project impacts on climate change and other limitations on surface water supplies projected to occur over the life of the Project.

5. THE RANGE OF ALTERNATIVES IS INADEQUATE.

33 An EIR must "describe a range of reasonable alternatives to the project . . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen

[29] CEQA Guidelines, § 15126.6, subd. (e)(2).

[30] The 2010 Monterey Plus EIR and the 2016 Revised Monterey Plus EIR are provided under separate cover.

any of the significant effects of the project . . . ."[31] The DEIR includes a no project alternative, which appears to include water banking without a method for recovery in perpetuity, the preferred alternative, and a single variation on the pumping amounts contemplated by the preferred alternative (the so-called Reduced Recovery Alternative). No other alternatives were carried forward for detailed study in the DEIR. The DEIR asserts that this is because other alternatives that were considered but rejected would either have greater significant impacts on the environment or because they were found to be infeasible.[32]

33 (con't)

Specifically, the DEIR considered, and rejected three other alternatives, without evaluating the alternatives in detail.[33] These alternatives considered a recovery alternative that would allow private landowners to take control of the recovery pumping, but was rejected primarily because it wouldn't include constructing new District-controlled water distribution infrastructure. The DEIR does not indicate any reason that infrastructure for pumping recovered water could not have been incorporated into this alternative, and offers no reason other than the absence of that infrastructure for its rejection.

The DEIR does not justify adequately its decision to summarily dismiss the Landowner Recovery Alternative or the Palms Area-Only Alternative, and the DEIR therefore fails to evaluate a reasonable range of alternatives. For the Palms Area-Only Layout, the DEIR only evaluated a layout of 34 recovery wells, without considering reduced recovery variations for this alternative or fewer recovery wells. The DEIR concludes without adequate analysis on the grounds that the groundwater quality would not be sufficient for blending and then transportation through the Aqueduct.

34

Even if the alternatives do not accomplish all of a project's goals and objectives, CEQA requires that alternatives be evaluated and compared against the proposed Project.[34] One of an EIR's major functions "is to ensure that *all reasonable alternatives* to proposed projects are thoroughly assessed by the responsible official."[35] Similar to the discussion of alternatives that the California Supreme Court found inadequate in *Laurel Heights Improvement Association*, the DEIR's discussion of these alternatives is cursory and does not reflect an adequate discussion of alternatives as CEQA requires.

As documented above, proposal to recharge water on the west side in an area of poor quality, and to recovery water on the east side in an area of good water quality, has significant and adverse water quality and hydrological impacts. Buena Vista's only justification for mixing water of differing quality is so the Project water meets Aqueduct water quality standards so that the water can be transferred to undefined "partners" in southern California. There is an obvious

35

---

[31] CEQA Guidelines, § 15126.6, subd. (a).

[32] DEIR, pp. 5-3 through 5-6.

[33] *Id.*

[34] CEQA Guidelines, § 15126, subd. (d)(3); *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 400

[35] *Laurel Heights Improvement Assn. v. Regents of University of California, supra*, 47 Cal.3d at p. 400, citing *Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 197, emphasis added.

alternative to avoid and minimize these water quality and hydrology impacts – an alternative that does not require moving recovered water to the Aqueduct for sale to southern California.

35 (con't) The first stated objective of the Project is to "increase conjunctive management on the west side of the county by improving the District's ability to meet demands during periods when water supply is limited. (DEIR, p. 2-5.) The second stated objective is to "improve the conveyance of water throughout the District. *Id.* Because this objective may be achieved without sending water to southern California, the DEIR is required to evaluate an alternative that restricts use of Project water to landowners within the District – avoiding the need to mix water to meet Aqueduct water quality standards.

36 The DEIR also does not evaluate an alternative that includes recharge on the off-District lands. Such an alternative may reduce the many environmental impacts the project currently causes.

37 The DEIR does not evaluate any alternative to the operation of the recharge ponds. The Kern Water Bank is located immediately to the east of the Project. The Kern Water Bank provides a real-life, successful, example of a feasible alternative to the Project that would minimize and mitigate the potential effects of the Project – on groundwater, water quality and biological resources. The DEIR should be revised to include a water banking operation including the enforceable commitments to the protection of the biological resources included in the Kern Water Bank HCP/NCCP. The commitments should include a detailed description of (i) the biological resource objectives of the Project, (ii) enforceable standards for minimizing and mitigating the impacts of Project operations on listed and special status species, and (iii) conveyance of conservation easements to the California Department of Fish and Wildlife that provide long-term conservation protection for listed species.

38

39 The Project's highly-engineered recharge ponds are devoid of vegetation, and they will be aggressively managed to eliminate vegetation. The highly-engineered recharge ponds will have none of the environmental values provided by the mosaic of seasonal wetland and upland habitat conserved by the Kern Water Bank HCP/NCCP.[36] Instead, the highly-engineered recharged ponds shown in the DEIR create the risk of creating a biological sink by attracting migratory birds and other species, but without food, cover, buffers and other elements necessary to conserve these populations. The DEIR is devoid of any analysis of this risk.

6. THE DEIR'S EVALUATION OF THE PROJECT'S EFFECTS DOES NOT COMPLY WITH CEQA'S INFORMATIONAL STANDARDS.

40 The DEIR addresses only four resource areas with direct impacts – biological resources, cultural resources, hydrology and water quality, and geological resources. This truncated direct impacts discussion and analysis fails to comply with CEQA's directives. CEQA requires a discussion of all of a proposed action's impacts on the environment -- both direct, indirect, and

[36] A detailed descriptions of the environmental values and requirements of the Kern Water Bank HCP/NCCP is included in the 2016 Revised Monterey Amendment included in the Authority's files.

cumulative.[37] Here, the DEIR summarily states that all of the effects in each resource area that is not discussed in the DEIR were found to not be significant (e.g., air quality, GHG, etc.).[38]

40 (con't) With respect to air quality and greenhouse gases (GHG) specifically, the DEIR's reasoning is that the construction impacts would be minimal and temporary, but does not include any real analysis of the Project's potential impacts during operation. For example, the DEIR does not specify the type of recovery pump that would be used nor does it specify that the recovery pumps would be monitored for their efficiency and level of GHG emissions.

41 With respect to energy, the DEIR fails to substantially consider the Project's potential impacts. The DEIR states only that the "Recovery Project would be limited to the recovery of previously banked water at generally higher groundwater levels which would result in lower energy usage."[39] However, what the Project proposes is a use that would not exist in the absence of the Project, and energy use required to operate the recovery wells that would not exist absent the Project. This impact should be discussed in sufficient detail for the public and decision makers to understand why the Project's energy use would be "less than significant."

42 With respect to air quality, the DEIR acknowledges that part of the basis for the Project is the change from row crops to permanent crops. The District has a gross irrigable acreage of about 50,000 acres. The DEIR states about half the District lands are planted with permanent crops, as growers migrate away from row crops. The DEIR estimates that the conversion to permanent crops may increase the water demand by 1 acre-foot per acre. The DEIR does not, however, analyze potential air quality impacts associated with the projected indirect effect of conversions from row crops to tree crops. The DEIR also does not analyze the potential water supply impacts of increasing demand associated with changes in crop patterns that could be attributable to the Project.

The failure of the DEIR to provide an adequate analysis of the Project's impacts on hydrology and water quality is discussed above in Section 2. The DEIR's evaluation of other effects also does not comply with CEQA informational standards.

(i) Agricultural Impacts.

43 While the DEIR discloses that the primary beneficiaries of any additional or more reliable water capacity that is generated by the Project would be the agricultural operations in the area, there is no separate discussion of the Project's potential impacts on agriculture. In fact, there is no discussion of agricultural impacts at all.[40] Moreover, the DEIR's section on cumulative impacts and growth inducing impacts does not at all acknowledge that the presence of a more

---

[37] CEQA Guidelines, § 15126.2; see also *Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 367-370.

[38] DEIR, p. 3-1 through 3-5.

[39] DEIR, p. 3-3.

[40] *Stanislaus National Heritage v. County of Stanislaus* (1996) 48 Cal.App.4th 182 [an EIR is required to evaluate impacts on sources of water].

43 (con't) reliable or greater water supply might cause alterations to the patterns of agricultural uses in the area.

The Notice of Preparation for the DEIR indicates that "[t]he EIR will also explain why other effects were determined to not be potentially significant and were not discussed in detail in the EIR. For example, the Recovery Project site is in an agricultural area, would not damage scenic resources, or produce light and glare, therefore no significant aesthetic impacts are anticipated . . . . Impacts to air quality, agriculture and forestry resources, geology, hazards and hazardous materials, population and housing, mineral resources, and wildfire are also expected to be less than significant, or less than significant with mitigation incorporated …" However, the DEIR does not contain any of this discussion or explanation. Rather, the DEIR simply summarily
44 states that these impacts are expected to be less than significant. The only discussion of the basis for these conclusions is set forth in the Initial Study that was circulated along with the District's Notice of Preparation. This, too, provides only cursory explanation as to why the increase in reliability and stability of the agricultural water supply would not alter agricultural use patterns in the vicinity of the Project.

The DEIR should include evaluation of changes in agricultural production, which the DEIR acknowledges are ongoing, and the effects of that agricultural production. The 2016 Monterey Amendment EIR provides an example of a feasible approach to the analysis of potential indirect effects from change in agricultural patterns related to the Project.

(ii) Biological Resources.

The DEIR acknowledges that Project construction, in particular, could have a potentially significant impact to a number of different, sensitive species, some of which are listed under the California Endangered Species Act, federal Endangered Species Act, or are identified as fully protected species under California law. Specifically, the DEIR indicates that two state fully protected species have a moderate likelihood of occurring in the Project area – the blunt-nosed
45 leopard lizard, and the white-tailed kite.

The DEIR includes no material evaluation of the Project's impacts on the blunt-nosed leopard lizard or the white-tailed kite. Nor does the DEIR include analysis of the feasibility of avoiding take of the lizard or kite. Instead, the DEIR defers the evaluation of impacts to the blunt-nosed leopard lizard to pre-construction surveys. Deferral of the analysis of effects violates CEQA.[41]

46 The DEIR concludes that there will be no waters of the U.S. impacted, but does not document the basis for this conclusion. The DEIR does not include a delineation of potential waters of the U.S. prepared in accordance in federal standards and procedures.[42]

---

[41] *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2017) 40 Cal.4th 412, 441 [invalidating EIR for long-range development plan that deferred water supply analysis].

[42] If one exists, it has not been disclosed to the public.

Blunt-Nosed Leopard Lizard. The DEIR notes that special status wildlife could be substantially adversely affected by construction activities, and that this is considered a potentially significant impact, but concludes that the limited extent of Project construction activities would sufficiently guard against impacts and therefore no mitigation is required. Notably, this does not account for potential construction impacts to blunt-nosed leopard lizard habitat that occurs in the northwestern portion of the Project area.

The mitigation measure specific to blunt-nosed leopard lizard indicates that temporary exclusion fencing would be placed at the direction of a qualified biologist, but does not indicate that a pre-construction survey would be conducted to verify that no blunt-nosed leopard lizard are within the project area that would not be fenced off by the exclusion fencing. This raises the likelihood that blunt-nosed leopard lizards may be within the construction area. Because the blunt-nosed leopard lizard is a fully protected species, any impact to the species is a significant impact, as there is no authorization for incidental take of fully protected species.

47 The July 2020 comment letter of the California Department of Fish and Wildlife ("CDFW") on the Project makes this point. Indicating that the Project should include appropriate protocol surveys for the blunt-nosed leopard lizard in the DEIR and prior to any ground-disturbing or vegetation-disturbing activities. The DEIR does not contain any of these measures. The DEIR asserts that the pre-construction installation of exclusionary fencing will be sufficient. However, as noted by CDFW, the protocol surveys are designed to optimize the detectability of blunt-nosed leopard lizard in a way that simple installation of exclusionary fencing does not. The DEIR should be revised to include the results of protocol-level surveys of this species. Protocol-level surveys conducted as part of the DEIR will also allow for the consideration of alternative Project configurations that avoid incidental take of this fully-protected spaces – before the EIR is certified and the Project is approved.

White-Tailed Kite. The white-tailed kite is a fully-protected species under California law, and no take of the species outside of very limited exceptions that do not apply to the Project can be authorized.[43] The DEIR notes the potential for white-tailed kite to occur within the construction area, and specifically within the laydown yard, but indicates that a more generalized
48 pre-construction survey for special status bird and raptor species will be sufficient to mitigate and avoid any impacts to the white-tailed kite.

As there is no method for permitting incidental take of this species under California law, the DEIR should provide a more detailed description as to why this non-specific mitigation measure is sufficient to avoid take of the kite.

San Joaquin Antelope Squirrel. The San Joaquin Antelope Squirrel (also known as the
49 Nelson's antelope squirrel) is listed as a threatened species under the California Endangered Species Act.[44] As CDFW notes, the species is known to occur in the area of the Project, and the Project contains suitable habitat that represents some of the "only remaining undeveloped land in

[43] Fish & Game Code, § 3511.

[44] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109405&inline.

the vicinity, which is otherwise intensively managed for agriculture." It does not appear that the District performed any assessments to determine whether the squirrel actually occurs within the Project area or to determine if the Project is likely to impact the squirrel.

49 (con't)

The DEIR fails to include mitigation measures to avoid or mitigate the potential impacts of the Project on the squirrel. These failures are compounded by the fact that the DEIR does not data from any detailed biological surveys, nor does the DEIR include any data from the "reconnaissance" level surveys. The DEIR fails to properly identify, assess, and disclose the Project's potential impacts on the San Joaquin antelope squirrel.

A review of biological resources portions of the DEIR by Biologist James W., Jones, Jr., dated January 11, 2021, is attached (Attachment O).

B. The DEIR Fails To Properly Analyze Indirect and Cumulative Impacts.

The evaluation of cumulative effects in the DEIR violates CEQA informational standards.[45] CEQA requires the evaluation of the cumulative impacts of the project when added to the impacts of past, present, and reasonably foreseeable future projects.[46] The term "cumulative impacts" refers to two or more individual effects, which, when considered together, are considerable or which could compound or increase other environmental impacts.[47]

50

The DEIR identifies three other projects that it includes as part of the cumulative impacts analysis. The DEIR limits the scope of the projects considered as part of the cumulative impacts analysis to other groundwater recovery projects. No other types of projects are included in the DEIR's analysis or are even identified. Significantly, the DEIR includes only projects that are currently scheduled for construction, omitting any other projects that are currently under consideration or which may be approved before the Final EIR is adopted for this Project.

This DEIR omits any evaluation of the projects that have undergone or are currently undergoing their own CEQA evaluation including the Kern Fan Groundwater Storage Project, the Onyx Ranch South Fork Valley Water Project, the Stockdale Integrated Banking Project, and the McAllister Ranch Groundwater Banking Project.[48] These are just a handful of examples of projects occurring in the area immediately adjacent to the proposed Project that are not mentioned, discussed, or included in the DEIR's cumulative impacts analysis. As each and every one of these projects has the potential to impact groundwater supplies, overall water

51

---

[45] *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1213-1214; see also *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1984) 151 Cal.App.3d 61, 72-73.

[46] CEQA Guidelines, § 15355, subd. (b).

[47] *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 739; CEQA Guidelines, § 15130, subd. (a)(1).

[48] https:/ceqanet.opr.ca.gov/Project/2020049019 [Kern Fan Groundwater Storage Project]; https:/ceqanet.opr.ca.gov/Project/2018021061 [Onyx Ranch]; https:/ceqanet.opr.ca.gov/Project/2013091076 [Stockdale Integrated]; https:/ceqanet.opr.ca.gov/2020060267/2 [James and McAllister Ranch, BV applicant]. The EIRs for the recently approved Kern Fan Groundwater Storage Project are provided under separate cover.

availability and quality, as well as the potential to impact biological resources, cultural resources, and a variety of other resources.

52 The DEIR reasons that because there are no significant water quality impacts[49], there would be no cumulative impacts. As discussed above, the DEIR's analysis of direct water quality impacts is faulty and therefore the DEIR lacks substantial evidence for its conclusion that there would be no significant water quality impacts. The DEIR analyzes the Project's water quality impacts in a vacuum, fails to evaluate the cumulative water quality impacts of multiple banking projects pumping non-project water or groundwater into the Aqueduct. It does not evaluate the hydrology and water quality effects of extracting higher quality groundwater from one area of the basin without recharging it, while relying on water deposited in an entirely different part of the basin. The failure to analyze the Project's impacts on groundwater at its point of extraction is a substantial error and cannot serve as the basis to summarily conclude that there are no cumulative impacts to water quality.

53 The DEIR fails to evaluate the potential indirect impacts of the operation and maintenance of the Project on the biological resources for the adjacent Kern Water Bank Habitat Conservation Plan/Natural Communities Conservation Plan ("HCP/NCCP"). There is no disclosure of whether the Project may disrupt the frequency of intermittent wetland habitat at the Kern Water Bank HCP/NCCP by reducing water to the HCP/NCCP lands from the State Water Project or from the Kern River.

54 Finally, the DEIR fails to analyze the Project's potential impacts on private wells, including landowner wells both inside and outside of Buena Vista's service area. There is no analysis regarding whether the proposed extraction for the Project would render landowner wells unusable or require them to be deepened or relocated entirely.

C. The DEIR Improperly Defers Mitigation of Various Project Impacts.

55 While CEQA allows mitigation to be deferred in certain instances, it requires that enforceable performance standards in order to render deferred mitigation permissible.[50] Mitigation Measure CUM-1 fails to sufficiently address the potential cumulative impacts of the Project and does not at all address the Project's impacts to groundwater quality and levels within the KGAGSA. Here, the issue is not that the mitigation is deferred, it is that there is no mitigation at all.

The DEIR acknowledges that other banking projects in the area have adopted operating plans with specific and enforceable performance standards to minimize the potential impact of recovery operation on private domestic and agricultural wells. The Project has the same potential to impact domestic and agricultural wells. The DEIR does not describe or commit to achieve specific performance standards similar to the performance standards adopted by other banking projects.

---

[49] A conclusion that is itself faulty, for the reasons described, supra, in section 3.

[50] *Sacramento Old City Assn. v. City Council* (1991) 229 Cal.App.3d 1011, 1029.

56 The DEIR defers species specific surveys to determine presence or absence until pre-construction, and defers any survey for Swainson's Hawk until some undisclosed point in time, up to 14 days prior to construction activities.[51]

57 With respect to the blunt-nosed leopard lizard, the deferred mitigation fails to even provide for appropriate surveys. Mitigation Measure BIO-1 provides that there will be temporary exclusion fencing installed prior to construction activities, but does not provide for any pre-construction protocol surveys to identify the presence of the blunt-nosed leopard lizard. Because this is a fully protected species, the failure to provide a specific and enforceable mitigation measure violates CEQA. The DEIR must be revised to provide for specific and enforceable mitigation for the Project's potential impacts to blunt-nosed leopard lizard.

7. OTHER COMMENTS.

58 For all of the reasons described above including in sections 2 and 3, the Project as described fails to adequately evaluate the Project's compliance with the California law regarding reasonable and beneficial use of water and the management of groundwater resources in compliance with the SGMA. SGMA prohibits one agency within a basin from impacting existing conjunctive use or storage programs within the basin.[52] The Project described in the DEIR will impact existing storage and conjunctive use programs within the Kern basin.[53] This is because it proposes to extract groundwater out of the area under the jurisdiction of a neighboring groundwater sustainability agency.[54]

The KGAGSA has jurisdiction over the area in which the Project proposes to install new extraction wells. The water extracted from those wells would then be pumped out of the KGAGSA's jurisdiction, in violation of the standards set by the KGAGSA's members and the adopted GSP. The DEIR is required to evaluate the potential conflict with SGMA and the KGAGSA's GSP.

59 CEQA requires that an EIR include a list of all agencies that are expected to use the EIR in their decision making.[55] These are the responsible agencies under CEQA.[56] Here, while the DEIR identifies one agency that would rely on the DEIR for subsequent decision making, it fails entirely to identify the entities that would be required to use or rely on the DEIR to authorize the proposed extractions of water.[57]

---

[51] DEIR, p. 6-5, Mitigation Measure BIO-2b.

[52] Water Code, § 10726.2, subd. (b).

[53] DEIR, at p. 4-13.

[54] We incorporate by reference the comments of the KGAGSA on the DEIR.

[55] CEQA Guidelines, § 15124, subd. (d)(1)(A) [requiring "[a] list of the agencies that are expected to use the EIR in their decision-making . . . ."].

[56] CEQA Guidelines, § 15381; Pub. Resources Code, § 21069; see also *RiverWatch v. Olivenhain Municipal Water Dist.* (2009) 170 Cal.App.4th 1186, 1205-1206.

[57] DEIR, § 2.3, p. 2-7 [identifying the California Department of Fish and Wildlife as the only responsible or trustee agency expected to use the EIR].

The DEIR fails to identify the following responsible agencies: KGAGSA; Kern County Local Agency Formation Commission (LAFCO); California Department of Water Resources; State Water Resources Control Board; Regional Water Quality Control Board; the Kern Water Bank Authority; and the Rosedale-Rio Bravo Water Storage District.

59 (con't) For over four decades the California courts have held that annexation approvals by a LAFCO are an action that is subject to CEQA. The proposed annexation is part of the Project, and the LAFCO is prohibited from approving any annexation regarding the Project prior to the certification of a Final EIR that evaluates all of the direct, indirect, and cumulative effects of the Project. CEQA prohibits LAFCO's approval of the annexation application prior to the certification of a final EIR for the Project, a determination by the LAFCO that the final EIR is adequate for its use, and that LAFCO makes the findings required by CEQA.[58]

60 The DWR is a responsible agency because it has the authority to review, comment on, and approve groundwater sustainability plans and any amendments or changes thereto including GSA boundary adjustments. If any changes to either the GSA for the KGAGSA, or for the neighboring BVGSA, and/or their respective boundaries, are required in order to implement the Project, the Department of Water Resources will necessarily be responsible for reviewing, commenting on, and approving those changes. The Project would additionally require approval of DWR in order to use the Aqueduct including for non-project water pump-in and conveyance to Southern California purchasers, banking partners or others.[59] The Kern Water Bank Authority and the Rosedale-Rio Bravo Water Storage District are responsible agencies because the Project will require the approval by these agencies of amended memoranda of understanding concerning operating plans to minimize impacts on local groundwater supplies.

8. CONCLUSION.

The DEIR violates CEQA. KWBA objects to the certification of the Palms Groundwater Recovery DEIR and approval of the Palms Groundwater Recovery Project. CEQA requires Buena Vista to complete the additional analyses described in this letter, revise the DEIR to incorporate the additional analysis, and to circulate a revised DEIR for additional public review and comment.

[58] CEQA Guidelines, § 15096, subd. (e), (h).

[59] CEQA separately requires the lead agency to provide notice to and solicit comments from responsible agencies. (CEQA Guidelines, §§ 15082, 15086, 15124; Pub. Resources Code, §§ 21080.4, 21104.) It is KWBA's understanding that these additional responsible agencies were not provided notice nor were comments solicited from them. The DEIR additionally violates CEQA for this reason.

Very truly yours,

Jonathan Parker
General Manager
Kern Water Bank Authority

RDT:snc

ATTACHMENTS

Attachment A	Memorandum from V. Whitney, Chief Division of Water Rights at State Water Resources Control Board to Katherine Mrowka, Chief Watershed Unit 3, Division of Water Rights, State Water Resources Control Board Re Petitions to Revise Status of Kern River on State Water Board Fully Appropriated Streams List (October 2, 2008)
Attachment B	State Water Resources Control Board, Order WR-2010-0010: Order Amending Declaration of Fully Appropriated Streams to Remove Designation of the Kern River as Fully Appropriated
Attachment C	State Water Resources Control Board, Order WR-2010-0016: Order Denying Reconsideration
Attachment D	*North Kern Water Storage District v. State Water Resources Control Board*, Case No. S-1500-CV 270613 NFT, Judgment Denying Petition for Writ of Administrative Mandate (July 21, 2011
Attachment E	*North Kern Water Storage District v. State Water Resources Control Board*, F063989, Opinion (April 18, 2013)
Attachment F	Kern Water Bank Authority v. Buena Vista Water Storage District, Complaint Before State Water Resources Control Board
Attachment G	Application No. A031675 of the Buena Vista Water Storage District
Attachment H	Dr. E John List, Technical Memorandum, January 14, 2021
Attachment I	*Curriculum Vitae* of Dr. E John List
Attachment J	GEI, Water Quality Review of Groundwater Wells for the “Palms” Recovery Project, Feb. 17, 2017
Attachment K	Initial Study/Mitigated Negative Declaration, Assessment of Potential Groundwater Impacts for the Palms
Attachment K-1	Initial Study/Mitigated Negative Declaration, Figure 12

//

ATTACHMENTS

Attachment L	Wood Environmental & Infrastructure Solutions, Review of Draft EIR for the Palms Groundwater Recovery Project (January 15, 2021)
Attachment M	Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (January 1, 2003)
Attachment N	Annotated DEIR Figure 2-2.
Attachment O	Comments of Biologist, James W. Jones, Jr.)

January 11, 2021

Jonathan Parker
Kern Water Bank Authority
1620 Mill Rock Way, Suite 500
Bakersfield, California 93311

RE: Comments on the Draft Environmental Impact Report for the Palms Groundwater Recovery Project - SCH# 2020060315

Dear Mr. Parker:

South Valley Biology has reviewed the subject Draft Environmental Impact Report (DEIR). Please see the following observations/comments.

Section 3.2. Biological Resources:

Table 3-1:

1

1) Horn's milkvetch (*Astragalus hornii* var. *hornii*) on or adjacent to the project site should include the Outlet Canal and other periodically flooded areas. This species is known from occurrences in the Outlet Canal just south of the project site and also from some of the recharge basins and water conveyances on the KWB.
2) Lesser saltscale (*Atriplex minuscula*) is known to occur in the bush seepweed habitat adjacent to the northeast portion of the project site.

Table 3-2:

2

1) The table indicates that there is no habitat for coast horned lizard (*Phrynosoma blainvillii*) on or adjacent to the project site; however, the bush seepweed habitat adjacent to the northeast portion of the project site provides suitable habitat for this species.
2) The table indicates that Tulare grasshopper mouse (*Onychomys torridus* ssp. *tularensis*) is not known to occur at the KWB. This is incorrect. This species has been identified in several areas at KWB, including trapping grids, the Cheng Property, and the saltbush scrub habitat portion of the Nikkel Property.

3

3-21 Special-status Birds: In paragraph 3, the DEIR correctly indicates that Swainson's hawks (*Buteo swainsoni*) are known to nest at the nearby Tule Elk Reserve; however, this species also regularly nests at the KWB as well.

3-22 Special-status Birds: In paragraph 4, the DEIR states that "…No suitable nesting habitat for tricolored blackbird (*Agelaius tricolor*) is currently present on or adjacent to the project site…". However, this species has nested on occasion at the Tule Elk Reserve and frequently nests at the KWB.

3 (con't) The DEIR concludes the same for yellow-headed blackbird (*Xanthocephalus xanthocephalus*). This species also is known to nest at the KWB.

3-23 Special-status Mammals: In paragraph 2, the DEIR states that the Tulare grasshopper mouse nearest known occurrence is approximately 10 miles away from the project site. This species is known to occur in several areas at KWB, including trapping grids, the Cheng Property, and the saltbush scrub habitat portion of the Nikkel Property.

4 3-24 Special-status Mammals: In paragraph 1 on that page, the DEIR states "…No evidence of kit fox presence in the Biological Study Area was observed during focused field surveys…". Although I do not doubt this statement in any way, kit foxes are nevertheless known to occur in the surrounding area and the individuals can be wide ranging in their foraging habits. Therefore, it should be expected that this species is likely present at least time to time within the Biological Study Area.

5 3-31 Impact BIO-1: Horn's milkvetch should also be included in the Special-status Plants that are listed here, as it is also known to occur nearby within the Outlet Canal, similar to slough thistle.

6 3-32 Mitigation Measure BIO -1: Our experience has been that unless blunt-nosed leopard lizard surveys consistent with the 2019 CDFW protocols or some other CDFW-approved methodology are conducted, it is unlikely that fencing will be allowed to be installed. CDFW typically requires a very detailed fencing plan be prepared and approved prior to installing any exclusionary/barrier fencing. Additionally, CDFW does not normally approve fence installation within 50 feet of burrows that could be used by species such as Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) or San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) unless it can be demonstrated through an approved investigative trapping effort or other agreed upon method that these species are not present.

7 3-32 and 3-33 Special-status Birds: While I do not necessarily disagree with most of the statements and conclusions in these paragraphs, based on comments by CDFW in regard to Swainson's hawks they stated that …"The trees within the Project represent some of the only remaining suitable nesting habitat in the local vicinity". Hence, it seems that CDFW may view impacting a total of 10 acres of foraging habitat for this species as a significant impact. Swainson's hawks are definitely known to nest in the area nearby the project site and likely forage in some portions of the project site from time to time.

3-34 Mitigation Measure BIO 2b: The DEIR is proposing that a nest survey for potential Swainson's hawk nesting trees be conducted within 0.25 mile of the project site. From my experience, CDFW will typically require a nest tree survey for a minimum of 0.5 mile surrounding the project.

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

James W. Jones, Jr.

James W. Jones, Jr.
President and Senior Biologist III

Environmental Defense Sciences

202 S. Lake Ave., Ste. 294, Pasadena, CA 91101 Tel: 626-744-1766 Fax: 626-304-9427

TECHNICAL MEMORANDUM

Date: January 14, 2021

To: Jonathan Parker
Kern Water Bank Authority

From: E. John List, Ph.D., P.E.
Principal Consultant

Subject : Draft Environmental Impact Report for the Palms Groundwater Recovery Project
State Clearinghouse Number 2020060315
FSI E217003

This memorandum will present the results of my review of the subject DEIR for the Palms Groundwater Recovery Project proposed by Buena Vista Water Storage District (BVWSD). The memorandum is in two parts: Part I presents my analysis of perceived deficiencies in the DEIR; Part II describes what in my professional opinion are problems with the proposed project as described and evaluated in the DEIR. I discuss the additional information and analysis that should be developed in order for the DEIR to inform the public of the water quality effects of the project.

Part I - Deficiencies in the DEIR Regarding Water Quality

The primary problem with the project description in the DEIR is that there is a paucity of data describing in detail the water quality issues that will be associated with the project. It is clear that the groundwater quality on the western side of the East Side Canal differs significantly from that on the east of the Canal, and this is acknowledged in the DEIR in general terms. However, the DEIR does not include any of the detailed, but still somewhat limited, presentation of data available in the GEI 2017 memorandum:

GEI Consultants, Inc. 2017. Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

This document describes significant problems with water quality, including arsenic, nitrate
1 hardness, gross alpha activity and high levels of iron and manganese and concluded that:

> " Iron and manganese are issues in a majority of the BVWSD wells. All sample results for well 23B are extremely high: average iron is 14,082 ppb and manganese is 2,610 ppb. Since the sample results are consistently high, this data is considered representative of the aquifer. With the levels this high, it is unlikely that blending will provide adequate contaminant reduction and therefore will not be an acceptable treatment method."

The DEIR not only provides no discussion of these potential problems for the project, but on page 3-84 goes so far as to state:

"Overall, the water quality of the well locations in the Recovery Project area meets drinking water standards. However, monitoring wells that represent the shallow aquifer, generally less than 300 feet below ground surface (bgs) and the deeper aquifer, generally greater than 500 feet bgs show some constituents with exceedances. Constituents in the shallow and deeper aquifers tend to exceed chloride, conductivity, total dissolved solids, and sulfate. Table 3-8 presents the water quality constituents that were evaluated. These constituents either had noticeable detections or are part of the DWR's constituents of concern for non-SWP water that is pumped into the Aqueduct."

Table 3-8. Water Quality Constituents Evaluated

Antimony	Iron
Arsenic	Manganese
Boron	Nitrate
Bromide	Sodium
Chloride	Sulfate
Conductivity	Total Dissolved Solids
Gross Alpha	Total Organic Carbon
Hardness	Uranium

1 (con't)

"To further evaluate the potential impacts of the Recovery Project water when it enters the Aqueduct, the average theoretical blend values were compared against the average values observed in the Aqueduct near the Recovery Project Area. Table 3-10 depicts the comparison between the two types of water. It is anticipated that the following mitigation measures identified will reduce these constituents that exceed the quality of the Aqueduct."

Table 3-10 was apparently derived from Table 3-5, which purports to describe the SWP Aqueduct water quality upstream and downstream of the project. The data in Table 3-5 are clearly incorrect. It simply would not be possible to reduce the arsenic, chloride, sodium, sulfate and TDS concentrations in the Aqueduct water between the upstream and downstream measurement locations. It is likely that it is the upstream measurements in the table that are incorrect, but it is not clear. The data from Table 3-5 are transcribed into Table 3-10, so that the upstream data in Table 3-10 are also incorrect.

A further problem with the data in Table 3-10 is that the "Project Water" projection is based upon a blend of waters from west and east of the East Side Canal with the west side waters represented by a single well in the west, as is discussed further below.

Table 3-5. Summary of Aqueduct Water Quality Upstream and Downstream of Project Area

Constituent	Drinking Water Standard	Upstream		Downstream	
		Average	Max	Average	Max
Antimony (ppb)	MCL = 6	0		0	
Arsenic (ppb)	MCL = 10	14	18	3.5	11
Boron (ppm)	NL = 1	0.1		0.2	0.4
Bromide (ppm)	N/A	No data		No data	
Chloride (ppm)	SMCL = 250	120	131	70	127
Conductivity (µS/cm)	SMCL = 900	736	758	465	740
Gross Alpha (pCi/L)	MCL = 15	No data		No data	
Hardness (ppm)	Very Hard > 181	74.5	77	107	141
Iron (ppb)	SMCL = 300	3	6	17	63
Manganese (ppb)	SMCL = 50	0		2	220*
Nitrate as N (ppm)	MCL = 10	1.3	1.4	2.6	5.3
Sodium (ppm)	DWR = 200	106	112	53	97
Sulfate (ppm)	SMCL = 250	96	103	40	121
Total Dissolved Solids (ppm)	SMCL = 500	416	436	263	434
Total Organic Carbon (ppm)	N/A	No data		No data	
Uranium (pCi/L)	MCL = 20	No data		No data	

*Indicates that result is over the drinking water standard
* parts per billion

1 (con't)

Table 3-10. Comparison of Average Project Water and Aqueduct Water Quality

Constituent	Aqueduct Upstream	Project Water	Aqueduct Downstream
Antimony (ppb)	0	0.4	0
Arsenic (ppb)	14	1.5	3.5
Boron (ppm)	0.1	0.1	0.2
Bromide (ppm)	No data	0.75	No data
Chloride (ppm)	120	65	70
Conductivity (µS/cm)	736	905	465
Gross Alpha (pCi/L)	No data	6.2	No data
Hardness (ppm)	74.5	209	107
Iron (ppb)	3	63	17
Manganese (ppb)	0	28	2
Nitrate as N (ppm)	1.3	2.6	2.6
Sodium (ppm)	106	103	53
Sulfate (ppm)	96	281	40
Total Dissolved Solids (ppm)	416	613	263
Uranium (pCi/L)	No data	8.5	No data

Presuming that it is the downstream numbers in Table 3-10 that are correct it is difficult to see how the levels of iron, manganese, sulfate and total dissolved solids can be reduced by blending to meet a non-degradation standard for pumping into the Aqueduct. The required blend water would have to be of an even higher quality. i.e., lower concentrations, than the Aqueduct water. The only water seemingly available to accomplish the blending goals is the Kern River water (see Table 3-3 and the discussion in Part II below).

Table 3-3. Water Quality in the Kern River

Constituent	MCL	Minimum	Average	Maximum	Units
Chloride[2]	250	2.2	6.4	10	mg/L
Sodium[2]		4.5	15	30	mg/L
TDS[3]	500	40	129	227	mg/L
Arsenic[2]	10	ND	ND	ND	ug/L
Nitrate (as NO_3)[3]	45	ND	0.7	1.8	mg/L

[2] Source RWQCB 2015
[3] Source: Kern County Water Agency Water Supply Reports (2010; 2011, 2012; 2013)

The blending calculations offered in the DEIR have elected to use the analysis from a single monitoring well, DMW-13 Middle, but as is made clear in the foregoing analysis by GEI this single well is not representative of the wells in the project area west of the East Side Canal listed in Table 3-6. Even so the blending calculations do produce water exceeding drinking water standards. From page 3-60 of the DEIR:

> "In general, most constituents meet drinking water standards (Table 3-7). Due to limited water quality data for most of the wells west of the East Side Canal, BVWSD monitoring well 13 – middle zone, was used as a representative well. For wells located to the east of the East Side Canal, conductivity, sulfate, and TDS were exceeded. For wells located west of the East Side Canal, sulfate and TDS slightly exceeded the drinking water standards. Even though most constituents are below drinking water limits, it was observed that each side had varying constituent levels. For example, the west side does not have arsenic, however on the east side, the concentrations are about half the MCL at 5.6 parts per billion (ppb)."

1 (con't)

Table 3-7. Water Quality of Wells in and Around Project Area

Constituent	Drinking Water Standard	West of East Side Canal	East of East Side Canal	
			Average	Max
Antimony (ppb)	MCL = 6	0	0.7	5
Arsenic (ppb)	MCL = 10	0	2.7	5.6
Boron (ppm)	NL = 1	0.1	0.2	0.5
Bromide (ppm)	N/A	No data	0.09	0.1
Chloride (ppm)	SMCL = 250	54	75	95
Conductivity (µS/cm)	SMCL = 900	922	891	976*
Gross Alpha (pCi/L)	MCL = 15	0	11.6	14.6
Hardness (ppm)	Very Hard > 181	243	179	289
Iron (ppb)	SMCL = 300	44	80	240
Manganese (ppb)	SMCL = 50	49	11	25
Nitrate as N (ppm)	MCL = 10	0.1	4.7	6.8
Sodium (ppm)	DWR = 200	107	99	123
Sulfate (ppm)	SMCL = 250	310*	257*	334*
Total Dissolved Solids (ppm)	SMCL = 500	641*	589*	808*
Total Organic Carbon (ppm)	N/A	No data	0.6	0.8
Uranium (pCi/L)	MCL = 20	5.5	11	15

*Indicates that result is over the drinking water MCL

Table 3-6. Wells used in Water Quality Analysis

West of East Side Canal	East of East Side Canal
BVWSD Production Well	BVWSD Private Landowner Well
DW01	D04
DW02	Kern Water Bank
BVWSD Monitoring Well	13D01, 13D02, 13D03
DMW 11A & 11B	West Kern Water District
DMW 12A & 12B	NW-1
DMW 13-Shallow, 13-Middle, 13-Deep	NW-2
BVWSD Private Landowner Well	NW-3
D15	NW-4
	NW-5

The blending analysis is therefore significantly biased in that despite Table 3-6 list of "Wells used in Water Quality Analysis" only the data from DMW-13 Middle was actually used and as is made clear in the GEI 2017 Memorandum the other wells west of East Side Canal have some serious contaminant problems.

Part II – Feasibility of the Project and Cumulative Impacts

As is apparent from the water quality and blending analysis, it will be extremely difficult for the Project to meet the State Water Project (SWP) standards for pumping groundwater production into the California Aqueduct, and additionally there is no evaluation of cumulative water quality impacts of the Project along with other banking projects' pumping non-SWP water into the Aqueduct and having to meet SWP water quality standards. The only water available for blending that would likely enable the water quality standards to be met is Kern River water. However, at a time when groundwater is being withdrawn from storage it is extremely unlikely that Kern River water would be available for blending, which highlights another major deficiency of the DEIR. 2

The DEIR assumes that the project would add 100,000 acre.ft to the aquifers in eight (8) months and 25,000 acre.ft/year would be recovered in a six month window for each of four years in a time of drought, but the analysis is very rudimentary. A more appropriate approach would have been to use the Kern River monthly flow rate record, for however long a period as is available, as a surrogate for climate and perform a series of simulations that would enable the most productive operating scenario to be developed that recognizes the ephemeral nature of Kern River flows. These simulation techniques are widely used in designing facilities that are dependent upon river flows that vary significantly. For example, Sacramento Regional Sanitation has used simulations to optimize the design of their wastewater treatment and storage because the ability to discharge to the Sacramento River is controlled by the river flows, which are not predictable, but for which a long record is available.

The DEIR for the Palms project has no discussion at all about the variability of the Kern River flow or the return frequency of possible recharge opportunities. The infiltration project and its associated wetlands will be very dependent upon the river flow and yet there is no discussion of the impact of the frequency of sustained drought on the constructed wetland. The issue is not even discussed in the DEIR. 3

Given that the only water available for use in blending of BVWSD water to meet water quality standards required for SWP pump in is only available during times of water surplus, it is not at all clear that the proposed project is even viable.

Wood Environment & Infrastructure Solutions, Inc.
1281 East Alluvial Avenue, Suite 101
Fresno, CA 93720-2659
USA
T: 559-264-2535
www.woodplc.com

January 15, 2021
Project 8101

Jonathan Parker
Kern Water Bank Authority
1620 Mill Rock Way, Suite 500
Bakersfield, CA 93311

Subject: **Review of DRAFT EIR for the Palms Groundwater Recovery Project**
Kern County, California

Dear Mr. Parker:

Wood Environment & Infrastructure Solutions, Inc. (Wood), has prepared this review of the December 2020 *Draft Environmental Impact Report for the Palms Groundwater Recovery Project* (DEIR) prepared by GEI Consultants on behalf of the Buena Vista Water Storage District (BVWSD). The focus of this review is on the numerical modelling effort conducted on behalf of BVWSD by Todd Groundwater (Todd) in support of the DEIR. Specifically, this review evaluates the efficacy of the numerical modelling effort to effectively simulate potential impacts to groundwater related to the proposed Palms Groundwater Recovery Project (Palms Project). As explained below, the Palms Project numerical model was not calibrated to site conditions and is otherwise insufficient in several respects.

Numerical Modeling Review

The numerical model effort for the Palms Project is presented as a memorandum by Todd in Appendix D of the DEIR. Appendix D presents a summary of the proposed project, regional setting, geology, groundwater conditions (elevations and quality), and the development of a superposition model to evaluation potential groundwater impacts of the Palms Project. The development, validation, and use of the superposition model are discussed in the following sections. Each section contains a summary of the Todd memorandum followed by Wood's opinion on the text in italics.

Superposition Model Concept

Superposition models rely on Darcy's Law equation for groundwater flow and the principal of superposition. When applied to a groundwater system, the changes in an aquifer system affected by multiple hydraulic stresses (i.e. recharge and pumping) are equal to the sum of the individual hydraulic stresses applied to the aquifer system. Simply put, if Project A causes a 2-foot change in groundwater elevation (head) at some observation point, and Project B causes a 1-foot change in head at the same observation point, then Projects A and B together will result in a 3-foot change in head at the observation point. The results of a superposition modeling are calculated as a change in head, not absolute

groundwater elevations. Therefore, the starting groundwater elevations simulated are irrelevant and can be set to zero. Because the impacts of multiple hydraulic stresses on the aquifer system are additive, only the stresses of the project under evaluation are simulated. The resulting simulated change in head is intended to be a direct reflection of the impacts of the project.

Inherent in the principal of superposition is that the model used to calculate the change in head is well calibrated to site conditions and can accurately reproduce the observed change in head at known observations points to known hydraulic stresses. Superposition is strictly applicable to linear aquifer system problems only, that is, constant aquifer saturated thickness and linear boundary conditions. If the aquifer system is relatively linear, for example, the saturated thickness does not change by a significant portion, superposition can still provide reasonably accurate answers. If the aquifer system is non-linear (i.e. boundary conditions such as recharge and pumping are highly transient), then superposition models may yield unreliable results. Currently, superposition is used primarily in the simulation of aquifer tests, in that only changes due to the imposed change in stress (that is, the well discharge) are simulated, initial drawdowns are specified as zero, and boundary conditions are relatively constant.

Superposition Model Development

The superposition model for the Palms Project was developed using United States Geological Survey (USGS) numerical model code MODFLOW. MODFLOW is the defacto standard for numerical groundwater models and has been used world-wide for over 40 years. Development of the Palm Project MODFLOW model is documented in Appendix D, Attachment B.

The Palms Project model was derived from the 2009 USGS Central Valley Hydrologic Model (CVHM), a basin scale model of the entire Central Valley of California. The CVHM simulates the period 1962 through 2003, consists of 10 model layers using a relatively coarse model grid of 1-square mile, and simulates the Central Valley leaky aquifer system from ground surface to the base of fresh groundwater. Significantly, the CVHM does not include the extensive water banking recharge and recovery operations on the Kern River alluvial fan.

The Palms Project model is a subset of the CVHM, extending from slightly north of the Kern County line to the Tehachapi Mountains. In the vicinity of the proposed Palms Project, the model grid was refined from 1-square mile (640 acres) to about 40 acres. In addition, the Palms Project model combined several of the CVHM layer together to yield a 4-layer model. As a result, the hydraulic properties (horizontal and vertical hydraulic conductivity, storage coefficients, and specific yield) had to be averaged and re-districitized to the new Palms Model grid.

The model developed for the Palms Project is a subset of the CVHM that has been averaged and re-districitized to a refined model grid with fewer model layers. The Palms Project model is essentially a completely new MODFLOW model that should be calibrated to existing site conditions and hydraulic stresses prior to use for predictive simulations.

Superposition Model Validation

Following development, the Palms Project MODFLOW model was "validated" to three groundwater scenarios: 1) 2011 West Kern Water District (WKWD) Aquifer Test, 2) WKWD wellfield recovery from October 2012 through December 2014, and 3) Kern Water Bank recharge and recovery from 1993 through 1998 (see Appendix D, Attachment A). These are discussed in the following sections.

The term "validation" is mis-used here. Model calibration is the iterative process of comparing the model simulated response to a stress with the real aquifer system response to a stress, revising the model if necessary, and comparing again until the model results closely match the real aquifer system response. Model validation is the process of comparing the model and its behavior to the real aquifer system and its behavior to known stresses. Typically, model validation is conducted by taking a calibrated model and testing how well it can reproduce a unique set of stresses and observations that were not used to calibrate the model. For example, say Model A is calibrated to stresses and observed heads for the period 1980 to 2010. If Model A can then simulate the stresses and observed heads for period 2010 to 2020, without any recalibration of model hydraulic parameters, then Model A can be considered validated.

Superposition Model Validation Scenario 1

The Palms Project model was "validated" against the results of a 2-dimensional analytical element *WinFlow* model developed in 2009 to simulate a series of 24-hour aquifer pumping tests of five groundwater extraction wells located at the WKWD North Well Field. Observations of the change in head (drawdown) were recorded in up to six nearby monitoring wells during each 24-hour test. The 2009 WKWD *WinFlow* model was calibrated to simulate the drawdown observed at the end of each 24-hour test.

The WKWD *WinFlow* model was modified to simulate the hypothetical pumping of nine wells located around the WKWD North project. Each well was pumped at 2,000 gallons per minute (gpm) for 300 days. The Palms Project model was modified to simulate the same pumping scenario of the WKWD extraction wells. A comparison of the WKWD *WinFlow* model and Palms Project model simulated drawdown showed the Palms Project model under predicted drawdown at the well field. The Palms Project model was then modified (i.e. calibrated) to improve the match to the estimated drawdown by the WKWD *WinFlow* model. The drawdown simulated by the calibrated Palms Project model approximated the WKWD *WinFlow* model simulated drawdown at day 300 of pumping in the vicinity of the pumping wells (near-field), but under predicted drawdown further away from the pumping wells (far-field).

Numerical models (MODFLOW) are typically compared to an analytical model (WinFlow) to demonstrate that the numerical code can accurately reproduce the analytical solution. This is done using identical model construction (grid, layers) and hydraulic properties so the models are as similar as possible. This was not the case for the Scenario 1 simulations. The WKWD WinFlow model consists of a single uniform layer with homogeneous hydraulic properties. The Palms Project MODFLOW model consists of four layers with heterogenous hydraulic properties. Furthermore, the Palms Project model had to be calibrated to approximate the WKWD WinFlow solution after 300 days of pumping; and did not do so very well. It would be more appropriate to calibrate the Palms Project model to the drawdown observations (actual data) from the 24-hour pumping tests of the WKWD well field which were used to develop the WKWD WinFlow model.

Superposition Model Validation Scenario 2

The Palms Project model was also "validated" by simulating the recovery pumping of approximately 18,730 acre-feet (AF) of groundwater from five wells in the WKWD wellfield from October 2012 through December 2014. Preliminary simulation results indicated it was necessary to include the recovery pumping of approximately 1.8 million AF (MAF) from the Kern River Alluvial Fan Water Banking Projects (Kern River Projects) during this same period. The Palms Project model simulated drawdown was compared to observed drawdown in 11 observation wells around the WKWD well field. Hydrographs of observed and simulated drawdown showed that the Palms Project model simulated drawdown was more or less on trend with the observed drawdown in the pumping wells but did not reproduce the large changes in head due to well inefficiencies. The observed and simulated drawdown in nearby observation wells shows a poorer fit.

The need to include the Kern River Projects with the Palms Project model to approximate the observed drawdown in the WKWD well field from 2012 through 2014 demonstrates the underlying assumptions for use of a superposition model are not valid in the Palms Project area. The recharge and recovery operations of the Kern River Projects overwhelm the stresses induced by the recovery from WKWD wells. Furthermore, the Palms Project model did not evaluate the simulated drawdown in the numerous wells on and around the Kern River Projects. These data are readily available and could have made the Palms Project model calibration more robust.

Superposition Model Validation Scenario 3

The Palms Project model was also "validated" by simulating groundwater mounding associated with the Kern River Projectss from 1993 through 1998 when approximately 3.1 MAF of water were recharged. Monthly recharge volumes for each water banking project were imported at the approximate location of the recharge basins. The Palms Project simulated change in head was compared to observed change in head at 26 monitoring wells scattered across the Kern River Projects. Hydrographs of observed and simulated change in head were provided for only for 4 of the 26 wells used for "validation." The hydrographs show that the Palms Project model simulated change in head is generally on trend with the observed change in head; however, the model over predicts the change in head in the vicinity of the Palms Project and under predicts the change in head near the northern edge of the Kern Water Bank.

Again, the need to include the Kern River Projects with the Palms Project model to approximate the change in head resulting from the water banking recharge from 1993 to 1998 demonstrates the underlying assumptions for use of a superposition model are not valid in the Palms Project area. The recharge and recovery operations of the Kern River Projects will likely overwhelm the change in head induced by recharge and recovery stresses at the Palms Project. In addition, there is a significant amount of data generated by the Palms Project model (i.e. hydrographs) that were not presented for review. Furthermore, since it became necessary to simulate both recharge and recovery operations of the Kern River Projects, why wasn't a single, comprehensive model prepared simulating the entire history of water banking operations in the area?

Palms Project Recovery Scenarios A and B

The Palms Project model described above was then utilized to evaluate two hypothetical recharge and recovery scenarios at the Palms Project facility. Both scenarios were assumed to start in 2011, a period

when the Kern River Projects were all recovering groundwater. The Palms Project recovery scenario assumptions are shown below:

- 2011 – 100,00 AF recharge over 8 months
- 2012 – Idle
- 2013 – Year 1 recovery of 25,000 AF over 6 months
- 2014 – Year 2 recovery of 25,000 AF over 6 months
- 2015 – Year 3 recovery of 25,000 AF over 6 months
- 2016 – Year 4 recovery of 25,000 AF over 6 months
- 2017-2020 - Idle

The only difference between Scenario A and B is that Scenario B recovers only 15,000 AF in year four, leaving approximately 10 percent of the recharged water behind. Recovery pumping was assumed to be by 14 wells pumping approximately 2,200 gpm for 6 months. As stated in the Todd memorandum: "Because this is a superposition model, only the combined Palms {recharge} and Recovery Project operations were simulated."

As clearly shown by "validation" scenarios 2 and 3 described above, it was necessary to add the recharge and recovery operations of the Kern River Projects to the Palms Project model to obtain a reasonable fit to the observed change in heads during recharge and recovery periods. As such, there is no justification to remove the historical water bank recovery operation during the 2011 to 2020 simulation period from the Palm Project model. The Palms Project model simulated mounding during recharge and drawdown during recovery may underestimate mounding (because there was recharge by others during 2011) and underestimate drawdown during recovery (because there was also recovery by others during 2011 to 2019).

Summary and Opinion

Inherent in the principal of superposition is that the model used to calculate the change in head is well calibrated to site conditions and can accurately reproduce the observed change in head at known observations points to known hydraulic stresses. Superposition is strictly applicable to linear aquifer system problems only, with constant aquifer saturated thickness and linear boundary conditions. Non-linear boundary conditions, such as large-scale recharge and recovery operations, may result in unrealistic simulation results. The Palms Project superposition model derived from the USGS CVHM has a refined grid and fewer layers and utilizes averaged hydraulic properties. As such, the Palms Project model is a completely new model that should have been calibrated to historical site conditions.

The Palms Project model was "validated" by comparing simulated change in heads (drawdown) to drawdown calculated with an analytical *WinFlow* model using a hypothetical pumping scenario. The results did not match well, requiring further calibration of the Palms Project model. Rather than calibrate the Palms Project model to hypothetical drawdown results, the Palms Project model should have been

calibrated to the actual observed drawdown during the 24-hour pumping tests used to develop and calibrate the analytical *WinFlow* model.

The Palms Project model could not simulate long-term change in head associated with recovery pumping from the WKWD well field from 2011 to 2014 without adding the recovery operation of the Kern River Projects. Likewise, the Palms Project model could not simulate the long-term change in head associated with recharge operation from 1993 to 1998 without adding the recharge operation of the Kern River Projects. This demonstrates that the boundary conditions are non-linear, and simulation results are dependent on activities located away from the Palms Project site. The Palms Project model needs to include and be calibrated to the nearby recharge and recovery operations of the Kern River Projects.

It has been a pleasure to be of professional service to you. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Wood Environment & Infrastructure Solutions, Inc.

David M. Bean, PG, CHg
Principal Hydrogeologist

I:\8000s\8101.000\Archive\8101.005.docx

(Submitted Electronically)

[This page intentionally left blank.]

8.0 Response to Comments

This chapter includes a brief summary of the comments submitted, with the District's response. The full text of the comments is found in Chapter 7.

8.1 West Kern Water District

WKWD-1*: How was it determined that up to 10 feet of anticipated drawdown would be a less than significant impact? At times of drought and regional recovery operations, WKWD has had to lower pumps in its North Wellfield wells, and some of these wells cannot accommodate lower (deeper) pump settings.*

Response: Drawdown would be considered a significant impact if it could result in groundwater levels falling below MTs. For the WKWD's North and South Management Areas, the two management areas where production wells are located, MTs for chronic lowering of groundwater levels are defined based on historic maximum and minimum levels observed at each well. At each well 20 percent of the difference between these elevations was calculated, and then subtracted from the minimum historical value to obtain the numerical MT value (WKWD GSA 2020). An undesirable result would occur when the MT for groundwater levels are exceeded in at least three adjacent management areas that represent at least 15 percent of the Subbasin, or that represent greater than 30 percent of the Subbasin (as measured by each management area).

The modeled scenario was intended to reflect a worst-case scenario, where recovery pumping would occur over 4 consecutive years, starting 1 year following the associated recharge. The maximum drawdown under this scenario is shown on Figure 3-13 of the DEIR. This impact was determined to be less-than-significant because the drawdown is expected to be at this level or less and will be temporary, with recovery occurring during periods of recharge.

The drought and regional recovery operations were considered under the cumulative analysis. The cumulative analysis did find that the drawdown from the Project, in conjunction with other regional projects, may cause a potentially significant impact to the groundwater levels at the WKWD North Wellfield. Under Mitigation Measure CUM-1, recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD. Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90 percent of the recharged amount.

WKWD-2: *Are two years of recharge required to occur before any project-related extraction occurs?*

Response: Two years of recharge has already occurred at the Palms. To date, the District has recharged approximately 27,166 AF in the Palms Project, 14,164 AF in 2017 and 13,002 AF in 2019. The District has selected the Reduced Recovery Alternative (Scenario B) as the preferred alternative. Under this alternative, recovery will be limited to 90 percent of the amount recharged.

WKWD-3*: On Figure 3-15, the simulated monitoring point named MW_WKWD shows the change in water level at the end of year 6 reaches -15 ft. Would this be considered a significant impact?*

Response: The hydrological analysis concluded that drawdowns from the Recovery Project alone would not produce a drawdown that would be considered a significant impact. However, the cumulative analysis found that drawdown from the Recovery Project, in conjunction with other regional projects, could result in groundwater levels falling below MTs resulting in a potentially significant impact to the groundwater levels at the WKWD North Wellfield. Mitigation Measure CUM-1 is proposed reduce the impact to less-than-significant by deferring Project pumping to later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs.

For the WKWD's North and South Management Areas, the two management areas where production wells are located, MTs for chronic lowering of groundwater levels are defined based on historic maximum and minimum levels observed at each well. At each well 20 percent of the difference between these elevations was calculated, and then subtracted from the minimum historical value to obtain the numerical MT value (WKWD GSA 2020). An undesirable result would occur when the MT for groundwater levels are exceeded in at least three adjacent management areas that represent at least 15 percent of the Subbasin, or that represent greater than 30 percent of the Subbasin (as measured by each management area).

WKWD-4: *Would a change in timeline for recovery operations lead to a potentially significant impact? If a delayed timeline where to occur, would the overall impact to water levels at the WKWD be greater than 10 feet and would this be considered a significant impact? What mitigation could be provided if any existing pump in a WKWD well cannot be lowered any deeper than it currently is?*

Response: The modeled scenario was intended to reflect a worst-case scenario, where recovery pumping would occur over 4 consecutive years, starting 1 year following the associated recharge. Under the selected alternative, the Recovery Project would recover 90 percent of the recharged water. The simulated recovery pumping would occur at a rate of 25,000 AFY over a 6-month period over 3 consecutive years. During Year 4, the recovery pumping would occur at a rate of 15,000 AFY. The same pumping rate occurs during the first 3 months, reduced pumping occurs in the 4th month, and no pumping during the final 2 months of Year 4 of the extraction period. As described for Scenario A, this recovery schedule is anticipated to be the worst-case scenario, with actual recovery extending over a longer time period, with less impact to groundwater levels.

The modeling performed for the DEIR was designed to inform decision making with respect to well placement, well construction and project operation and has provided insights useful in supporting these decisions. With respect to project operations, it is the monitoring program and mitigation measures that will govern. As noted in clarifications made to the project description in the EIR, the District will follow the monitoring standards and the mitigation measures established in the BVGSA. In the event the District joins the JOC, then those monitoring standards would be controlling for the Palms Project. Thus, the mitigation provided if groundwater recovery in the Palms should be demonstrated to impact operation of a well in WKWD or within the boundaries of other JOC members would be determined by the JOC's measures for mitigating such a condition.

WKWD-5a: *Does the BVWSD Palms Project DEIR using the groundwater-surface water modeling (C2VSimFG-Kern) consider work presented in the recent Kern Fan Groundwater Storage Project DEIR?*

Additionally, does the cumulative analyses presented in the BVWSD Palms Project DEIR consider the effects on neighboring wells if the BVWSD Palms Project wells were to recover stored groundwater at the same time that groundwater recovery operations were to occur at the Kern Fan Groundwater Storage Project, the Rosedale Rio Bravo Drought Relief Project, and the Stockdale Integrated Banking Project?

Response: The cumulative simulation for the cumulative analysis is based on the C2VSimFG-Kern model projected-future Baseline Scenario used to support the Kern County Subbasin GSPs submitted to DWR in 2020. The Kern Fan Groundwater Storage Project and the Stockdale Integrated Banking Project are listed in Table 4-1 of Attachment D of Appendix D of the DEIR as projects included in the Baseline scenario by the RRBWSD Management Area. The RRBWSD Drought Relief Project is represented as part of the projected groundwater bank recovery for the Irvine Ranch projects. These projects, and many others, were considered in the cumulative impact analysis in the DEIR.

The modeling for the Kern Fan Groundwater Storage Project DEIR was conducted concurrently with the modeling work performed for the proposed Project DEIR. During this period (April 2020), BVWSD held meetings with RRBWSD, WKWD and KWBA to discuss the Palms Recharge Project and presented the modeling approach and preliminary results of the Palms Recharge Project. No reciprocal exchange of modeling information was provided for the Kern Fan Groundwater Storage Project.

WKWD-5b*: If extraction is occurring in the BVWSD Palms Project at the same time as extractions are occurring at the Kern Fan Groundwater Storage Project, the Drought Relief Project, and the Stockdale Integrated Banking Project, would the impacts to WKWD North Wellfield wells be greater than anticipated by the modeling presented in the BVWSD Palms Project DEIR? If cumulative impacts to WKWD are significant mitigation responses with respect to water level drawdown impacts on the WKWD North Wellfield should be included in the DEIR.*

Response: As noted in Section 2.3.3 of the DEIR, BVWSD entered into a MOU with the KWBA and its Member Entities (including WKWD), which provides that, "…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…" In subsequent years, a JOC has been formed among these parties, which utilizes multiple groundwater models to assess impacts to groundwater from banking and recovery operations. BVWSD will either amend the existing MOU, develop a new MOU, or join the JOC, to address the operation and monitoring of the Recovery Project. Therefore, the intent is to use this mechanism to address issues such as the one outlined in the comment.

WKWD-6: *The BVWSD Palms Project DEIR does not address energy recovery cost due to increased drawdown in adjacent wells (specifically those operated by WKWD) caused by operation of Palms Project wells.*

Response: It is anticipated that increased cost of pumping during times of recovery would be countered by reduced cost of pumping during recharge.

WKWD-7*: What specific mitigation measures can be applied to address site-specific impacts on WKWD operations?*

Response: **Mitigation Measure CUM-1** has been proposed to mitigate potentially significant impacts to WKWD. This mitigation measure states that Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW-088-WKWD, RMW-089- WKWD, RMW-058-RRBWSD, and RMW-059-RRBWSD. Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90 percent of the recharged amount.

WKWD-8*: Were variable groundwater flow directions considered as part of the analyses? Would groundwater flow directions other than northwest to southeast result in significantly different stimulated outcomes?*

Response: Yes, the analysis does consider variable groundwater flow directions including the range of likely groundwater flow directions in the area around the proposed Project. The Superposition Model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. The groundwater level change maps based on the Superposition Model are the equivalent of the difference map generated by subtracting a Project Scenario from a Baseline Scenario when using a traditional groundwater model. The superposition hydrographs show the simulated groundwater level change added, or superimposed, onto historical conditions to illustrate the extent of groundwater level change that would have resulted if the proposed Project had occurred as simulated in the past. Therefore, the analysis includes an assessment of the variable groundwater flow directions that have occurred historically.

The Cumulative Impact Analysis is based on the C2VSimFG-Kern model projected-future Baseline Scenario used to support the Kern County Subbasin GSPs submitted to DWR in 2020. The C2VSimFG-Kern model is based on the DWR C2VSimFG model developed for the Central Valley. For the Kern County Subbasin GSPs, the DWR version of the model was enhanced by including data from the local water agencies with the Subbasin, with an emphasis on recharge and groundwater pumping. C2VSimFG-Kern model is a conventional groundwater model in that it provides a complete representation of the groundwater sources and sinks within the model domain. As such, the C2VSimFG-Kern model directly simulates the variable groundwater flow directions for the projected-future conditions.

WKWD-9: *Was the data presented in the 2017 GEI memo considered as part of the preparation of Table 3-7?*

Response: *See* Master Response #3 – Water Quality Data. Regarding the arsenic data comment, arsenic data from DW01 and DW02 were prior collected to 2008 with only one result. More recent data from BVWSD's Monitoring Well 13 was used in the DEIR analysis as it is considered to be more representative of Project area conditions.

WKWD-10*: Does the water quality analysis consider changes that may occur to water quality as water levels decrease? If the expected water quality parameters presented in Table 3-7 were to increase in concentration as water levels decrease over time in the area, could the Palms Project still operate as proposed?*

Response: Water quality analysis included use of maximum and average available results from 2008-2019. This would capture changes in water quality within the last 10 years, which includes the last major

extended drought from 2012 to 2016, resulting in deeper groundwater levels. However, without available consistent monitoring over time, trending analysis against groundwater levels was not conducted.

There is limited value to continue collecting data within the existing monitoring well network. Only one monitoring well is within the Project area and other wells outside the Project area are not constructed to depths representative of the proposed new wells. Once the new wells are constructed, they will be added to BVWSD's existing monitoring well network for continued monitoring. As noted in clarifications made to the project description in the EIR, the District will follow the monitoring standards and the mitigation measures established in the BVGSA. In the event the District joins the JOC, then those monitoring standards would be controlling for the Palms Project.

WKWD-11*: The Palms Project DEIR states a potential beneficial impact on water quality. Additionally, the Palms Project DEIR states that a total of 27,000 AF was recharged in the Palms Project property during 2017 and 2019. However, there is no information provided in the Palms Project DEIR to demonstrate if that recharged water improved water quality in the area.*

Response: The purpose of BVWSD's monitoring wells is to continue groundwater quality monitoring. The District expects, over time, for groundwater quality to be consistent with recharge water quality. Since the quality of the surface water being recharged is than the current groundwater quality, recharge with the surface water will, over time, result in improved groundwater quality in the Project area. Elevated constituents in the groundwater such as total dissolved solids are expected to drop in response to recharge over time. Changes to the groundwater quality are beneficial to existing and potential future users of the groundwater resource.

WKWD-12: *Is Manganese the only constituent that prevents the Palm Area-Only project alternative from being feasible? If Table 3-7 is representative, wouldn't the Palms Project wells located to the north of WKWD make the water quality less desirable after blending?*

Response: Manganese is not the only constituent preventing the Palm Area-Only project alternative from being feasible. Other constituents such as conductivity, hardness, sodium, sulfate, and total dissolved solids are slightly elevated compared to average groundwater results east of East Side Canal. In addition, there are some constituents where levels are higher than west of East Side Canal. Based on the theoretical blending calculations summarized in Table 3-9, blending of the two types of groundwater balances out the water quality to meet state and federal drinking water standards. As mentioned in Master Response #4, the theoretical blending calculations were conducted based on the best available data at the time. The proposed mitigation measures HYDRO 1 through HYDRO 5 will be implemented with anticipation the new production wells will yield better water quality than the wells used in this evaluation.

WKWD-13: *If water quality conditions at the Palms Project recharge site are poor and water pumped from the site cannot be placed back into the aqueduct without blending from offsite wells, is spreading higher quality Kern River Water and State Water Project water in the Palms Project area a reasonable use of resources?*

Response: *See* response Master Response # 9 – Clarification of Recovery Project Description. Comments regarding the impacts of recharging water in the Palms Project Area are not relevant to this Recovery

Project. The Recovery Project only seeks to construct and operate recovery facilities to supplement the District's existing recovery of previously banked water.

Groundwater quality in the region is variable and depends on the quality of the recharge water [DEIR 3-59]. As can be seen in the environmental documents for existing groundwater recharge projects within the District, which are all public record, surface water recharged is of better quality than groundwater and thus, generally improves groundwater quality. Groundwater quality is suitable for beneficial use, so recovered water will be applied to beneficial use. *See* Master Response #4 – Water Quality #2 and Master Response # 8 – Beneficial Use of Recovered Groundwater.

8.2 Kern County Water Agency

KCWA- Introduction: *The Kern County Water Agency (KCWA) contracts with DWS for SWP water and manages or participates in multiple groundwater banking project and is therefore uniquely qualified to provide comments.*

Response:

The District appreciates the feedback from the KCWA and we hope to resolve your concerns regarding the Recovery Project.

KCWA-1: *The Palms Project DEIR incorrectly uses drinking water MCLs as the benchmark for water quality comparisons when the appropriate benchmark for comparing water quality impacts of future Pump-in programs is historic California Aqueduct water quality. Additionally, in Table 3-5, several of the upstream Aqueduct water quality values appear to be high. Given the higher values, the potential impacts to water quality may be greater than what is discussed in the Palms Project DEIR.*

Response: DWR's 2012 Pump-In Policy (Policy) states that "both historical and current [State Water Project] SWP water quality levels shall be considered" when evaluating baseline water quality. The Policy also states future Non-Project (NP) projects should have water quality meeting primary drinking water standards and to show that the water shall be treated or blended before it enters the SWP to prevent water quality impacts. Although it's acknowledged both historical and current SWP water quality levels are to be considered, the focus of this evaluation was on the antidegradation of SWP water quality. To understand the impacts Palms Project water would have on the SWP, it was necessary to evaluate water quality upstream and downstream on the Aqueduct near the potential turnout. This data is more current than the historical values presented in DWR's 2012 Policy and more currently reflects the Aqueduct's water quality. DWR requires a new PIP to provide historical data that is no more than 3 years old. Once the new wells are constructed, sampling will need to be conducted to meet DWR's requirement. The EIR presents mitigation measures specifically to address this concern. Mitigation measure HYDRO-3: To develop the PIP, the District will conduct water quality sampling of all the wells quarterly for 1 year. Sampling will include Division of Drinking Water's Title 22 constituents along with DWR's "Constituents of Concern" that are not included in Title 22. Mitigation measure HYDRO-4: When water quality data becomes available on the Recovery Project's production wells (both existing and new wells), blending calculations will be updated. The final blending scenario will be selected to ensure that the final, blended water quality, meets DWR requirements. Mitigation measure HYDRO-5: The District will follow the water quality monitoring and reporting requirements in the Pump-In Agreement with DWR.

In response to the comment regarding the data used in the DEIR to characterize Aqueduct water quality, a request was made to KCWA to see if they have any current data on the Aqueduct. We were directed to Improvement District No. 4 2020 Annual Report on Water Conditions, Table 13, which provided water quality data for four sources of water they receive. The Aqueduct source was collected at Tupman and is representative of the Aqueduct, near the Palms Project. For this reason, Tables 3-4 and 3-5 of the FEIR have been updated. Also *see* Master Response #4 – Water Quality Impact Analysis.

KCWA-2: *It is difficult to evaluate the potential impacts to Aqueduct water quality based on representative wells as the results are highly variable and the DEIR includes no additional analysis of how to minimize water quality impacts outside of the limited discussion on blending water and construction modifications. Additionally, the Project should not rely upon water banked by adjoining entities, such as the Kern Water Bank, West Kem Water District or Pioneer Project, to blend water to improve water quality.*

Response: *See* Master Response #4 – Water Quality Impact Analysis and Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis. The Recovery Project does not rely on using water banked by adjoining entities to improve water quality by blending. Available water quality data from neighboring entities were used solely to help understand and characterize the groundwater quality east of the East Side Canal, where some new production wells would be constructed. Theoretical blending calculations were performed to evaluate if blending water from new production wells from both sides of the East Side Canal would be feasible for subsequent development of the PIP to DWR.

KCWA-3: The Palms Project DEIR may not have sufficient mitigation measures to reduce water quality impacts to meet the requirements of the Aqueduct Pump-in program. The Palms Project DEIR should be amended to include a complete analysis of potential water quality impacts from the Palms Project.

Response: *See* Master Response #4 – Water Quality Impact Analysis.

KCWA-4: *The Palms DEIR makes uncorroborated claims that there would be no impact to population and housing and that the Project would not be growth inducing. Without adequate discussion on the quantity of water, potential public water agencies or contract duration of potential water that may be sold to other industrial or municipal users, there is no way to substantiate the claim of no population or growth inducing impacts. Therefore, the DEIR should be amended to identify and discuss the aspects and limitations of potential future water sales and demonstrate BVWSD will commit to remaining in balance prior to selling any water.*

Response: The DEIR acknowledges that other parties may participate in the Project through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers. However, the identity of potential partners and the extent of their involvement is currently unknown and any analysis of such would be unduly speculative. Agreements would be made, as necessary, in advance of any water exchanges or transfers and if required additional compliance with CEQA would be completed at the appropriate time. The project description includes all the information required by CEQA to comprise an adequate description of the project without supplying extensive detail beyond that needed for evaluation and review of the environmental impacts (*CEQA Guidelines* §15124). It is the intent of the DEIR to evaluate impacts of recovering previously banked water from all such sources to the extent that they are reasonably foreseeable.

Since the Recovery Project recovers a maximum of 90 percent of the recharged water, the recovery pumping is in volumetric water balance with the existing recharge operations.

KCWA-5: *The Palms Project DEIR should amend the project approvals to include KCWA for approval of agreements to modify BV8 and approval of the agreements for authorizing use of the Aqueduct to deliver, exchange and covey water.*

Response: The requested edits have been made to Section 2.4 of the EIR.

KCWA-6: *The DEIR lacks a hydraulic analysis to determine the potential impacts to water surface elevations in the Aqueduct. The DEIR should be amended to include discussion of the need for hydraulic analyses and whether additional environmental documents may be prepared to analyze the results of a hydraulic analysis by DWR.*

Response: Sections 2.3.1 and 2.4 of the EIR has been revised to note the potential need for a hydraulic analysis to evaluate water surface elevations in the Aqueduct. If the results of that hydraulic analysis should trigger a need for additional environmental documentation, the additional environmental documents will be completed. The appropriate level of analysis will be determined at that time.

KCWA-7*: Based on Figure 2-2, the Project recovery facilities are located up fan of the Palms Groundwater Banking Project facilities, however, it is common knowledge that all banked water is recovered down fan from the recharge area. The DEIR indicates that Buena Vista will join the Kem Water Bank Authority Joint Operating Committee (JOC) or amend or enter into a new MOU. Should Buena Vista be permitted to join the JOC, it will still be required to enter into a new MOU that demonstrates the Project is in the spirit of the KFMC MOU. While the KFMC MOU allows for recovery of banked water outside of the project site, it requires consent of both the KFMC and the district or entity with jurisdiction over the recovery area. Therefore, the DEIR should be amended to include discussion of the KFMC MOU's provisions and how the Project will meet those requirements.*

Response: The recovery facilities shown on Figure 2-2 of the DEIR are distributed between facilities up fan of the recharge facilities and facilities located down fan within the recharge area. The recovery facilities located up fan of the recharge areas are separated from the recovery facilities because this area is not well-suited to groundwater recharge. As described in Master Response #7- Regional Groundwater Level Contour Mapping and Flow Analysis, groundwater flow direction is generally to the southeast in this area. meaning groundwater recharged at the Palms flows towards the eastern recovery wells. Thus, the distribution of recharge and recovery facilities is designed to achieve the project purpose by placing the recharge facilities in the area best suited for recharge while recovery facilities are located to produce a water supply that will minimize requirements for treating recovered water and to spread the recovery operations over an area sufficiently broad to minimize well interference, breaches of MTs and other impacts of concentrated pumping.

The Recovery Project intends to maintain a positive balance between project recharge and recovery to demonstrate no borrowing of recovered water from the basin. The project will be operated in a manner consistent with the requirements of the Kern Fan Monitoring Committee's (KFMC) MOU.

KCWA-8: *The superposition model is not the appropriate approach to adequately assess the potential groundwater impacts, including impacts to the Aqueduct. the DEIR should be amended to include an updated modeling approach that considers geologic factors, including local operations, water projects and Kern River hydrology.*

Response: *See* Master Response #1 – Suitability and Validation of Superposition Model.

8.3 Kern Groundwater Authority

KGA – Introduction: KGA is concerned the Proposed Project is unlawful, violating the California Constitution and the Water Code. In addition, the DEIR is deficient for not disclosing components of the Proposed Project and not evaluating its environmental impacts. The KGA requests that BVWSD revise the Proposed Project to ensure it complies with applicable law and revise and recirculate the DEIR to address the deficiencies demonstrated in the comments below.

Response: *See* responses to detailed comments in KGA-1 through KGA-9, below, for explanation of the District's conclusion that the Proposed Project is lawful and the EIR complies with applicable law. The DEIR has been revised in response to the comments received to clarify, amplify, and make insignificant modifications to an adequate DEIR. Recirculation is not required (CEQA Guidelines Section 15088.5(b)).

KGA-1a: *The DEIR does not analyze whether the water being recharged in the Palms Area is of such quality that it can be extracted and applied to beneficial uses. Without disclosure and evaluation of data that shows the water recharged by the Proposed Project will later be extracted and put to beneficial use, the Proposed Project amounts to an unreasonable use of water. Because the DEIR does not establish that the water recharged will be or can be later extracted and put to beneficial use, the Proposed Project proposes to use water in a wasteful and unreasonable manner and the Proposed Project cannot be approved as lawful.*

Response: *See* Master Response #8 – Beneficial Use of Recovered Groundwater.

KGA-1b: *The Proposed Project proposes to recharge high-quality surface water in an area where groundwater is documented to be of much poorer quality. If read carefully, the DEIR acknowledges that the water quality in the recharge area prevents BV [BVWSD] from extracting water where it has been recharged…the DEIR does not evaluate how BV will ultimately meet the water quality requirements of the pump-back program.*

KGA-1b:
This comment raises concerns with the Project's proposals to recover water from two different sites (both east and west of the Eastside Canal) and the DEIR's evaluation of water quality in order to meet DWR's pump-back requirements to the CA Aqueduct. The comment implies that the water recovered within the "Recovery Project Area" is native groundwater. This is not accurate. The Project will recover water previously banked by the District.

The Project proposes 14 recovery wells, half of which will be located on the property west of the Eastside Canal in the location of the existing Palms Project area, where the recharge facilities are located, with the other half on the to the east [DEIR Fig. 2.2]. As described in Chapter 3.4, the water quality in both locations

meets the standards for beneficial use. All of the proposed wells will recover water that was previously banked by the District under existing projects. This includes the Palms Project, as well as District canals, laterals, etc. [DEIR Sec. 2.31 & 2.3.2].

Water recharged in the District generally flows in a southeasterly direction [DEIR 3-55]. This is similar to how West Kern operates their project. Most of their banking is in BVWSD. All of their recovery is outside the District. BVWSD is only installing half of its wells in the area just outside the current District boundary, and much closer to its recharge facilities than the West Kern recovery wells are to its banking locations. For a more detailed explanation of this conclusion, please *see* the discussion of the direction of groundwater flow in Master Response #7- Regional Groundwater Level Contour Mapping and Flow Analysis. As such, the proposed recovery wells are situated to capture water previously recharged by the District.

In is incorrect to state that the DEIR did not evaluate how the District will meet the water quality requirements of the Aqueduct. Chapter 3.4.3 of the DEIR discloses that since the Recovery Project involves the construction of new wells, the District conducted an evaluation of the water quality data of existing groundwater wells in the area to gain a general understanding of constituent concentrations at certain depths of the aquifer. However, the water quality of the new production wells may vary from the water quality of the existing wells. As water quality varies by depth, it is possible to screen the new wells to produce more favorable water quality. Aquifers with favorable water quality will be identified prior to construction of the wells. Well design will include considerations to allow, if necessary, modification of the wells after construction to improve water quality.

Prior to well construction, either aquifer isolation zone testing, which is common water quality testing method used by the scientific and well drilling communities, will be conducted or alternatively, nested monitoring wells will be constructed. In either scenario, water quality sampling will be conducted at varying depths to determine the appropriate well screen interval for the production wells. The production wells will then be designed to just collect water from aquifers with favorable water quality.

During well construction, strong well screens will be used, which will allow patches to be placed over them to prevent poorer quality water from entering the well once it is constructed. Bentonite clay seals will again be placed along with the gravel pack to isolate aquifers so that if patches are installed the poor-quality water does not move vertically within the gravel pack and enter the well through another well screen. The water quality may also be able to be adjusted by changing the pump intake depth.

To further reduce unfavorable levels of constituents identified earlier, treatment by blending will be conducted in a transmission pipeline. All wells will be blended in the pipeline prior to discharge into the Aqueduct *via* a turnout. Five mitigation measures are proposed to mitigate for the potentially significant impact that the Recovery Project could have impacts to the water quality of the Aqueduct, if discharges degrade the Aqueduct's existing water quality. These mitigation measures reduce the Recovery Project potential impacts to a less-than-significant level. Ultimately, the District will not pump into the Aqueduct until the water quality is approved by DWR.

KGA-2: *The DEIR fails to analyze whether any of the water recharged in the Palms Area could be later extracted and put to beneficial use. The DEIR provides no data establishing that the recharge from the Proposed Project augments the usable supply. Without further analysis disclosure, the Proposed Project*

has not established that the proposed recharge would result in any valid right to extract groundwater outside the Palms Area.

Response: *See* Master Response # 8 – Beneficial Use of Recovered Groundwater.

KGA-3: *In the cumulative impact section of the Palms Project DEIR, BVWSD discloses that the Proposed Project will, in fact, affect existing storage programs and conjunctive use projects. Because this impact is prohibited by SGMA, the Proposed Project is unlawful and cannot be approved.*

Response: As stated in the DWR draft BMP 6 (BMP 6 Sustainable Management Practices – Draft. California DWR. 2017) and stated in Section 3.3 of the KGA GSP, occasional, localized exceedances of MTs do not constitute impacts prohibited by SGMA and therefore are not violations of SGMA, *see* also Master Response #5 – SGMA.

Modeling results presented in the EIR indicate negligible effects from the Recovery Project operations in the Cumulative Scenario RMW locations in WKWD South Wellfield, RRBWSD, KRGSA (city of Bakersfield) and the Pioneer Project show (Figures 4-4 and 4-5 of the DEIR). The cumulative impacts modeling does indicate that recovery operations may result in water levels lower than those shown in the SGMA Baseline – Projects scenario at wells the WKWD North Wellfield (Figure 4-2 of the DEIR) and the far western areas of RRBWSD (Figure 4-3). However, modeling of cumulative impacts shows only sporadic breaches of MTs at the above locations, with breaches shown in modeling of the Palms – 90 percent Recovery Scenario being eliminated in the scenario selected as the environmentally preferred alternative for implementation, the Palms – Deferred Recovery Scenario. This impact (groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD to fall below the MT during simulation years) is disclosed in the EIR and described as potentially significant.

The results of the Cumulative with Deferred Recovery Scenario indicate that there are active mitigation measures that are available to reduce the potential of undesirable results resulting from the Recovery Project recovery pumping. Therefore, mitigation measure CUM-1 "Recovery Project pumping will be deferred prior to groundwater levels reaching their MTs at RMW locations RMW-088-WKWD, RMW-089-WKWD, RMW-058-RRBWSD, or RMW-059-RRBWSD. Deferred pumping will occur in later years, when groundwater levels are sufficiently high that deferment will protect against breach of MTs. The total amount of recovery will remain the same, at a maximum of 90 percent of the recharged amount." will be applied to reduce potentially significant cumulative impacts.

Implementing Mitigation Measure CUM-1 would reduce the potentially significant impact on groundwater levels to a less-than-significant level because it would minimize the potential that groundwater levels will decline below the MT.

In addition to Mitigation Measure CUM-1, should operation of wells that are part of the Recovery Project be demonstrated to be impacting operation of other wells within the BVGSA or in neighboring GSAs, Section 7.4.1.1 of the BVGSA GSP includes the following provisions regarding curtailment of pumping in response to adverse conditions:

- Curtailment of pumping is the third adaptive management action included in the GSA's program. Of the suite of actions, this is the action best suited to quickly correcting adverse conditions observed at representative monitoring sites.
- Minimum thresholds have been set at all wells in the GSA's groundwater level monitoring network that are used to monitor two important sustainability indicators:
    - Chronic lowering of groundwater levels
    - Reduction of groundwater storage

Should groundwater levels drop below the MT at any well in this network, and it can be determined that the decline can be attributed to extraction occurring within the BVGSA, the GSA will curtail pumping through the following series of steps to be taken after notification that groundwater levels have breached a MT:

1. Verification measurements will be made within 72 hours, after ensuring that no nearby wells are actively pumping.
2. If the verification measurement is still below the established MT, groundwater levels at nearby monitoring wells in the BVGSA and neighboring GSAs will be checked to confirm that the breach is the result of localized extraction and is not due to extraction from neighboring areas.
3. If determined that the breach is primarily due to localized pumping, a curtailment notice will be sent to all agricultural and industrial well operators within a 1-mile-radius of the relevant monitoring site. Wells subject to curtailment will be identified through GIS software and known locations of production wells.
4. Weekly groundwater level measurements will be taken at the affected monitoring site to observe the impact of the curtailment.
5. Pumping will be allowed to resume if the water level rises above the established MT and is sustained for 2 consecutive weeks. The volume of pumping may be limited by the BVGSA based on trends in groundwater levels observed prior to and after implementation of the curtailment.
6. If groundwater levels continue to decline or are unchanged after imposition of a 1-mile-radius pumping restriction, the radius of the restriction will be increased to a distance the BVGSA determines adequate based on assessment of regional groundwater elevations and modeling of the likely impacts of extending or prolonging the restriction.
7. Pumping restrictions are enforceable through monitoring of the magnetic flow meters now installed on all production wells in the BVGSA.

Depending upon the cause of the reduction in groundwater levels that trigger a pumping curtailment, the BVGSA may choose to combine the curtailment with actions to make supplemental surface water available to the affected area to substitute for the reduced access to groundwater.

As well as the curtailment measures that could be implemented in response to conditions observed at RMWs, the GSP includes the following sequence of measures for remediation of any wells that have lost production due to chronic lowering of groundwater levels.

1. Losses in well production believed to result from lowering of groundwater levels will be reported to the BVSGA.
2. Within 5 business days, a representative of the GSA will meet with the claimant to develop a full understanding of the basis for the reported impact.
3. The GSA, and, if necessary, a technical specialist, will investigate the reported impact to assess the extent of the impact and determine whether the impact is the result of lowered groundwater elevations or other factors unrelated to groundwater elevations such as deterioration of the well, pump and motor. This investigation will include analysis of groundwater elevations, pumping data, and inspection of the well.
4. Based on the results of the investigation, if the reduction in pumping capacity is confirmed to have been caused by lowered groundwater levels, remediation measures will be developed and promptly implemented. These measures may include deepening or replacement of the well; lowering of pump bowls; and other corrective measures. During the period of discussion, investigation and remediation, the owner of the affected well may receive deliveries of water from other sources, or other measures necessary to relieve the reduction in pumping capacity. Mitigation measures will be developed through consultation with the claimant and will be approved by the GSA and the County of Kern. The BVGSA will strive to develop and implement the agreed upon mitigation measures as quickly as reasonably possible.
5. Implementation of remediation measures will be confirmed, and the results of the implementation program will be monitored.

The BVGSA will maintain adequate financial resources to cover impact assessment studies, well repairs and other reasonably anticipated remediation needs.

As noted in clarifications made to the project description in the EIR, the District will follow the monitoring standards and the mitigation measures established in the BVGSA for wells located within the BVGSA. For wells located outside of the BVGSA, the monitoring standards and mitigation measures of the KGA will apply. In the event the District joins the JOC, then those monitoring standards would be controlling for the entire Palms Project.

Adoption of mitigation measure CUM-1, in addition to mitigation measures and adaptive management actions already being implemented through the BVGSA GSP, will enable the Recovery Project to be operated in a manner that will not impact operation of existing conjunctive management or storage projects.

KGA-4a: *The project description fails to describe the Proposed Project in an accurate manner, it is deficient and must be revised.*

Response: The specified deficiencies reflect an incomplete and inaccurate understanding of the Recovery Project as described in the project description and applicable law. Based on the language of the KGA GSP and the owner of the Recovery Project property, these lands will eventually be incorporated into the BVGSA boundaries as there is not existing agreement giving the KGA or any of its members authority. Notwithstanding, as stated in Master Response #2, the KGA does not have discretionary authority over

the new wells proposed by the Recovery Project. *See* Master Response #2 – Boundaries of the GSA for more information.

Figure 2-2 of the DEIR and this FEIR clearly displays the location of the recharge facilities and the recovery facilities. The DEIR fully discloses the location of the wells that will extract water and that some of this extraction will take place at locations different from where the Palms Recharge project is now operating.

The DEIR clearly describes the objective of the Proposed Project to recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the Aqueduct. *See* Chapter 5.6 of the DEIR and this FEIR for an explanation of why the Palms-only Recovery Alternative was not evaluated in detail. It is incorrect to state that water quality is not sufficient in the Palms area to allow extraction and use, *see* Master Response #8 – Beneficial Use of Recovered Groundwater.

The final EIR has been modified to clarify the following reasons for the separation of some of the recovery wells from the site of the Palms Recharge Project:

- The area where recovery wells are located outside the footprint of the recharge project was not proposed for location of recharge facilities because the land is not suited to groundwater recharge.
- Water quality data from wells within the recharge area and outside of this area indicate that the quality of water recovered from each site is of sufficient quality for the intended purpose. However, while water from each of the project wells is of a quality that allows the water to be put to beneficial use, the ability to blend water recovered from within the recharge area with water recovered from wells outside this area will increase the range of uses the water may serve. Therefore, the most effective use of resources available to the BVGSA is to recharge surface water in areas suited to recharge while distributing recovery facilities to produce groundwater from the array of recovery wells of a quality that will require no or minimal treatment to meet a broad range of beneficial uses.

KGA-5: *The Proposed Project proposes to recharge up to 100,000 acre feet of additional surface water per year into the Kem subbasin… The DEIR did not identify the source of the additional recharge water and therefore failed to disclose or evaluate any of these environmental impacts of the Proposed Project. The KGA requests the Palms Project DEIR be revised to identify the source of the additional recharge water, the anticipated years in which such water would be available and evaluate the environmental impacts from the increased diversion to recharge.*

Response: The Project does not propose to recharge any water, let alone an additional 100,000 acre-feet, *see* Master Response #9 – Clarification of Project Description.

KGA-6: *The DEIR fails to disclose and analyze the water quality in the different areas of the Proposed Project; specifically, the area in which water will be recharged compared to the area in which water will be extracted for use. The KGA requests the DEIR be revised to disclose all the water quality data and evaluate the impacts of the Proposed Project on water quality.*

Response: *See* Master Response #3 – Water Quality Data.

KGA-7: *The DEIR's environmental analysis of the Proposed Project impact on subsidence is not sufficient. Additionally, the DEIR does not include any of the information or analysis required by DWR. For this reason, the DEIR is deficient and must be revised and recirculated.*

Response: Subsidence is one of six SGMA sustainability criteria and is defined as, "Significant and unreasonable land subsidence that substantially interferes with surface land uses" (DWR draft Best Management Practices for the Sustainable Management of Groundwater – Sustainable Management Practices, 2017 p. 5). The GSAs within the Kern County Subbasin have agreed to further refine the term "significant and unreasonable subsidence" as meaning, "The point at which significant and unreasonable impacts, as determined by a subsidence rate and extent in the basin, that affects the surface land uses or critical infrastructure. This is determined when subsidence results in significant and unreasonable impacts to critical infrastructure as indicated by monitoring points established by a basin wide coordinated GSP subsidence monitoring plan." (KGAGSP 2020b).

The KGAGSP describes the subsidence monitoring program to be implemented by all GSAs in the Subbasin as follows:

> As detailed in the monitoring plan, the KGA along with the other GSAs in the Subbasin will develop a joint subsidence monitoring program to better understand the cause and impacts of subsidence. The intent of the KGA and the other GSAs in the Subbasin is to develop MTs for subsidence for inclusion in the 2025 GSP update. The Monitoring Network section of this GSP provides a description of the proposed basin-wide land subsidence monitoring strategy that has been adopted by the KGA and all other GSAs in the Subbasin." (KGAGSP, 2020a)

Direct monitoring of subsidence is important in the Kern Fan area because past measurements of ground surface elevations and groundwater levels do not suggest that groundwater elevations and subsidence are correlated in a way that would make measurement of changes in groundwater elevations a reliable proxy for measurement of changes in ground surface elevations. This is noted in the BVGSAGSP and in GSPs developed for other GSAs overlying the Kern Fan. For example:

> Subsidence monitoring at the KWB extensometer indicates both upward and downward changes (of at most 0.1 ft/yr) have occurred within an overall upward trend of inflation (Figure 15). As of June 2018, the land surface was 0.27 feet higher than the land surface in June 1994. The data indicate subsidence has not resulted from KWB recovery operations during extended droughts, where groundwater elevations have fluctuated as much as 250 feet. The KWB extensometer monitors subsidence with the aquifer to depths of ~800feet. InSAR data monitors the land surface regardless of the depth of the sediments. That data indicates the lands where stored water is recovered in the eastern portion of the KWB have risen as much as 0.16 feet and lands in the western portion of the KWB have dropped as much as 0.16 feet for the 2015-2018 period (Figure 16). This data is not in conflict with the extensometer data discussed above. Subsidence of up to 0.36 feet is indicated in the most southeasterly portion of the KWB where stored water is not recovered. (KWBAGSP 2020, Section 2.2.2.11 Historic Subsidence Monitoring, p.27)

> Historic KWB operations during four significant storage cycles and two significant recovery cycles, where water levels have fluctuated over 250 feet, have actually resulted in a cumulative land surface rise of about 0.27 feet, providing incontrovertible evidence that the Kern Fan Aquifer is not susceptible to subsidence due to stored-water recovery (see Section 2.2.2.11). DWR also reviewed the geology of the KWB aquifer and the extensometer data and concluded that potential impacts related to both historic and future operations would be less than significant (DWR 2016, page 7.8-11). The extensometer will continue to be monitored and the results will be reported to DWR in annual KGAGSP reports. (KWBAGSP 2020, Section 3.2.4 Land Subsidence, p.34)
>
> Inelastic subsidence has not occurred in over twenty years of KWB operations. DWR has also concluded that subsidence is not likely to occur as the result of future operations. Monitoring will continue, and if significant subsidence begins to develop appropriate mitigation measures will be developed. (KWBAGSP 2020, Section 4.2.4 Subsidence, p.37)
>
> Although groundwater pumping has caused subsidence elsewhere in the southern San Joaquin Valley, data indicate that the Kern Fan aquifer behaves elastically in response to groundwater banking operations. Figures 2-27 and 2-28 in the Umbrella GSP show Subbasin subsidence rates from 2007 to 2011, and from 2015 to 2016 respectively. The data show the impact of subsidence due to groundwater pumping on ground surface elevation in the GSA area has been minimal, and over time, the average land surface elevation has risen approximately 0.8 feet. (KWBA 2018. KWBA Conservation and Storage Project Environmental Impact Report. Cited in WKWDGSP. 2019, Section 3.6 Land Subsidence, p. 3-14.)

Based on the above passages, information presented in BVWSD's DEIR is consistent with analyses presented in the BVGSA's GSP as well as in documents prepared by neighboring GSAs in concluding that operation of the Recovery Project is unlikely to result in subsidence. Thus, the DEIR concluded that inelastic subsidence is unlikely to become a problem in the Project area.

In addition, since a correlation between groundwater elevations and subsidence has not been established in or near the project area, it is unclear that the few instances where the cumulative effects analysis indicates groundwater elevations may briefly drop below local MTs are relevant to an evaluation of subsidence. The analyses noted above regarding operation of nearby water banking facilities located in the Kern Fan are believed to address the substance of DWR's request that reports and analyses be cited to support the conclusion that the risk of subsidence in Basin 5-022 is **less-than-significant**.

KGA-8: *Because BV failed to provide notice and solicit input from responsible agencies, it violated the requirements of CEQA. The KGA requests BVWSD provide it and other responsible agencies with notice and an opportunity to comment prior to revising and recirculating the DEIR.*

Response: All notice requirements and solicitations for input were adequately made to the appropriate responsible agency(ies) [DEIR Sec. 1.3]. It is understood that this comment is made on the mistaken belief that the KGA is a responsible agency. The KGA does not have discretionary approval power over the

Recovery Project, and is therefore not a responsible agency, *see* Master Response #2, Boundaries of the BVGSA.

Kern County does not have discretionary approval power over the project and is therefore not a responsible agency for the Recovery Project as defined in the CEQA Guidelines Section 15381.

KGA-9: *The KGA is committed to serving its members and achieving sustainability for the Kern sub basin. The KGA supports the development of projects and management actions consistent with the subbasin's groundwater sustainability plans and looks forward to working with BV on the revision of the Proposed Project and DEIR.*

Response: The District also supports the development of projects and management actions consistent with the subbasin's groundwater sustainability plans, and looks forward to working with the KGA on cooperative development of the Proposed Project.

8.4 California Department of Fish and Wildlife

CDFW-1: *Aerial imagery of the Project area shows various habitats, including riparian, scrub, grassland, and agricultural. Tule Elk Reserve is adjacent to the Project boundary. Based on review of the Project description, California Natural Diversity Database (CNDDB) records, and the surrounding habitat, several special-status species could potentially be impacted by Project activities.*

Response: Pages 3-6 to 3-10 of the DEIR provide maps and descriptions of habitat and other cover types on and within 200 feet of the project site. The DEIR also acknowledges the Tule Elk Reserve location, and that special-status species could be impacted by Project activities. The DEIR evaluated potential for special-status species to occur on or adjacent to the project site and be impacted by Project implementation.

CDFW-2: *Species may be present in locations not depicted in the CNDDB but where there is suitable habitat and features capable of supporting species. In order to adequately assess potential Project impacts, surveys conducted by a qualified wildlife biologist/botanist during the appropriate survey period(s) and using the appropriate protocol survey methodology are warranted in order to determine whether or not any special-status species are present at or near the Project area.*

Response: Determinations made in the DEIR regarding potential for special-status species to occur on or adjacent to the project site were made based on habitat conditions observed during the field surveys and the species' range. The CNDDB was reviewed for specific information on documented species occurrences in the project vicinity, but the lack of occurrences was not used to assume species absence. As described in Master Response # 6 – Biology and the DEIR and FEIR, field surveys were conducted by qualified biologists to assess suitability of habitat on and adjacent to the project site for special-status species, to search for evidence of special-status species occurrence, and to determine presence or absence of San Joaquin antelope squirrel. Protocol surveys for blunt-nosed leopard lizard and trapping for Tipton kangaroo rat and giant kangaroo rat are not required, because no suitable habitat for these species occurs within 50 feet of the project footprint, including fence installation.

CDFW-3: *The Project has the potential to temporarily disturb and permanently alter suitable habitat for San Joaquin kit fox and directly impact individuals if present during construction, recharge, and other activities. The DEIR defers identifying mitigation for impacts to San Joaquin kit fox until potentially after Project activity has begun, and does not specify consultation with CDFW for activities that may impact San Joaquin kit fox. Recommended mitigation measures include conducting a habitat assessment and surveys to assess presence or absence, implementing U.S. Fish and Wildlife Service (USFWS) 2011 standardized recommendations for protection of San Joaquin kit fox, and avoiding take or acquiring an incidental take permit.*

Response: As recommended by CDFW and described in Master Response #6 - Biology and the FEIR, a San Joaquin kit fox habitat assessment of the project site and adjacent areas was conducted by qualified biologists, and focused surveys for potential dens and evidence of kit fox presence were conducted in native scrub within 500 feet of the northeast portion of the project site. Also as recommended by CDFW, Mitigation Measure BIO-3 includes implementing the USFWS standardized recommendations for protection of San Joaquin kit fox (USFWS 2011). Mitigation is not deferred until potentially after Project construction has begun, because surveys for potential dens and establishment of USFWS standard avoidance buffers or alternative avoidance measures would occur before construction activities begin and would require take avoidance. Mitigation Measure BIO-3 in the FEIR has been augmented to specify the timing for establishing exclusion zones and conducting agency consultation (if required to develop alternative take avoidance measures) and that the District will also consult with CDFW (in addition to USFWS). Because take of San Joaquin kit fox would be avoided, an incidental take permit is not required.

Regarding potential impacts of recharge to San Joaquin kit fox, environmental review for the Palms Project, where recharge occurs, was completed in 2016 (Palms Project IS / Mitigated Negative Declaration (SCH # 2015121030)). Mitigation measures in that IS/MND were developed to reduce potential impacts to kit fox to less-than-significant level.

CDFW-4: *Suitable blunt-nosed leopard lizard habitat includes areas of grassland and upland scrub that contain requisite habitat elements such as small mammal burrows. Individuals also use open space patches between suitable habitats, including disturbed sites, unpaved access roadways, and canals. DEIR Mitigation Measure BIO-1 specifies the installation of temporary exclusion fencing between the Project site and bush seepweed scrub habitat to prevent potential encroachment of small animals, including blunt-nosed leopard lizard, into the Project work area during construction. Fencing design, alignment, construction, and removal are not described in the DEIR, and the potential impacts of fencing are not addressed. Without appropriate avoidance and minimization measures, potentially significant impacts associated with ground-disturbing activities include blunt-nosed leopard lizard habitat loss, burrow collapse, reduced reproductive success, reduced health and vigor of eggs and/or young, and direct mortality. Recommended mitigation measures include conducting a habitat assessment and protocol-level surveys and avoiding take.*

Response: As recommended by CDFW and described in Master Response #6 – Biology, a blunt-nosed leopard lizard habitat assessment of the project site and adjacent areas was conducted by qualified biologists. The project footprint was adjusted based on results of this assessment to provide a minimum 50-foot no-disturbance buffer between the project site and suitable habitat for blunt-nosed leopard lizard. Therefore, no impacts on suitable habitat for blunt-nosed leopard lizard would occur. Mitigation Measure

BIO-1 has been augmented in the FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and therefore will not impact suitable habitat for blunt-nosed leopard lizard. Because impacts on this species and its habitat would be avoided, protocol-level surveys and additional take avoidance measures are not required.

CDFW-5: *Suitable San Joaquin antelope squirrel habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows. Without appropriate avoidance and minimization measures for San Joaquin antelope squirrel, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals. Recommended mitigation measures include conducting a habitat assessment and focused daytime visual surveys, implementing a 50-foot minimum no-disturbance buffer around small mammal burrow entrances if suitable habitat is present and surveys are not feasible, and acquiring an incidental take permit if avoidance is not feasible.*

Response: As recommended by CDFW and described in Master Response #6 – Biology, focused daytime visual surveys of potentially suitable habitat for San Joaquin antelope squirrel within 50 feet of the project site were conducted. Qualified biologists walked appropriately-spaced transects at the appropriate time of year and during the appropriate temperatures. Because no San Joaquin antelope squirrels were observed, the species is assumed to be absent from native scrub habitat adjacent to the northeast portion of the project site. In addition, a 50-foot minimum no-disturbance buffer between the project site and small mammal burrow entrances in suitable habitat for special-status mammals would be implemented, as recommended by CDFW and specified in the revised Mitigation Measure BIO-1. Because San Joaquin antelope squirrel does not occur in native scrub habitat adjacent to the northwest portion of the project site, and the recommended 50-foot minimum no-disturbance buffer would be implemented throughout the project site, take of San Joaquin antelope squirrel would be avoided and an incidental take permit is not required.

CDFW-6: *Suitable Tipton kangaroo rat habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows. Without appropriate avoidance and minimization measures for Tipton kangaroo rat, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals. Recommended mitigation measures include conducting a habitat assessment, implementing a 50-foot minimum no-disturbance buffer around small mammal burrow entrances if suitable habitat is present, conducting focused trapping surveys if burrow avoidance is not feasible, and acquiring an incidental take permit if the species is detected and avoidance is not feasible.*

Response: *See* Response to CDFW-7.

CDFW-7: *Suitable giant kangaroo rat habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows. Without appropriate avoidance and minimization measures for giant kangaroo rat, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals. Recommended mitigation measures include conducting a habitat assessment and focused daytime visual surveys, implementing a 50-foot*

minimum no-disturbance buffer around small mammal burrow entrances if suitable habitat is present and surveys are not feasible, and acquiring an incidental take permit if avoidance is not feasible.

Response: As recommended by CDFW and described in Master Response #6 – Biology, habitat assessments and focused daytime visual surveys in suitable habitat for Tipton kangaroo rat and giant kangaroo rat were conducted by qualified biologists. The project footprint was adjusted based on results of this assessment to provide a minimum 50-foot no-disturbance buffer between the project site and small mammal burrow entrances in suitable habitat for these species. Therefore, no impacts on Tipton or giant kangaroo rat burrows would occur. Mitigation Measure BIO-1 has been augmented in the FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and therefore will not impact suitable habitat for Tipton kangaroo rat or giant kangaroo rat. Because the CDFW-recommended 50-foot no-disturbance buffer would be implemented, protocol-level trapping surveys and an incidental take permit are not required.

CDFW-8: The DEIR analysis does not provide a biological basis for employing a 0.25-mile survey radius for Swainson's hawk nests without a robust protocol to maximize detection or for how no-disturbance buffers would be determined as adequate to avoid significant impacts, including but not limited to take of individuals through nest failure or other means, as a result of Project implementation. Without appropriate avoidance and minimization measures for Swainson's hawk and white-tailed kite, potential significant impacts include nest abandonment and reduced reproductive success that includes mortality of young and reduced health and vigor of eggs and/or young. Recommended mitigation measures include conducting surveys for active nests within 0.5 mile of the project site, implementing a 0.5-mile no-disturbance buffer around active nests, replacing nest trees removed by the Project, and acquiring an incidental take permit if avoidance is not feasible.

Response: The DEIR indicates on page 3-33 that the project site is subject to regular disturbance from agricultural activities similar to disturbance levels anticipated during project construction. Because of this regular disturbance associated with ongoing agricultural activities, Swainson's hawks nesting more than 0.25 mile from the project site are extremely unlikely to be disturbed by project activities. Nonetheless, Mitigation Measure BIO-2b has been revised in the FEIR, based on CDFW recommendations, to expand the survey area for active nests of Swainson's hawk and white-tailed kite to within 0.5 mile of the project site and to require a survey within 10 days before construction begins. As indicated in the DEIR, Mitigation Measure BIO-2b requires a qualified biologist to monitor active nests to ensure buffers established around active nests are effective. This measure has been augmented to specify that the qualified biologist will determine appropriate buffers and adjustment buffers, if necessary, to ensure significant project-related impacts are avoided. This project-specific approach to establishing buffers and avoiding project-related nest disturbance has been proven effective by GEI biologists on multiple projects with nearby active Swainson's hawk nests and in situations which much lower levels of existing disturbance. Finally, no raptor nest trees would be removed by the Project. Because take of Swainson's hawk would be avoided, an incidental take permit is not required.

CDFW-9: *Review of aerial imagery indicates that the Project boundary includes flood-irrigated agricultural land, which is an increasingly important nesting habitat type for tri-colored blackbird. Without appropriate avoidance and minimization measures, potential significant impacts include nesting habitat loss, nest and/or colony abandonment, reduced reproductive success, and reduced health and*

vigor of eggs and/or young. Recommended mitigation measures include conducting focused surveys for tricolored blackbird nest colonies, implementing a 300-foot no-disturbance buffer around active nest colonies, and acquiring an incidental take permit if avoidance is not feasible.

Response: As indicated on page 3-22 of the DEIR, no suitable nesting habitat for tricolored blackbird is currently present on or adjacent to the project site. Agricultural lands at the time the 2020 fields surveys were conducted supported pistachio and almond orchards, fallow fields, cotton, and alfalfa. In addition, the Project would not result in loss of nesting habitat. In response to CDFW recommendations, Mitigation Measure BIO-2b has been augmented to specify that the pre-construction survey for tricolored blackbird nest colonies will be conducted within 10 days before construction begins and minimum 300-foot no-disturbance buffers will be implemented around active nest colonies, in compliance with *Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015* (CDFW 2015). Because the recommended no-disturbance buffer would be implemented, an incidental take permit is not required.

CDFW-10: *The DEIR states that recurved larkspur and other special-status plant taxa were not observed during field surveys, but surveys were conducted very late in the blooming season and it is not clear if plants that may be present were identifiable. Measures to avoid special-status plants are not included in the DEIR. Without appropriate avoidance and minimization measures for special-status plants, potential significant impacts associated with subsequent construction include loss of habitat, loss or reduction of productivity, and direct mortality. Recommended mitigation measures include conducting focused surveys, implementing a 50-foot no-disturbance buffer, and acquiring an incidental take permit if avoidance is not feasible.*

Response: As described in Master Response #6 - Biology, habitat assessments for special-status plants were conducted by qualified biologists on and adjacent to the project site. Adjustments to the project footprint were made based on results of special-status species habitat assessments and focused surveys to provide a minimum 50-foot no-disturbance buffer between the project site and suitable habitat for special-status plants. Because the CDFW-recommended 50-foot no-disturbance buffer would be implemented, protocol-level surveys and an incidental take permit are not required.

CDFW-11: *The Project and surrounding area contain remnant undeveloped land but is otherwise intensively managed for agriculture; therefore, subsequent ground-disturbing activities associated with subsequent constructions have the potential to significantly impact local burrowing owl populations. In addition, and as described in CDFW's Staff Report on Burrowing Owl Mitigation (CDFG 2012), excluding and/or evicting burrowing owls from their burrows is considered a potentially significant impact under CEQA. Recommended mitigation measures include conducting a habitat assessment and focused surveys, avoiding occupied burrows, and replacing occupied burrows that are destroyed.*

Response: As recommended by CDFW and described in Master Response #6 – Biology, a burrowing owl habitat assessment of the project site and adjacent areas was conducted by qualified biologists. As described on page 3-21 of the DEIR, burrowing owls were observed adjacent to the northeast and southwest portions of the project site, and they have potential to occur elsewhere on and adjacent to the project site. Mitigation Measure BIO-2a requires measures consistent with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012) be implemented, as recommended by CDFW. This mitigation measure has

been augmented, based on CDFW recommendations, to include replacement of occupied burrows with artificial burrows at a ratio of one burrow collapsed to one artificial burrow constructed if passive relocation and destruction of occupied burrows is required.

CDFW-12: *Tulare grasshopper mouse, San Joaquin pocket mouse, San Joaquin coachwhip, western spadefoot, coast horned lizard, California glossy snake, Le Conte's thrasher, and American badger have been documented in the vicinity of the Project, which supports requisite habitat elements for these species. Recommended mitigation measures include conducting habitat assessments and focused surveys and implementing 50-foot no-disturbance buffers around mammal dens and burrows that can provide refuge for special-status wildlife.*

Response: As recommended by CDFW and described in Master Response #6 – Biology, habitat assessments for all special-status species that have been documented in the project vicinity were conducted by qualified biologists on and adjacent to the project site. San Joaquin pocket mouse is not addressed as a special-status species in the DEIR, because it is not designated by CDFW as a California species of special concern, is not fully protected by the CDFG and is not listed or proposed or a candidate for listing as threatened or endangered under federal or state endangered species acts. In addition, as indicated in Table 3-2 of the DEIR, no suitable habitat for western spadefoot or typical habitat for Le Conte's thrasher occurs on or adjacent to the project site. As described in Master Response #6 – Biology, the current project footprint provides the CDFW-recommended minimum 50-foot no-disturbance buffer around mammal dens and burrows.

CDFW-13: *The Project area is in the immediate vicinity of numerous waterways and riparian and wetland areas. Development within the Project has the potential to involve temporary and permanent impacts to these features. Recommended mitigation measures include stream and wetland mapping impact mitigation.*

Response: The proposed Project will cross several man-made features, such as the West Side Canal, East Side Canal, and unnamed canals, as discussed in the Biological Resources Section of the DEIR. The proposed Project does not have the potential to temporarily or permanently impact non-manmade waterways and wetland areas. Wetlands have been mapped (per the National Wetland Inventory) on the Tule Elk State Natural Reserve and undeveloped (i.e., annexed) lands in the northeast; however, the reserve is situated on the opposite bank of the East Side Canal where work will not occur and the proposed Project has been modified (i.e., pipeline rerouted) to avoid the wetlands on the northeast undeveloped lands. Consequently, stream and wetland mapping and stream and wetland habitat mitigation are not required.

CDFW-14: *The DEIR does not include an impact analysis or description for the ground disturbing and other activities related to the installation, maintenance, and removal of proposed exclusion fencing. CDFW recommends the DEIR include an adequate description and impact analysis of the proposed exclusion fencing, including details regarding its alignment, methods of installation and removal, and how the design would prevent special-status species from entering work areas.*

Response: As described in Master Response #6 – Biology, fencing would be installed a minimum of 50 feet from suitable habitat for special-status reptiles or mammals. Mitigation Measure BIO-1 has been augmented to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and

therefore will not impact suitable habitat for blunt-nosed leopard lizard, Tipton kangaroo rat, giant kangaroo rat, or other special-status reptiles and small mammals.

CDFW-15: *CDFW recommends consulting with USFWS regarding potential impacts to federally listed species.*

Response: As described in the DEIR, impacts associated with the Project would be temporary and do not include substantial modification or degradation of suitable habitat for federally listed species. Project implementation, including proposed mitigation measures, would not interfere with essential behavior patterns of federally listed species to the extent that injury or death could occur. USFWS would be consulted if unanticipated project-related circumstances develop that have potential for take of federally listed species.

CDFW-16: *Project activities have the potential to substantially change the bed, bank, and channel of lakes, streams, and associated wetlands onsite and/or substantially extract or divert the flow of any such feature that is subject to CDFW's regulatory authority pursuant Fish and Game Code section 1600 et seq.*

Response: The Recovery Project would neither substantially change the bed, bank, and channel of any lake stream, or associated wetland nor substantially extract or divert the flow of any such feature. The Recovery Project will cross several man-made features, such as the West Side Canal, East Side Canal, and unnamed canals, as discussed in the Biological Resources Section of the DEIR. First, these man-made features would not be substantially impacted because they would be restored to pre-project conditions and contours. Second, construction activities would only occur in the dry and flow would be restored postconstruction. Thirdly, these man-made conveyances are not subject to FGC section 1600 et seq.

CDFW-17: *Fish and Game Code sections that protect birds, their eggs and nests include sections 3503, 3503.5, and 3513. CDFW encourages Project implementation to occur during the bird non-nesting season; however, if Project activities must occur during the breeding season (i.e., February through mid-September), the Project applicant is responsible for ensuring that implementation of the Project does not result in violation of the Migratory Bird Treaty Act or relevant Fish and Game Codes as referenced above.*

Response: The District specifically acknowledges on page 3-30 of the DEIR that it is responsible for ensuring project implementation does not violate the MBTA or FGC.

8.5 Kern Water Bank Authority

Note: Attachments to the Kern Water Bank Authority Comment Letter are found in Appendix E.

KWBA – Introduction and Summary: *KWBA objects to certification of the EIR and the approval of the Project based on legal and factual errors identified in this letter and attachments.*

Response: The EIR is sufficiently detailed and accurate and forms the sound basis for decision making and public disclosure. A response to the summary section of the KWBA is not required as a complete response to each of the issues raised follows.

KWBA-1: *The description of the Project violates CEQA because it does not describe and evaluate the "whole of the action."*

Response: This comment wrongly assumes that the subject project includes construction, operation, and maintenance of recharge ponds and is based on the mistaken belief that the subject Project is part of a previously approved and implemented recharge project known as the "Palms Project." *See* Master Response # 9 – Clarification of Recovery Project Description.

This comment wrongly claims annexation of the eastern parcels in the Recovery Project Area is a component of this Project. This Project is not dependent on whether the eastern parcels of the Recovery Project area is annexed into the District. With or without such annexation, this Project can be constructed and operated. Projects are not legally required to be within the boundaries of the proposing public agency. Local Agency Formation Commission (LAFCo) has no discretionary authority over whether the Recovery Project is approved. The District is pursuing annexation of those lands for reasons unrelated to this Project and would seek such annexation into the District even if the Project is not implemented. While the District honestly revealed the intended use of the subject property, the annexation of these lands into the District has zero bearing on the Recovery Project. Accordingly, a Notice of Exemption was properly approved and filed for the annexation. The annexation is not part of the whole of the action because the annexation is not necessary for the approval of the Recovery Project, *see Simi Valley Recreation & Park Dist. v. Local Agency Formation Com.* (1975) 51 Cal.App.3d 648.

KWBA-2*: In the DEIR, the project description provides an uncertain and shifting description of the sources of banked water. The DEIR does not include detail on the sources of Project water sufficient to allow for a detailed analysis of the effects on the water sources.*

Response: The comment fails to identify any omissions and errors, significant or otherwise, and is not supported by substantial evidence. The project description in the DEIR includes all the information required by CEQA to comprise an adequate description of the project without supplying extensive detail beyond that needed for evaluation and review of the environmental impacts (*CEQA Guidelines* §15124). The sources of water that may be recovered in connection with the proposed Project are identified as the District's Pre-1914 Kern River Right and the State Water Project supply which is recharged into the basin *via* existing facilities [DEIR, Sec. 2.1] and whatever is recharged by the District under existing projects [DEIR Sec. 2.3]. The DEIR discusses in greater detail those sources of supply deemed reasonably foreseeable, namely the SWP water, and Kern River water in the Hydrology and Water Quality section of the DEIR [DEIR Sec. 3.4.1]. The Project does not propose to divert, or recharge water, and thus does not require a new water supply.

See Master Response # 9 – Clarification of Recovery Project Description clarifying that the Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures. Water is currently, and will in the future, be banked at the existing Palms Project, which went through its own environmental review (*see* IS / Mitigated Negative Declaration [SCH # 2015121030] and the Notice of Determination filed in January 2016). This is just one of the many existing water recharge facilities within the District [DEIR 2.6]. Accordingly, the project description in the DEIR includes all of the information necessary for the complete and adequate review under CEQA.

The DEIR acknowledges that other parties may participate in the Project through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers. However, the identity of

potential partners and the extent of their involvement is currently unknown and any analysis of such would be unduly speculative. Agreements would be made, as necessary, in advance of any water exchanges or transfers and if required, additional compliance with CEQA would be completed at the appropriate time. The project description includes all the information required by CEQA to comprise an adequate description of the project without supplying extensive detail beyond that needed for evaluation and review of the environmental impacts (CEQA Guidelines §15124). It is the intent of the DEIR to evaluate impacts associated with the recovery of previously banked water from all such sources to the extent that they are reasonably foreseeable.

KWBA-3*: The DEIR fails entirely to describe the groundwater mixing elements of the Project. The Project description must identify the location of any facilities at which water would be mixed, and the ultimate destination and uses of the mixed water, so that the effects of the Project are analyzed and mitigated.*

Response: Blending of groundwater from the new production wells would occur in piping and blending would be achieved through pipe turbulence. Also *see* Master Response #4 – Water Quality Impact Analysis.

KWBA-4: *The DEIR indicates that parties other than BVWSD may participate in the Project, but fails to identify who those parties would be, what the nature of their involvement would be, and whether the involvement of these third parties would alter Project operations or result in impacts resulting from such parties' use of banked supplies for growth or otherwise. The DEIR must identify, evaluate, and disclose any environmental impacts this might have, including disclosing the foreseeable use of Project water provided by the unidentified partners.*

Response: The DEIR acknowledges that other parties may participate in the Project through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers. However, the identity of potential partners and the extent of their involvement is currently unknown and any analysis of such would be unduly speculative. Agreements would be made, as necessary, in advance of any water exchanges or transfers and if required additional compliance with CEQA would be completed at the appropriate time. The project description includes all the information required by CEQA to comprise an adequate description of the project without supplying extensive detail beyond that needed for evaluation and review of the environmental impacts (*CEQA Guidelines* §15124). It is the intent of the DEIR to evaluate impacts of recovery of previously banked water from all such sources to the extent that they are reasonably foreseeable.

KWBA-5*: The Project description fails to describe the recovery capacity of the extraction wells that the Project would rely on.*

Response: The Project description provides a general description for the recovery wells that is appropriate to provide the necessary capacity for the proposed Project. The new and replacement wells will be designed accordingly within the Project description parameters to meet local conditions.

KWBA-6*: Neither the text nor Figure 2-2 identify the District boundary or the locations of the BVGSA, the WKWD Banking project or GSA, the Kern Water Bank, or the KGAGSA. All of these facilities/agencies are directly adjacent to the Project and significant stakeholders in the groundwater basin where that portion of the recovery project outside the District is located.*

Response: Figure 2-3 has been added to this FEIR to depict the District boundaries and boundaries of GSAs in the area. Figure 3-9 of the DEIR displays the location of banking operations, operated by others, in the area of the Recovery Project. *See* also Master Response #7 - Regional Groundwater Level Contour Mapping and Flow Analysis, which provides maps of the neighboring GSAs.

KWBA-7*: Historic canal seepage in the District is not part of a bona fide groundwater banking program that has not undergone public review under CEQA. This water cannot be included in the Palms Project bank account without CEQA analysis.*

Response: The District has been recharging water in its canal system during wet years for later recovery in dry years since the inception of the District in 1927, a practice initiated by the District's predecessor-in-interest. This is not a new component of the project. This existing activity pre-dates CEQA.

For purposes of this FEIR the District took the very conservative approach and did not include canal seepage. All of analysis of potential Recovery Project impacts on groundwater in the EIR was based on the assumption that the Recovery Project will only recover groundwater banked at the Palms Recharge ponds. None of the recharge from canal seepage was included in the estimated recovery.

KWBA-8: *The DEIR must be revised to properly identify the sources of the water for the Project (including water recharge that is subject to BVWSD Kern River water rights and any limitations thereon) in order to comply with CEQA.*

Response: The Recovery Project does not propose to divert water, deliver water, or recharge water. The project description includes all the information required by CEQA to comprise an adequate description of the project without supplying extensive detail beyond that needed for evaluation and review of the environmental impacts (CEQA Guidelines §15124). *See* Master Response # 9 – Clarification of Recovery Project Description, clarifying that the Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures.

KWBA-9: *The DEIR fails to disclose that Buena Vista lacks a water right for diversion of water to the Project. The DEIR asserts the right to divert "surplus water" from the Kern River. This claim is unsupported by water rights on the Kern River and California water rights law and is contrary to recent water rights orders of the State Water Resources Control Board.*

Response: The Recovery Project does not propose to divert, deliver or recharge water, and thus does not require a new water supply. *See* Master Response # 9 – Clarification of Recovery Project Description, clarifying that the Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures.

A discussion regarding the District's Pre-1914 Kern River rights, in excess of the description provided in the DEIR is not required by CEQA. The August 8, 2019, complaint filed by the KWBA is not only irrelevant to the Project but was also dismissed by the State Water Board on December 21, 2020. Accordingly, the project description in the DEIR includes all of the information necessary for the complete and adequate review under CEQA.

KWBA-10: *The DEIR fails to disclose, discuss, or evaluate Application A0316Y5 or the environmental effects of the increased Kern River diversions contemplated by that application.*

Response: The Recovery Project will not result in increased Kern River diversions. The Recovery Project does not propose to divert, deliver or recharge any water, and does not require a new water supply. *See* Master Response # 9 – Clarification of Recovery Project Description, clarifying that the Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures.

Applications before the State Board to appropriate excess Kern River water that would otherwise flow into the Intertie are not relevant to this project.

The Recovery Project only seeks to supplement District facilities to allow for the more efficient recovery of water recharged by existing District projects. The DEIR states that this Project will only recover water banked in the District; will be limited to 25,000 AF in any given year; will leave behind 10 percent of the water recharged; and will be managed so that groundwater elevations will, in the long term, improve from those observed historically [DEIR, 2-6].

KWBA-11: *The Palms Project as described in the DEIR fails to disclose critical data regarding both groundwater levels and quality, is poorly conceived, and may in fact be infeasible. The Project, by its very design, will result in both significant environmental impacts to water resources and lead to undesirable results as defined by the Sustainable Groundwater Management Act, Water Code section 10720 et seq. ("SGMA").*

Response: This comment fails to provide sufficient information to support the claim that the project will lead to undesirable results as defined by SGMA. The EIR sets forth that the Recovery Project will not recover more water than is recharged by the District and mitigation measures have been implemented to prevent undesirable results, *see* Master Response #5. Additionally, the EIR provides water quality data sufficient to satisfy CEQA, *see* Master Response #4. The Recovery Project is subject to SGMA and will comply with the applicable Groundwater Sustainability Plan.

Mitigation measures have been proposed to prevent undesirable results, as defined by SGMA. *See* Mitigation Measure CUM-1 in the EIR, and Master Response #5 – SGMA.

The District expects, over time, for groundwater quality to be consistent with recharge water quality. Since the surface water quality is of better quality than the groundwater quality, recharge with the surface water will, over time, result in improved groundwater quality in the Project area. Elevated constituents in the groundwater such as total dissolved solids are expected to drop in response to recharge in the area over time. Changes to the groundwater quality are beneficial to existing and potential users of the groundwater resource.

The water quality evaluation conducted for this DEIR meets the Standards of Adequacy of an EIR, as specified in the CEQA Guidelines Section 15151, "An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes into account of environmental consequences. An evaluation of environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of

what is reasonably feasible…" Further, the EIR meets the requirement to be based on Substantial Evidence, as defined in the CEQA Guidelines Section 15384, "Substantial evidence as used in these guidelines means enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached…". For further response, *see* Master Response # 3 – Water Quality Data and Master Response # 4 – Water Quality Impact Analysis.

KWBA-12: *With respect to groundwater levels and flow directions, the DEIR describes flow directions as generally in a southeasterly direction using data from a single map from January 2015. Abundant groundwater data for the area is available but is not disclosed in the DEIR.*

Response: In response to this comment, and other similar comments from others, the District undertook additional data gathering and analysis for a regional review of groundwater flow direction. The results are presented in Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis. The results of this analysis confirmed the information presented in the DEIR regarding general groundwater levels and flow directions across the district are consistent with data provided in the BVWSD GSA GSP issued in January 2020 and with data presented by other agencies in the area including Semitropic Monitoring Committee, KGA GSP and the KFMC.

KWBA-13: *The description of groundwater quality in the Project Area is misleading and does not disclose available information. Table 3-6 is a list of wells in each area and is captioned "Wells used in Water Quality Analysis." Ten wells are listed for the area west of the East Side Canal, however, the text then states that, due to limited data, only one well is used as a "representative well." In 2017, GEI conducted an evaluation of groundwater in the District "to provide California Environmental Quality Act (CEQA) compliance support services for the Palms Groundwater Bank- Recovery Phase (Project)." The information from this study was not disclosed or referenced in the DEIR, rather, the much more limited data from the "representative well" was provided.*

Response: *See* Master Response #3 – Water Quality Data.

KWBA-14: *The incorrect values for TDS and other constituents in the DEIR results in an incorrect blending evaluation later in the document and a DEIR that does not comply with CEQA standards as informational. The DEIR must be revised to disclose all available water level and quality data and provide a thorough evaluation of that data, so that the public and decisions makers can understand the potential impacts of the Project document.*

Response: In response to this comment, additional water quality data was collected, and the EIR revised. For details, please *see* Master Response #4 – Water Quality Impact Analysis.

KWBA-15: *A superposition groundwater model was used to evaluate groundwater level changes expected from the Project. However, there are several weaknesses in the application of this type of model for this Project.*

Response: *See* Master Response #1- Suitability and Validation of Superposition Model.

KWBA-16: *The groundwater modeling report incorporates the inaccurate southeasterly flow directions, instead of relying on the more robust data provided in the Negative Declaration for the Palms Project Recharge Phase, which indicates a westerly flow direction. The operational scenario used to evaluate groundwater level changes is also unrealistic. With respect to the modeling results, an exaggerated recharge volume overestimates the extent of the predicted groundwater mound, which then underestimates the extent of the ensuing drawdown during Project pumping.*

Response: Detailed information on groundwater flow directions is found in Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis.

With respect to the comment on groundwater mounding, the simulation of groundwater mounding and drawdown are both governed by Darcy's Law and the Conversation of Mass. Since we assume consistent aquifer properties in the area of the Recovery Project, the Superposition Model solves each phenomenon in the same manner. Therefore, the model cannot simultaneously overestimate mounding and underestimate drawdown. If the mounding is over-estimated, then the drawdown is also being comparably overestimated, and vice versa.

The effect that is described in the comment is due to the setup of the groundwater impact scenario that was intended to reflect a maximum-case, or worst-case, scenario. As part of this maximum-case, or worst-case, scenario, the groundwater recharge was applied only as the existing Palms Recharge Project rather than distributed over the various BVWSD recharge locations. This was considered a conservative assumption by concentrating the recharge in one location further from the BVWSD district boundary. Consideration of the groundwater mound is an essential part of evaluating the groundwater impacts of the Recovery Project. In this scenario, the full recharge occurs during 1 year at one location which results in high mounding. The Recovery Project recovers 90 percent of the recharge water by pumping over a larger area (14 well locations over 2 wellfields) over a period of 4 years. The setup of the recovery is part of the Recovery Project design to distribute drawdown over a larger area to minimize groundwater impacts.

KWBA-17: *The DEIR also lacks a survey of wells in the area. A thorough evaluation of the likelihood of impacts to adjacent well owners cannot be conducted without this information. The DEIR should correct the deficiencies in the model discussed above, complete a survey of wells in the area, and then conduct more realistic banking scenarios.*

Response: In the DEIR, a general analysis was performed to assess potential impacts to groundwater levels and water quality. The groundwater impacts assessment evaluated the impacts on groundwater levels of the Recovery Project in conjunction with the existing Palms Recharge Project. This analysis is considered to address potential impacts to private wells, including landowner wells both inside and outside of Buena Vista's service area. Should issues arise, they would be addressed by Mitigation Measure CUM-1 and management actions under the BVWSD GSA GSP.

See Master Response #1 – Suitability and Validation of Superposition Model for discussion of comments regarding the modeling used to support the groundwater impacts analysis.

KWBA-18: *The Project, by pumping groundwater outside the District without replenishment or replacement, will essentially be mining good quality groundwater in an effort to make the project feasible.*

Response: Half of the recovery wells proposed are within the District. The other half, while outside the District are located generally down gradient of the Palms to capture the recharged water, as described in Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis, the Recovery Project will recover groundwater recharged within the District, and does not "mine" groundwater without replenishment. As described in Master Response #8 – Beneficial Use of Recovered Groundwater, groundwater in the Palms area is of suitable quality for beneficial use. The EIR proposes mitigation measure CUM-1 to maintain groundwater levels above MTs. The existing Recharge Project as well as the proposed Recovery Project are all within the same hydrogeologic zone. Thus, the Recovery Project will not, as the commentors contend, create significant and unmitigated environmental impacts and create undesirable results in conflict with SGMA.

KWBA-19: *Because the Project will not replenish groundwater by recharging water on the lands outside the District where Project recovery will occur, it will result in a significant and unmitigated reduction in groundwater storage within the KGA GSA and West Kern Water District GSA ("WKGSA"). The Project would be inducing the migration of poor-quality groundwater within the District into an area of better-quality groundwater outside the District, another significant and unmitigated environmental impact and undesirable result under SGMA regulations.*

Response: Under the existing Recharge Project, groundwater recharge occurs along the southeastern boundary of the district and recharges the same Kern County Subbasin utilized by the BVGSA, KGAGSA and WKGSA. The Recovery Project recovers 90 percent of the recharge volume, therefore, there is a net benefit to groundwater storage in the Kern County Subbasin. The results of both the Superposition Model and the C2VSimFG-Kern Project scenarios illustrate that groundwater levels will rise during operation of the Palms Recharge Project over a large area that includes adjacent areas of the KGAGSA and WKGSA. Half of the recovery wells proposed are within the District while the other half are outside the District but down gradient of the Palms to capture the recharged water, as described in Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis. The Recovery Project will only recover groundwater recharged.

With respect to migration of poor-quality groundwater, groundwater quality in the vicinity of the proposed Project has long been used for beneficial use for agriculture use, domestic water use and municipal water supply at Buttonwillow. The water quality data in the DEIR demonstrate that water quality differs with respect to concentrations of individual constituents but that both areas meet existing water quality for beneficial use within the local area. Furthermore, even if there were groundwater quality concerns about migration of poor-quality groundwater from the west, the implementation of the Recovery Project would intercept groundwater flow from the west from reaching KGAGSA and WKGSA.

The grouping of recovery wells presented in the DEIR is purposeful.

Seven of the proposed 14 recovery wells lie within the footprint of the Palms Recharge Project. Although this is the area where recovery activity is expected to begin, clustering all of the project's recovery capacity within this footprint would create a localized cone of depression that would jeopardize the efficiency and flexibility of the recovery program, risk violation of MTs established by the BVGSA and adjacent GSAs and have the potential to impact other well owners in the area.

The second group of seven recovery wells is located to the northeast of the recharge facilities. Locating half of the recovery wells in this area achieves the spacing between wells needed to allow efficient operation of the recovery project and to minimize impacts to other well owners within the project area and in neighboring areas. Further, the wells outside of the recharge area are situated to capture the subsurface flow running from the recharge area (Palms Project area) to the east.

In addition to providing the recovery project an acceptable level of spacing between recovery wells, analyses of water quality indicate that groundwater recovered outside the recharge area will be of different quality than groundwater recovered from within the recharge area footprint. While water recovered from the recharge area has a history of being applied for beneficial uses, this difference in water quality introduces the possibility that water recovered from the recharge area that does not meet the standards required for pump-in to the California Aqueduct could be blended with water from the northeastern area to satisfy those standards.

The cumulative effects scenarios modeled for the DEIR for RMW-089 WKWD, RMW-058 RRWSD, RMW-059-RRWSD are presented for the following four scenarios:

- SGMA Baseline Scenario: represents projected water levels for existing banking and recovery operations
- SGMA Baseline - Projects Scenario: represents projected water levels for existing banking and recovery operations plus projects proposed for implementation by GSAs under SGMA
- Palms 90-percent Recovery Scenario: combines SGMA Baseline – Projects Scenario with operation of the Recovery Project constrained to recover 90% of recharged water
- Palms Deferred Recovery Scenario: represents SGMA Baseline – Projects Scenario plus operation of the Recovery Project with timing of recovery deferred to alleviate exceedance of MTs.

Figures 4-2 through 5-2 of the DEIR Modeling Report are hydrographs that show the degree to which the projects introduced by each of the latter three scenarios improve upon the SGMA Baseline Scenario. The hydrographs display instances where groundwater elevations drop below MTs and also display how adjustments in operations such as the Palms Deferred Recovery scenario can be introduced to minimize such breaches. The most important point illustrated in the hydrographs is the similarity in water levels modeled for the SGMA Baseline and the two Palms scenarios, similarities that indicate the impacts resulting from operation of projects in the Kern Fan can be anticipated and minimized or mitigated as conditions require.

The operations of the existing recharge and recovery facilities of the KWBA and of the WKWD are included in the modeling each of the four scenarios including the SGMA Baseline Scenario. Therefore, their contributions to groundwater levels at each of the locations included in the cumulative impact analysis influence each of the hydrographs.

As the groundwater modeling performed for the DEIR demonstrates, Kern River water recharged by Palms Groundwater Recharge Project will migrate beyond the footprint of the recharge facilities and boundaries of the BVGSA. Due to the high quality of the Kern River water recharged at the Palms, the contention that pumping by the Recovery Project would induce migration of poor-quality groundwater

into areas having better-quality groundwater overlooks one of the Project's objectives, which is that continued operation of the recharge facilities will progressively improve the quality of groundwater migrating from the recharge area to the benefit of all users.

KWBA-20: *The potential for impacts resulting from the discharge of Project water into the California Aqueduct are described under Impact HYDRO-2, which states: "The Recovery Project could have impacts to the water quality of the Aqueduct, if drinking water standards are not met." This statement is misleading and incorrect. The standard for discharges to the Aqueduct include degradation standards. That is, discharges to the Aqueduct must not degrade the existing quality of water in the Aqueduct if unmitigated.*

Response: *See* Master Response #4 – Water Quality Impact Analysis. The sentence "The Recovery Project could have impacts to the water quality of the Aqueduct, if drinking water standards are not met" has been revised for clarity in the DEIR.

KWBA-21: *Because Project water exceeded the upstream values in the Aqueduct (incorrectly) reported in the DEIR, the five mitigation measures were proposed, however, only one mitigation measure (HYDRO-2) has the potential to improve the quality of recovered Project water, but lacks performance standards. In addition, Project operations will alter groundwater conditions through time. As such, Project monitoring must not be discontinued.*

Response: *See* Master Response #4 – Water Quality Impact Analysis. The District concurs that groundwater monitoring is a key facet of all groundwater banking programs in Kern County. Groundwater monitoring protocols for the District are specified in the BVGSA's BVGSP (Section 4.4.3.6 Monitoring Protocols, 2020). The District has no intention of discontinuing groundwater monitoring and has revised the DEIR to clarify the District has operated, and will continue to operate, a groundwater monitoring program.

KWBA-22: *There are several problems related to the analysis completed for this environmental impact. First, the blending calculations used the quality data from a single "representative well," which does not reflect the significantly worse quality conditions in the area. Second, the analysis assumes drinking water standards rather than more restrictive degradation standards apply. Third, Project water is compared to incorrect values for upstream Aqueduct quality. These compounding errors must be corrected and the analysis for this impact re-evaluated, taking into consideration relevant and representative quantitative data, to determine if the Project is even feasible, in addition to being necessary to adequately evaluate the Project's environmental effects, and to identify specific and enforceable mitigation measures that comply with CEQA standards.*

Response: *See* Master Responses #3 and #4 – Water Quality Data and Water Quality Impact Analysis.

KWBA-23: *Recharging very good quality water from the Kern River and SWP may actually be a waste and unreasonable use under California water law in violation of Article X, Section 2 of the California Constitution, and SGMA. It should also be noted that groundwater pumping in the Palms Recharge Basin area could also induce the migration of extremely poor-quality western water to the east, another significant environmental impact not evaluated in the DEIR.*

Response: Comments regarding the impacts of recharging water are not relevant to the Recovery Project. The Recovery Project only seeks to construct and operate recovery facilities to supplement the District's existing recovery of previously banked water. *See* Master Response # 9 – Clarification of Recovery Project Description.

However, BVWSD has been conducting managed groundwater recharge in the vicinity of the proposed Project for many decades from unlined canals using primarily Kern River water and the KWB has been in operation since 1995. Groundwater quality in BVWSD remains highly suitable for beneficial use for agriculture, domestic water supply and municipal water supply by the Community of Buttonwillow, uses which it has served for many years. The long history of recharge in BVWSD clearly demonstrates that recharging Kern River water in this area has not resulted in waste and unreasonable use under California water law. *See* Master Response #8 – Beneficial Use of Recovered Groundwater

The water quality analysis shows no indication of migration of the high salinity water from the far western reaches of the Kern County Subbasin. Since the Recovery Project recovers 90 percent of the recharge water over a period of 4 years, the recovery pumping is in volumetric water balance with the existing recharge operations.

KWBA-24: *The Palms Project recovery wells located outside the District have not been reviewed or approved by the KGAGSA as required in the Memorandum of Understanding Regarding Operation and Monitoring of the Buena Vista Water Storage District Groundwater Banking Program (MOU). The MOU also prescribes minimum operating criteria, mitigation measures, and project monitoring requirements. However, none of these requirements have been described in the DEIR or evaluated for their effectiveness in eliminating significant impacts or consistency with the Project.*

Response: As noted, the MOU Regarding Operation and Monitoring of the BVWSD Groundwater Banking Program states that: "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." The Recovery Project area is not within the jurisdiction of any signatory to the MOU. The eastern portion of the Recovery Project area are "whitelands" and do not have any contract with a member of the KGA for coverage by the KGA GSP. The KGA does not have discretionary approval over the Recovery Project, *see* Master Response #2, GSA Jurisdiction.

The minimum operating criteria described in the MOU were considered in the DEIR. To more clearly demonstrate this, the language of the DEIR has been revised to affirm Buena Vista's intent to comply with the provisions of the MOU and to clarify the correspondence between language of the DEIR and provision of the MOU as follows:

1. One of the purposes of installing recovery facilities both within the footprint of the Palms Groundwater Recharge Project and in a location within the BVGSA to the northeast of the recharge facilities is to spread out recovery facilities for the reasons suggested by this comment.
2. The spacing of recovery wells is intended to provide a buffer between these wells and neighboring groundwater users as suggested in the comment.

3. The project recovery rate and the location of wells that will be operated at any given time will be adjusted in response to groundwater levels and other conditions and to conform with operational constraints such as those described in this comment. One of the reasons for the number and location of wells presented in the DEIR is to provide the operational flexibility needed to enable recovery to take place under a broad range of operating conditions. As noted in the cumulative impact analysis and other sections of the DEIR, the project will be operated to satisfy leave-behind requirements and deferred recovery has been assessed as a mechanism to minimize impacts.
4. A purpose of the number, location and spacing of recovery wells presented in the DEIR is to allow rotation among recovery wells and to enable recovery to be distributed within the Project area as conditions dictate.
5. The superposition model was run with the grouping of wells presented in the DEIR to confirm that the spacing among the wells was sufficient to minimize interference under a range of operating scenarios.
6. As the DEIR's analysis of a deferred recovery scenario indicates, BVWSD is aware that the recovery program will need to be managed flexibly to respond to groundwater conditions and to avoid impacts to other water users determined to have resulted from recovery operations at the Palms.
7. The superposition modeling used to analyze the relative impacts of the recovery operations assumes a 1-year lag between recharge cycles and the beginning of subsequent recovery activities. In addition, the Palms Recharge Project has been used to recharge Kern River water in 2017 and 2019 without any of the recharged water having been recovered. Given these two periods of recharge, and the possibility of other recharge events occurring prior to completion of recovery facilities, groundwater will be available for recovery upon completion of these facilities. Thus, the 1-year allowance made in project planning to provide time for recharged surface water to reach underlying aquifers has already been exceeded.

The water users in the Kern County Subbasin will benefit from high quality of water recharged at the Palms.

1. The Palms Recharge Project is designed with the principal source of water for storage being the Kern River, a high quality source of surface water.
2. Because the salt load introduced by recharge of Kern River water is lower than that of groundwater recovered at any location in the Kern Fan, the Recovery Project will remove more salts than are being stored. As noted in the IS/MND for the Recharge Project, the concentration of salts introduced by the Recharge Project to the underlying aquifer is considerably lower than that introduced by the previous land use, irrigated agriculture.
3. Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis provides additional analysis of groundwater flow directions and additional impacts analyses showing the simulated drawdown of the Recovery Project in context with regional groundwater flow. Drawdown resulting from the full operation of the Palms recovery wells extends over the southern areas of BVWSD and some adjacent areas. The areas of the major drawdown and the designated wellfield sources areas do not extend to areas of poor water quality in the northern areas of BVWSD. This drawdown does not significantly change the groundwater gradient north of 7th

Standard Road; therefore, the operation of the Recovery Project wells would not change to the regional groundwater gradient that would affect the movement and distribution of poor-quality groundwater observed in the northern areas of BVWSD.

4. As described in the DEIR, the purpose of the blending options made possible by the distribution of recovery sites over the project area is to enable water recovered at various locations to be blended to meet the water quality requirements of downstream users. Recovery of high-quality water will be targeted to users having stringent water quality standards.

KWBA-25: *The KWBA, Pioneer and Rosedale water banking projects on the Kern Fan in the Project vicinity have also developed an Operating Plan that provides mitigation measures for impacts to landowner wells. None of these requirements have been described in the DEIR or evaluated for impact mitigation or consistency with the Project.*

Response: The District held meetings with the JOC to discuss the project, to share modeling results and to request data from JOC members to improve Buena Vista's modeling of the impact of operation of the Project on JOC members. The District has also made clear the need to coordinate with the JOC and has expressed an interest in becoming a member of the JOC.

The DEIR has been revised to note the mitigation measures included in the BVGSA's GSP which address many of the conditions covered by the mitigation measures developed by the JOC.

As discussed with JOC members, Buena Vista would welcome the opportunity to explore membership in the JOC and adoption of a shared approach to modeling. As noted in clarifications made to the project description in the EIR, the District will follow the monitoring standards and the mitigation measures established in the BVGSA. In the event the District joins the JOC, then those monitoring standards would be controlling for the Palms Project.

KWBA-26: *The DEIR here fails to describe the environmental baseline for each of the resource categories it addresses. In some cases, this failure includes omission of any description of the relevant physical conditions at the time of the filing of the Notice of Preparation for the DEIR on June 16, 2020.*

Response: The DEIR describes the conditions on site at the time of the Notice of Preparation. This description was based upon on-site evaluations of habitat conditions, as described in Section 3.2.1. Hydrologic conditions were evaluated based on extensive data and two types of groundwater models, as described in Section 3.4.1.

KWBA-27: *The biological resources section fails to include any surveys that are at a sufficient level of detail to determine the actual presence or absence of threatened, endangered and other special status species in the Project vicinity. In the absence of adequate and complete biological surveys, the DEIR is unable to describe adequately actual conditions, or evaluate effects on biological resources.*

Response: As described in Master Response #6 - Biology, field-based habitat assessments and focused surveys were conducted for special-status species. These surveys, in combination with consideration of cover types in the Biological Study Area and species occurrence information obtained from resource databases and inventories, inform the existing conditions in the project area. The primary purpose of the field surveys was to evaluate potential for special-status species to occur on or adjacent to the project site,

based on habitat conditions and physical evidence of potential species presence. Survey methods are summarized in Master Response #6 – Biology and were adequate to identify species and habitats that could be affected by the proposed project and species for which there is no suitable habitat and no potential for adverse effects. It is not necessary to confirm species presence in order to adequately address potential effects under CEQA, and it is appropriate to assume absence of species for which no suitable habitat occurs on or adjacent to the project site or for which surveys were adequate to determine absence, such as San Joaquin antelope squirrel. No species were assumed to be absent from the project area based solely on lack of known occurrences in the project area.

KWBA-28: *The DEIR must discuss not only the BVGSA, but at a minimum must also discuss the KGAGSA, its current status and properly analyze any impacts the Project may have on achievement of SGMA standards within the KGAGSA.*

Response: The DEIR states that the BVGSA is bordered by the Kern River GSA and the KGA GSA [DEIR, 3-53]. The DEIR describes the regulatory framework of SGMA [DEIR, 3-63 – 3-64]. The groundwater model used to analyze potential impacts to the groundwater basin was not restricted by the jurisdiction of the BVGSA or any other GSA. Rather, all potential impacts resulting from the Project were analyzed [DEIR, 3-68 – 3-83]. The DEIR concluded that the Project, as proposed, would create a less-than-significant impact [DEIR, 3-84]. This conclusion is not limited to the BVGSA boundaries, but also includes the identified GSAs in the area surrounding the Project location. As SGMA requires coordination between the GSA's to achieve basin wide sustainability, this is appropriate.

See also Master Response #2 – GSA Jurisdiction & Master Response #5 – SGMA.

KWBA-29: The DEIR also fails to describe why it is reasonable for groundwater quality to limit the baseline to conditions between Stockdale Highway on the north, BVWSD southern boundary on the south, Dunford Road on the west, and Mo*rris Road on the east.*

Response: The area used for the groundwater quality evaluation are consistent with the source areas defined for the Recovery Project wells as described in Master Response #7 – Regional Groundwater Level Contour Mapping and Flow Analysis. The source areas illustrate the general areas of the aquifer where groundwater pumped by the Palms recovery wells is derived. Therefore, the data within this area provides a representative data set for the water quality analysis.

KWBA-30: *The baseline for the evaluation of impacts on hydrology and water quality should include the identification of all landowner wells within the potential area of hydrologic influence of the Project. Without identifying landowner wells, the DEIR is not able to evaluate adequately the potential impacts of the Project on domestic and agricultural water supplies.*

Response: The water quality analysis indicates that the water quality in the proposed Project area is currently suitable or all beneficial use for agriculture use, domestic water use and municipal water supply. The water quality analysis in Section 3.4 of the DEIR identifies only total dissolved solids, conductivity and sulfate as exceeding secondary MCLs. This general analysis did not find major water quality issues with the continued beneficial use of groundwater for landowner wells in the area. *See* Master Response #8 – Beneficial Use of Recovered Groundwater.

KWBA-31: *In regard to the No Project Impact analysis, the assumption of continuation of current surface water availability over the next 50 years is unreasonable and misleading*.

Response: As noted in the BVWSD GSA GSP, the district has a long-standing water rights to the Kern River water based on the historic Miller-Haggin Agreement of July 1888. This agreement, as amended, continues to serve as the basis by which the flow of the Kern River is allocated among "First and Second Point" interests. BVWSD has an average entitlement of 156,000 AF/yr delivered by First Point interests to the Second Point of Measurement, undiminished by delivery losses. Buena Vista's entitlement is 96.044 percent of this flow or 149,828 AF/yr.

However, as described in Master Response # 9 – Clarification of Recovery Project Description, the Recovery Project does not propose to recharge any water. The Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures.

KWBA-32: *The DEIR is required to describe a realistic no project baseline that takes into consideration project impacts on climate change and other limitations on surface water supplies projected to occur over the life of the Project.*

Response: As described in Master Response # 9 – Clarification of Recovery Project Description, the Recovery Project does not propose to recharge any water. The Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures. Therefore, a discussion of climate change and other limitations on surface water supplies is not an appropriate analysis for the Recovery Project. The Recovery Project is limited to recovering 90 percent of water recharged at the Palms Recharge Project. If future water supplies are reduced, the amount of recovery will be reduced proportionally.

KWBA-33: *The DEIR includes a no project alternative, which appears to include water banking without a method for recovery in perpetuity, the preferred alternative, and a single variation on the pumping amounts contemplated by the preferred alternative (the so-called Reduced Recovery Alternative). No other alternatives were carried forward for detailed study in the DEIR. The DEIR asserts that this is because other alternatives that were considered but rejected would either have greater significant impacts on the environment or because they were found to be infeasible.*

Response: Section 5.6 of the DEIR meets the requirements of CEQA because it describes the alternatives considered and the reasons they were rejected in sufficient detail to enable meaningful participation and criticism by the public. The two alternatives carried forward for detailed evaluation (Section 5.7 of the DEIR) were evaluated in considerable detail. The Reduced Recovery Alternative was specifically developed to reduce potential impacts to groundwater resources. The modeling analysis of that alternative demonstrated it was effective at reducing potential impacts and was thus selected by the District as the environmentally preferred alternative. The District intends to propose adoption of this alternative.

KWBA-34: *The DElR does not justify adequately its decision to summarily dismiss the Landowner Recovery Alternative or the Palms Area-Only Alternative, and the DEIR therefore fails to evaluate a reasonable range of alternatives. For the Palms Area-Only Layout, the DEIR concludes without adequate*

analysis on the grounds that the groundwater-quality would not be sufficient for blending and then transportation through the Aqueduct.

Response: As stated in §15126.6(a) of the CEQA Guidelines, "The EIR must describe a reasonable range of alternatives to the project that would, …feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."

As explained in Section 5.6.1 of the DEIR, the landowner delivery option would provide growers direct access for recovery of banked groundwater, this water would serve only a single beneficial use therefore limiting the Recovery Project from attaining of its stated objective of improving conveyance of previously stored water throughout the District and to neighboring districts. Therefore, this alternative was not evaluated in detail because it cannot feasibly attain most of the Recovery Project's objectives.

KWBA-35: *Because this objective may be achieved without sending water to southern California, the DEIR is required to evaluate an alternative that restricts use of Project water to landowners within the District - avoiding the need to mix water to meet Aqueduct water quality standards.*

Response: As described in Section 2.2 of the DEIR, the Recovery Project has the following primary objectives (emphasis added):

- Increase conjunctive management on the west side of the County by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies.
- Improve conveyance of previously stored water throughout the District and to neighboring districts.
- Install recovery facilities to attract new banking partners in order to increase groundwater in the Kern Subbasin for District use
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the Aqueduct.

The District's stated objectives will not be met by limiting the use of recovered water to service areas that can be reached without transfer of water in the Aqueduct. The KWBA may prefer the District modify their objectives, but they may not dictate to the District what their project objectives may be.

KWBA-36: *The DEIR does not evaluate an alternative that includes recharge on the off-District lands. Such an alternative may reduce the many environmental impacts the project currently causes.*

Response: Recharging water is not a component of the Project, *see* Master Response # 9 – Clarification of Recovery Project Description. The off-District lands are not proposed for recharge because those lands are not suitable for groundwater recharge. This is similar to the strategy employed by the WKWD, as well as KWBA members.

KWBA-37: *The DEIR does not evaluate any alternative to the operation of the recharge ponds.*

Response: The purpose of the DEIR is to analyze the impacts of the construction and operation of the Palms Groundwater Recovery Project. The operation of the recharge ponds is a project of independent utility which has been in operation since 2017, *see* Master Response # 9 – Clarification of Recovery Project Description.

KWBA-38: *The DEIR should be revised to include a water banking operation including the enforceable commitments to the protection of the biological resources included in the Kern Water Bank Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP).*

Response: The proposed Project is not required to be operated in the same manner as the KWB and associated HCP/NCCP. The Project does not have biological resource objectives and is not required to do so. Project operations would not result in significant impacts on special-status species and the Project does not require authorization for take of state or federally listed species or establishment of conservation easements.

KWBA-39: *The highly engineered recharge ponds shown in the DEIR create the risk of creating a biological sink by attracting migratory birds and other species, but without food, cover, buffers, and other elements necessary to conserve these populations. The DEIR is devoid of any analysis of this risk.*

Response: As described in Master Response # 9 – Clarification of Recovery Project Description, the Recovery Project does not propose to recharge any water. The Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures. Therefore, environmental review of potential impacts of recharge is not part of the EIR for the Recovery Project.

Environmental review for the Palms Project was completed in 2016 (Palms Project IS / Mitigated Negative Declaration (SCH # 2015121030)). No issues were raised during that environmental review regarding risks of creating a biological sink, probably because the assertion that recharge ponds would act as a sink for migratory birds and other species is highly speculative. The recharge areas are not highly engineered, devoid of vegetation, or managed to eliminate vegetation; they are a mosaic of aquatic and vegetated upland habitat that provides food and cover for a variety of wildlife species. It is extremely unlikely that attraction of migratory birds and other species to the recharge areas would meet the level of significance under CEQA by causing a wildlife population to drop below self-sustaining levels, threatening to eliminate an animal community, or substantially reducing the number of an endangered, rare, or threatened species.

KWBA-40: *With respect to air quality and greenhouse gases (GHG) specifically, the DEIR does not include any real analysis of the Project's potential impacts during operation. For example, the DEIR does not specify the type of recovery pump that would he used nor does it specify that the recovery pumps would be monitored for their efficiency and level of GHG emissions.*

Response: Assuming recovery of no more than 25,000 AFY with 14 recovery wells that would be pumped at a rate of no more than 5 cubic feet per second, the District would run the recovery wells a maximum of 60,500 hours per year. As stated in this FEIR (Chapter 3.1.4), the recovery wells would be equipped with new, energy-efficient pumps up to 250 horsepower. The recovery wells would be connected to existing PG&E electrical powerlines and maintained pursuant to the District's standard operating procedures. Operating the recovery wells would not result in GHG emissions.

The Air Quality analysis regarding potential impacts from construction activities associated with the Recovery Project was updated using the S.J.V.A.P.C.D. Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI). The S.J.V.A.P.C.D.'s SPAL for Ambient Air Quality Analysis – Combustion Exhaust Emissions was used to determine if construction of the Recovery Project would exceed the construction significance threshold for criteria pollutants. This additional analysis confirmed the conclusion of the DEIR. Please *see* Chapter 3.1.3, "Air Quality" in this FEIR for the updated analysis regarding construction-related air quality impacts.

KWBA-41: *With respect to energy, the DEIR fails to substantially consider the Project's potential impacts. This impact should be discussed in sufficient detail for the public and decision makers to understand why the Project's energy use would be less than significant.*

Response: The District's mission, in part, is to convey and deliver water supplies and beneficially manage groundwater resources. As stated in the DEIR, the purpose of the Recovery Project is to manage the District's water supply in a manner that ensures full production of permanent crops regardless of the current years water supply. With regards to energy resources, the Recovery Project is not wasteful, inefficient, or unnecessary because it helps fulfill the District's mission. Moreover, the Recovery Project would not conflict with a local plan for renewable energy or energy efficiency because one has not been adopted by Kern County. These are the only two energy-related questions in the CEQA checklist.

KWBA-42: *The DEIR does not analyze potential air quality impacts associated with the projected indirect effect of conversions from row crops to tree crops. The DEIR also does not analyze the potential water supply impacts of increasing demand associated with changes in crop patterns that could be attributable to the Project.*

Response: The DEIR does acknowledge that the "conversion to permanent crops may increase the water demand by 1 AF per acre." The DEIR, however, also goes on to state, "In the short term, this conversion typically reduces demand, as a pistachio tree will not reach full demand for water until about the 12th year, with the 1st year being as low as 0.25 AF per acre. The Recovery Project will allow for the highs and lows of the District's water supply to be managed in a manner that ensures full production of permanent crops regardless of the current years water supply." The Recovery Project is about managing existing (not expanding) water supply. Moreover, a landowner's decision to convert row crops to tree crops is independent of the Recovery Project (*see* response to KWBA-44 for additional information). Therefore, analyzing the potential air quality impacts associated with the indirect effect of conversions from row crops to tree crops is outside the scope of CEQA.

The Air Quality analysis regarding potential impacts from construction activities associated with the Recovery Project was updated using the S.J.V.A.P.C.D. GAMAQI. The S.J.V.A.P.C.D.'s SPAL for Ambient Air Quality Analysis – Combustion Exhaust Emissions was used to determine if construction of the Recovery Project would exceed the construction significance threshold for criteria pollutants. This additional analysis confirmed the conclusion of the DEIR. Please *see* Chapter 3.1.3, "Air Quality" in this FEIR for the updated analysis regarding construction related air quality impacts.

KWBA-43: *The DEIR's section on cumulative impacts and growth inducing impacts does not at all acknowledge that the presence of a more reliable or greater water supply might cause alterations to the patterns of agricultural uses in the area.*

Response: As mentioned in the preceding responses, a landowner's decision to convert row crops to tree crops is independent of the Recovery Project which is about managing existing (not expanding) water supply. The Initial Study did analyze the CEQA checklist questions pertaining to agriculture, including (2-a) conversion of Prime or Unique Farmland or Farmland of Statewide Importance to non-agricultural use, (2-b) conflict with existing zoning for agricultural use or Williamson Act contract, and (2-e) involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use. For agricultural resources, the CEQA checklist requires an analysis of conversion from an agricultural use to a non-agricultural; conversely, the CEQA checklist for agricultural resources does not require an analysis of conversion from one agricultural use to another agricultural use. Based on the analysis in the Initial Study, the Recovery Project would have no impact on agricultural resources.

KWBA-44: *The Notice of Preparation for the DEIR indicates that "[t]he EIR will also explain why other effects were determined to not be potentially significant and were not discussed in detail in the EIR. The only discussion of the basis for these conclusions is set forth in the Initial Study that was circulated along with the District's Notice of Preparation. This provides only cursory explanations as to why the increase in reliability and stability of the agricultural water supply would not alter agricultural use patterns in the vicinity of the Project.*

Response: The District determined that additional information was not warranted in the DEIR for potential impacts to air quality, agriculture and forestry resources, geology, hazards and hazardous materials, population and housing, mineral resources, and wildfire. According to CEQA checklist, the Initial Study sufficiently analyzed these resource areas.

The District agrees with the conclusion on page 4-8 of the Monterey Plus Final Revised EIR which provides, "…numerous factors are causing the increase in permanent crops in Kern County and the shift is not due to KWB activities." As succinctly detailed in the Monterey Plus Final Revised EIR (pages 4-1 – 4-8), the factors include world commodity price increases, state policy to increase agricultural irrigation efficiency, and reliance on groundwater pumping. For these same reasons, the increase in permanent crops in Kern County is a regional trend and is unrelated to District activities.

KWBA-45: *The DEIR includes no material evaluation of the Project's impacts on the blunt-nosed leopard lizard or the white-tailed kite. Nor does the DEIR include analysis of the feasibility of avoiding take of the lizard or kite. Instead, the DEIR defers the evaluation of impacts to the blunt-nosed leopard lizard to pre-construction surveys.*

Response: The DEIR evaluates potential Project impacts on blunt-nosed leopard lizard on page 3-31 and does not defer analysis of effects on this species. As stated in the DEIR and discussed in Master Response #6 – Biology, no suitable habitat for blunt-nosed leopard lizard occurs within 50 feet of the project footprint. Despite this lack of suitable habitat in the immediate vicinity, the DEIR acknowledges that potential for blunt-nosed leopard lizard to wander into the project footprint cannot be completely discounted and discloses that such individuals would be vulnerable to injury or death. Mitigation Measure BIO-1 has been augmented in the FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and therefore will not impact suitable habitat for blunt-nosed leopard lizard. Implementing Mitigation Measure BIO-1 is a feasible means of avoiding take of this fully protected species.

The DEIR evaluates potential Project impacts on white-tailed kite on pages 3-32 and 3-33 and does not defer analysis of effects on this species. The DEIR describes the means by which Project activities could result in take (nest abandonment, reduced care of eggs or young, or premature fledging), if active nests occur near project activities. Implementing Mitigation Measure BIO-2b would avoid take by conducting pre-construction surveys and implementing buffers adequate to avoid take, as confirmed by monitoring by a qualified biologist. This is a feasible means of avoiding take of this fully protected species.

KWBA-46: *The DEIR concludes that there will be no waters of the U.S. impacted, but does not document the basis for this conclusion. The DEIR does not include a delineation of potential waters of the U.S. prepared in accordance in federal standards and procedures.*

Response: Various sources, including the National Wetland Inventory and Google Earth imagery have been reviewed and confirmed during the biological reconnaissance-level survey. The Recovery Project will cross several man-made features, such as the West Side Canal, East Side Canal, and unnamed canals, as discussed in the Biological Resources Section of the DEIR. Wetlands have been mapped on the Tule Elk State Natural Reserve and undeveloped (i.e., annexed) lands in the northeast; however, the reserve is situated on the opposite bank of the East Side Canal where work will not occur and the Recovery Project has been modified (i.e., pipeline rerouted) to avoid the wetlands on the northeast undeveloped lands. Consequently, completion of a wetland delineation to federal standards is not warranted.

KWBA-47: *The mitigation measure specific to blunt-nosed leopard lizard indicates that temporary exclusion fencing would be placed at the direction of a qualified biologist, but does not indicate that a pre-construction survey would be conducted to verify that no blunt-nosed leopard lizard are within the project area that would not be fenced off by the exclusion fencing. Additionally, the DEIR should be revised to include the results of protocol-level surveys of this species.*

Response: CDFW comments on the NOP recommended a habitat assessment be conducted to determine if the Project site or immediate vicinity contain suitable habitat for blunt-nosed leopard lizard. As described in Master Response #6 – Biology and on page 5-5 or the DEIR, the project footprint was adjusted based on results of this assessment to provide a minimum 50-foot no-disturbance buffer between the project site and suitable habitat for blunt-nosed leopard lizard. Therefore, the CDFW recommendation to conduct focused surveys in suitable habitat on or in the immediate vicinity of the project site is not relevant. In addition, CDFW recommends surveys be implemented as a mitigation measure, not before the EIR is certified, as suggested by KWBA. Because impacts on this species and its habitat would be avoided, protocol-level surveys and additional take avoidance measures are not required. Mitigation Measure BIO-1 has been augmented in the FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and to provide additional information on measures that would be implemented to avoid impacts on blunt-nosed leopard lizard during fence installation and removal.

KWBA-48: *As there is no method for permitting incidental take of white-tailed kite under California law, the DEIR should provide a more detailed description as to why this non-specific mitigation measure is sufficient to avoid take of the kite.*

Response: As indicated in the response to KWBA-45, implementing Mitigation Measure BIO-2b would avoid take by conducting pre-construction surveys and implementing buffers adequate to avoid take, as

confirmed by monitoring by a qualified biologist. This is a feasible means of avoiding take of this fully protected species.

KWBA-49: *The DEIR fails to include mitigation measures to avoid or mitigate the potential impacts of the Project on the San Joaquin antelope squirrel. These failures are compounded by the fact that the DEIR does not include data from any detailed biological surveys, nor does the DEIR include any data from the "reconnaissance" level surveys. The DEIR fails to properly identify, assess, and disclose the Project's potential impacts on the San Joaquin antelope squirrel.*

Response: Table 3-2 of the DEIR indicates that no San Joaquin antelope squirrels were observed during focused surveys. As described in Master Response #6 - Biology, focused surveys of potentially suitable habitat within 500 feet of the northeastern portion of the project site were adequate to confirm absence of this species. Surveys were conducted during the time period and temperatures recommended by CDFW and no individuals were observed. Therefore, mitigation measures to avoid impacts on this species are not required.

KWBA-50: *The DEIR limits the scope of the projects considered as part of the cumulative impact analysis to other groundwater recovery projects. No other types of projects are included in the analysis or are even identified. Significantly, the DEIR includes only projects that are currently scheduled for construction. Omitting any other projects that are currently under consideration or which may be approved before the Final EIR is adopted for this Project.*

Response: The comment is incorrect. The cumulative impact analysis of the DEIR was not limited to an evaluation of only three projects. The complete list of projects considered for the cumulative impact analysis for groundwater and geological impacts is listed in Appendix D Attachment D of the DEIR. The project list was taken from these Groundwater Sustainability Plans:

- Kern Groundwater Authority Groundwater Sustainability Plan, January 2020
- Final Groundwater Sustainability Plan, Kern River Groundwater Sustainability Agency, January 2020
- Henry Miller Water District Groundwater Sustainability Plan, Kern County Subbasin, January 2019

These projects were included in the Projected-Future Baseline with SGMA Projects Scenario.

KWBA-51: *This DEIR omits any evaluation of the projects that have undergone or are currently undergoing their own CEQA evaluation, some examples being the Kern Fan Groundwater Storage Project, the Onyx Ranch South Fork Valley Water Project, the Stockdale Integrated Banking Project, and the McAllister Ranch Groundwater Banking Project, and more. The projects occurring in the area immediately adjacent to the proposed Project should be discussed in the DEIR's cumulative impacts analysis.*

Response: The comment is incorrect. The complete list of projects considered for the cumulative impact analysis for groundwater and geological impacts is listed in Appendix D Attachment D of the DEIR. The Kern Fan Groundwater Storage Project, the Onyx Ranch South Fork Valley Water Project, the Stockdale Integrated Banking Project, and the McAllister Ranch Groundwater Banking Project (aka, the James

Groundwater Storage and Recovery Project), are all explicitly listed in Table 4-1 of Attachment D of Appendix D of the DEIR. These projects, and many others, were considered in the cumulative impact analysis in the DEIR.

KWBA-52: *The DEIR analyzes the Project's water quality impacts in a vacuum, fails to evaluate the cumulative water quality impacts of multiple banking projects pumping non-project water or groundwater into the Aqueduct. The failure to analyze the Project's impacts on groundwater at its point of extraction is a substantial error and cannot serve as the basis to summarily conclude that there are no cumulative impacts to water quality.*

Response: It would be unduly speculative and unreasonable to assess cumulative impacts of future groundwater banking projects pumping non-project water into the Aqueduct on water quality. The District has no basis for determining that future pump in of non-project water by other groundwater banking projects is a probable future project. Therefore, an analysis of future water banking projects potential impacts on water quality is unknown, and unknowable at this time.

However, it is clear that any pump in of non-project water into the Aqueduct will be carefully evaluated by DWR prior to authorization. Pump-in proposals must be prepared and will not be approved until DWR can conclude that the proposal will not have a detrimental impact on Aqueduct water quality.

KWBA-53: *The DEIR fails to evaluate the potential indirect impacts of the operation and maintenance of the Project on the biological resources for the adjacent Kern Water Bank Habitat Conservation Plan/Natural Communities Conservation Plan ("HCP/NCCP").*

Response: The Project will have no impact on wetlands because the wetlands are supported by surface water in the KWBA's recharge ponds, not groundwater. The groundwater levels are substantially below the root zones of plants and are too deep to support vegetation. In addition, the groundwater modeling does not indicate significant declines in groundwater levels from the project. The Proposed Project will have no impact on surface water deliveries to the KWB from the State Water Project or from the Kern River.

KWBA-54: *The DEIR fails to analyze the Project's potential impacts on private wells, including landowner wells both inside and outside of Buena Vista's service area. There is no analysis regarding whether the proposed extraction for the Project would render landowner wells unusable or require them to be deepened or relocated entirely.*

Response: In the DEIR, a general analysis was performed to assess potential impacts to groundwater levels and water quality. The groundwater impacts assessment evaluated the impacts on groundwater levels of the Recovery Project in conjunction with the existing Palms Recharge Project. This analysis is considered to address potential impacts to private wells, including landowner wells both inside and outside of Buena Vista's service area. Should issues arise, they would be addressed by MM CUM-1 and management actions under the BVWSD GSA GSP.

Likewise, the water analysis did not find major water quality issues with the continued beneficial use of groundwater for landowner wells in the area. The potential water quality issue may occur delivering groundwater from the recovery wells to the California Aqueduct due to their more stringent water quality

requirements. *See* Master Responses # 3 and #4- Water Quality Data and Water Quality Impact Analysis for information on the water quality.

Minimum Thresholds presented in the BVWSD GSP were established to be protective of domestic wells, generally the shallowest of the wells found in the BVGSA (BVGSA 2020a). In addition, the mitigation measures established in the GSP are designed to remedy instances where the performance of individual wells within the GSA is found to have been impacted by operation of other wells. The DEIR has been clarified to describe how operation of all recovery wells will be governed by the mitigation measures contained in the BVGSA GSP (BVGSA 2020b). Similarly, in instances where operation of wells in neighboring GSAs can be demonstrated to have been impacted by operation of recovery wells, the mitigation measures prescribed by the GSAs of the affected wells will be applied.

As noted elsewhere, Buena Vista agrees to adopt the mitigation measures of the JOC for operation of the Palms. Adoption of these measures and implementation of the adaptive management actions presented in the BVGSA's GSP will be used to remedy conditions where operation of recovery wells is shown to have impacted wells with the jurisdiction of other JOC members but beyond the boundaries of the BVGSA where the mitigation measures of the BVGSA would continue to govern.

KWBA-55: *Mitigation Measure CUM-1 fails to sufficiently address the potential cumulative impacts of the Project and does not at all address the Project's impacts to groundwater quality and levels within the KGAGSA. Additionally, the DEIR does not describe or commit to achieve specific performance standards similar to the performance standards adopted by other banking projects.*

Response: As noted in Section 2.3.3 of the DEIR, BVWSD entered into a MOU with the KWBA and its Member Entities, which provides that, "…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…" In subsequent years, a JOC has been formed among these parties, which utilizes multiple groundwater models to assess impacts to groundwater from banking and recovery operations. BVWSD will either amend the existing MOU, develop a new MOU, or join the JOC, to address the operation and monitoring of the Recovery Project. Therefore, the intent is to use this mechanism to address issues such as the one outlined in the comment.

It should also be noted that the mitigation measures laid out in the BVWSD GSP are active throughout the BVGSA and are designed to minimize the impacts of well operation on the performance of neighboring wells. These measures, together with the MTs, are intended to protect shallow domestic wells from being impacted by deeper wells operating nearby. While governing the entire BVGSA rather than being specific to operation of the Project, the BVGSA's mitigation measures function as performance standards for the Recovery Project. As well as mitigation measures adopted by the JOC and the BVGSA, Mitigation Measure CUM-1 presented in the DEIR was formulated specifically to defer recovery pumping prior to groundwater levels reaching the MTs established at the RMWs in WKWD and RRBWSD designated by the proposed mitigation measure.

KWBA-56: *The DEIR defers species specific surveys to determine presence or absence until pre-construction, and defers any survey for Swainson's Hawk until some undisclosed point in time up to 14 days prior to construction activities.*

Response: As described in Master Response #6 – Biology, species-specific surveys were conducted to support the DEIR, including habitat assessments and focused surveys for evidence of species presence. Surveys to determine presence or absence are not required to adequately evaluate potential impacts of the project on species evaluated in the DEIR. The DEIR does not assume absence of any species for which absence could not be confirmed and evaluated potential project-related impacts on species for which absence could not be confirmed.

KWBA-57: *With respect to the blunt-nosed leopard lizard, the deferred mitigation fails to even provide for appropriate surveys. The DEIR must be revised to provide for specific and enforceable mitigation for the Project's potential impacts to blunt-nosed leopard lizard.*

Response: Protocol surveys for blunt-nosed leopard lizard are not required, because construction activities would not occur within 50 feet of suitable habitat for this species. Mitigation Measure BIO-1 has been augmented in the FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and to describe measures that would be implemented to avoid impacts on blunt-nosed leopard lizard during fence installation and removal.

KWBA-58: *For all of the reasons described above including in sections 2 and 3, the Project as described fails to adequately evaluate the Project's compliance with the California law regarding reasonable and beneficial use of water and the management of groundwater resources in compliance with the SGMA. The DEIR is required to evaluate the potential conflict with SGMA and the KGAGSA's GSP.*

Response: *See* Master Response #8 – Beneficial Use of Recovered Groundwater.

KWBA-59: *CEQA requires that an EIR include a list of all agencies that are expected to use the EIR in their decision making. The DEIR fails to identify the following responsible agencies: KGAGSA; Kern County Local Agency Formation Commission (LAFCO); California Department of Water Resources; State Water Resources Control Board; Regional Water Quality Control Board; the Kern Water Bank Authority; and the Rosedale-Rio Bravo Water Storage District. The proposed annexation is part of the Project, and the LAFCO is prohibited from approving any annexations regarding the Project prior to the certification of a Final EIR that evaluates all of the direct, indirect, and cumulative impacts of the Project.*

Response: Chapter 2.4 of this FEIR has been modified to include KCWA. The other agencies listed in the comment are not responsible agencies for the Recovery Project because they have no discretionary approval authority, *see* 14 Cal. Code Regs. §15381. The Recovery Project is not subject to LAFCo approval or annexation of the lands. There is no legal authority requiring a project to be within the jurisdictional boundaries of the proposing public agency. The annexation of the Recovery Project lands is unrelated to the Recovery Project and can be approved with or without the Recovery Project's approval. The KGA has no authority to approve or disapprove the Recovery Project and is thus not a responsible agency, *see* Master Response #2 – Boundaries of the BVGSA.

KWBA-60: *The DWR is a responsible agency because it has the authority to review, comment on, and approve groundwater sustainability plans and any amendments or changes thereto including GSA boundary adjustments.*

Response: Chapters 2.4 and 2.5 of this FEIR has been modified to clarify DWR's role. However, the Recovery Project is not dependent upon GSA boundary adjustments and can proceed without any adjustments.

8.6 Kern Water Bank Authority, South Valley Biological Consulting

SVBC-1: *Table 3-1 of the DEIR should be edited to indicate Horn's milkvetch (Astragalus hornii var. hornii) occurs in the Outlet Canal and periodically flooded areas at the KWB and lesser saltscale (Atriplex minuscula) occurs in bush seepweed habitat adjacent to the northeast portion of the project site.*

Response: This information has been added to relevant text from Chapter 3.2 – Biological Resources, as shown in this FEIR. This information does not change the DEIR conclusion that impacts on special-status plants would be less than significant.

SVBC-1: *Table 3-2 of the DEIR incorrectly indicates there is no suitable habitat for coast horned lizard (Phrynosoma blainvillii) on or adjacent to the project site and that Tulare grasshopper mouse (Onychomys torridus ssp. tularensis) is not known to occur at the KWB.*

Response: Page 3-21 of the DEIR indicates that suitable habitat for coast horned lizard occurs adjacent to the northeast portion of the project site. Edits have been made to Table 3-2 (now Table 3-3 in this FEIR) and other relevant text from Chapter 3.2 – Biological Resources, as shown in this FEIR. Supplemental information on Tulare grasshopper mouse occurrences at KWB, which range from approximately 6 to 10 miles from the Recovery Project site, has also been included in this FEIR. This information does not change the DEIR conclusions that impacts on coast horned lizard and Tulare grasshopper mouse would be less than significant.

SVBC-3: *The DEIR correctly indicates that Swainson's hawks (Buteo swainsoni) are known to nest at the nearby Tule Elk Reserve; however, this species also regularly nests at the KWB as well.*

Response: This information has been added to relevant text from Chapter 3.2 – Biological Resources, as shown in this FEIR. This information does not change the DEIR analysis of potential impacts on Swainson's hawk.

SVBC-4: *The DEIR states that "…No suitable nesting habitat for tricolored blackbird (Agelaius tricolor) is currently present on or adjacent to the project site…". However, this species has nested on occasion at the Tule Elk Reserve and frequently nests at the KWB. The DEIR concludes the same for yellow-headed blackbird (Xanthocephalus xanthocephalus). This species also is known to nest at the KWB.*

Response: This FEIR acknowledges in Table 3-3 that tricolored blackbird is known to nest at Tule Elk Reserve. These nesting locations are nearly 0.5 mile from the project site at their closest point and are therefore not considered adjacent to the site. Supplemental information on tricolored blackbird and yellow-headed blackbird nesting at KWBA has been added to relevant text from Chapter 3.2 – Biological Resources, as shown in this FEIR. Suitable nesting habitat for these species at KWB also is not considered adjacent to the project site, and this information does not change the DEIR analysis of potential impacts on tricolored blackbird or yellow-headed blackbird.

SVBC-4: *The DEIR states that the Tulare grasshopper mouse nearest known occurrence is approximately 10 miles away from the project site. This species is known to occur in several areas at KWB. The DEIR states "…No evidence of kit fox presence in the Biological Study Area was observed during focused field surveys…". Although I do not doubt this statement in any way, kit foxes are nevertheless known to occur in the surrounding area and the individuals can be wide ranging in their foraging habits. Therefore, it should be expected that this species is likely present at least time to time within the Biological Study Area.*

Response: Supplemental information on Tulare grasshopper mouse occurrences at KWB, which range from approximately 6 to 10 miles from the project site, has been included in this FEIR. Consistent with the commentor's conclusion, the FEIR states in Table 3-3 that San Joaquin kit fox has moderate potential to occur on or adjacent to the project site and acknowledges that potential dens occur adjacent to the project site. Therefore, the impact evaluation assumes the species could be present and potentially impacted by the proposed project, and Mitigation Measure Bio-3 is included to minimize potential project-related impacts on San Joaquin kit fox.

SVBC-5: *Horn's milkvetch should also be included in the Special-status Plants addressed on page 3-31, as it is also known to occur nearby within the Outlet Canal, similar to slough thistle.*

Response: Horn's milkvetch has been added to the discussion of potential impacts on special-status plants, as shown in the FEIR. This information does not change the DEIR conclusion that impacts on special-status plants would be less than significant.

SVBC-6: *Our experience has been that unless blunt-nosed leopard lizard surveys consistent with the 2019 CDFW protocols or some other CDFW-approved methodology are conducted, it is unlikely that fencing will be allowed to be installed. Additionally, CDFW does not normally approve fence installation within 50 feet of burrows that could be used by species such as Tipton kangaroo rat (Dipodomys nitratoides nitratoides) or San Joaquin antelope squirrel (Ammospermophilus nelsoni) unless it can be demonstrated through an approved investigative trapping effort or other agreed upon method that these species are not present.*

Response: As stated in the DEIR and described further in Master Response #6 – Biology, no suitable habitat for blunt-nosed leopard lizard, Tipton kangaroo rat, or giant kangaroo rat occurs within 50 feet of the project footprint. In addition, focused surveys confirmed San Joaquin antelope squirrel does not occur adjacent to the area where fencing would be installed. Mitigation Measure BIO-1 has been augmented in this FEIR to specify that fencing will be placed outside the minimum 50-foot no-disturbance buffer and therefore will not impact suitable habitat for blunt-nosed leopard lizard, Tipton kangaroo rat, or giant kangaroo rat. Protocol surveys for blunt-nosed leopard lizard and mammal trapping are not required, because suitable habitat would be avoided.

SVBC-7: *The trees within the Project represent some of the only remaining suitable nesting habitat in the local vicinity. Hence, it seems that CDFW may view impacting a total of 10 acres of foraging habitat for this species as a significant impact. Swainson's hawks are definitely known to nest in the area nearby the project site and likely forage in some portions of the project site from time to time. The DEIR is proposing that a nest survey for potential Swainson's hawk nesting trees be conducted within 0.25 mile of the project site. From my experience, CDFW will typically require a nest tree survey for a minimum of 0.5 mile surrounding the project.*

Response: As indicated in Chapter 3.2.3 of this FEIR, foraging habitat disturbance would be temporary, and only a small proportion of the overall habitat on the project site would be disturbed at any one time. Because pipeline would be installed sequentially and project construction is anticipated to be completed within approximately 11 months, the amount of potential Swainson's hawk foraging habitat that would be disturbed during the breeding would be small and very unlikely to result in a significant impact. Notably, CDFW did not comment on this issue in their letter regarding the DEIR. Because most of the project area is subject to regular disturbance associated with ongoing agricultural activities, Swainson's hawks nesting further that 0.25 mile from the project site are extremely unlikely to be disturbed by project activities. However, Mitigation Measure BIO-2b has been revised in this FEIR to expand the survey area to within 0.5 mile of the project site.

8.7 Kern Water Bank Authority, Environmental Defense Sciences

EDS-1*: The blending analysis is significantly biased in that despite Table 3-6 list of "Wells used in Water Quality Analysis" only the data from DMW-13 Middle was actually used and as is made clear in the GEI 2017 Memorandum the other wells west of East Side Canal have some serious contaminant problems.*

Response: *See* Master Responses #3 and #4 – Water Quality Data and Water Quality Impact Analysis and response to KCWA-1.

EDS-2: *As is apparent from the water quality and blending analysis, it will be extremely difficult for the Project to meet the State Water Project (SWP) standards for pumping groundwater production into the California Aqueduct, and additionally there is no evaluation of cumulative water quality impacts of the Project along with other banking projects' pumping non-SWP water into the Aqueduct and having to meet SWP water quality standards.*

Response: The comment on project and cumulative impacts with respect to the quality of recovered water pumped into the California Aqueduct does not account for the fact that no water can be introduced from outside sources that does not meet the standards for pump-in water established by the DWR and the State Water Project. As is now taking place with 123-TCP, DWR and project contractors set pump-in standards that are protective of the quality of water delivered to SWP customers and water users. Therefore, water will not be pumped in from the Recovery Project or any other existing or proposed water bank that does not satisfy the standards for pump-in water in force at the time of the activity. *See* Master Responses #3 and #4 – Water Quality 1 and 2 for more information on the water quality.

EDS-3*: The DEIR for the Palms project has no discussion at all about the variability of the Kern River flow or the return frequency of possible recharge opportunities. The infiltration project and its associated wetlands will be dependent on river flow. No discussion of impacts of sustained drought on the constructed wetland.*

Response: This comment pertains to the Palms Recharge Project (*see* Master Response # 9 – Clarification of Recovery Project Description) and should have been introduced during the comment period for the IS/MND for that project.

The Chapter 2.3.2 – Operations, states that, "Available water supply will continue to be recharged through seepage in District-owned facilities **in wet years**. This includes the existing Palms Project where it is

anticipated that up to 100,000 AFY can be recharged. The District will also continue to recharge surface water through their canal system, a District practice for many decades" (emphasis added). Therefore, the intermittent nature of recharge is clear, as this can only occur during wet years, when water is available.

As described in Section 3.2.1 of the DEIR, there are no wetlands on the project site. The Palms recharge ponds are not managed as constructed wetland. Wetlands at the KWB and Tule Elk Reserve will not be impacted by the project, because the project will have no impact on water diversions to those areas. *See* also response to KWBA #53.

8.8 Kern Water Bank Authority, Wood Environment and Infrastructure

See Master Response#1- Suitability and Validation of Superposition Model.

9.0 Master Responses to Comments

The DEIR was released for public comment on December 4, 2020, the 45-day comment period closed on January 19, 2021. Timely comments were submitted by the WKWD, KCWA, KGA, CDFW, and the KWBA. The comment letters themselves are found in Chapter 7.

Each comment letter was also responded to individually. A summary of each comment, and the District's responses to those comments, is found in Chapter 8.

In some cases, multiple commenters submitted comments with a common theme. Master responses have been prepared to address comments related to the suitability and validation of the superposition model (Chapter 9.1), the boundaries of the BVGSA (Chapter 9.2), Water Quality Data (Chapter 9.3), Water Quality Impact Analysis (Chapter 9.4), compliance with SGMA (Chapter 9.5), Biology (Chapter 9.6), Regional Groundwater Level Contour Mapping and Flow Analysis (Chapter 9.7), Beneficial Use of Recovered Groundwater (Chapter 9.8), and Clarification of Recovery Project Description (Chapter 9.9).

9.1 Master Response #1 – Suitability and validation of superposition model

Several commenters included comments with a common theme related to suitability and implementation of a superposition model for the groundwater impacts assessment in the DEIR. This master response is intended to address these comments.

9.1.1 Superposition Model Concept – Application for Numerical Models

The Principle of Superposition is applicable to both analytical and numerical groundwater flow models. The technique to develop a numerical model using the Principle of Superposition is described in two reports from the USGS:

- Reilly, T.E., Franke, O.L., and Bennett, G.D. 1984. The Principle of Superposition and Its Application in Ground-water Hydraulics: USGS Open-File Report 84-459, 43 p.
- Reilly, T.E., Franke, O.L., and Bennett, G.D. 1987. The Principle of Superposition and Its Application in Ground-Water Hydraulics, USGS, Techniques of Water-Resources Investigations, Book 3, Chapter B6, 28p., http://pubs.usgs.gov/twri/twri3-b6/pdf/twri_3-B6_a.pdf.

In brief, the Principle of Superposition states that solutions can be added together to obtain a composite solution. Reilly, Franke and Bennett (1984, 1987) note that this is a powerful mathematical technique routinely used for analyzing certain complex problems in many areas of science and technology. In their reports, Reilly, Franke and Bennett (1984, 1987) demonstrate that this approach has important applications in groundwater modeling. Superposition modeling enables the groundwater impacts analysis to assess the effects of the Recovery Project on the groundwater system in isolation from other acting stresses (e.g., pumping, recharge, etc.) without having to obtain data of non-project related stresses to simulate the

Recovery Project. Using a superposition model, calculation of groundwater impacts is inherently precise because flow quantities other than Recovery Project-related components are set to zero (Leake 2011).

Thus, superposition modeling techniques allow for the formulation of the Recovery Project scenarios, and simulation of the Recovery Project-related changes, in a manner that incorporates all of the details of the Recovery Project while reducing the need to collect non-project-related data that may not be obtainable.

9.1.2 Superposition Model Concept - Handling of Nonlinearities

With respect to comments that a superposition model should be limited to a linear aquifer system, we included in the DEIR an assessment of non-linearities in Section A.4.2 in Appendix D (pdf document page number 419). In this documentation, we cited several references from the USGS and peer-reviewed journals for additional methods for handling more complex nonlinearities in groundwater modeling. These reports include Reilly and Harbaugh (2004), Durbin et al. (2008), Leake (2011), Takahashi and Peralta (1995), among others, who summarize practices to address complex nonlinearities in superposition models. We followed the standard practices advanced by these authors for handling nonlinearities in groundwater modeling for the Recovery Project.

We further noted that it is always best-practice to evaluate the likely degree and significance of any nonlinearities on a project-specific basis (Reilly et al. 1987; Reilly and Harbaugh, 2004). Therefore, our approach is consistent with guidelines from the USGS (Reilly et al. 1987) and other scientific organizations.

For the Superposition Model the likely effects of the following potential sources of nonlinearity on model results include the following:

- Groundwater-surface water interactions – This relationship becomes nonlinear if groundwater levels cross the riverbed elevation (point of discontinuity) during the simulation periods causing the calculation of the rate of seepage to change from a continuous equation to a constant value. If groundwater levels remain consistently above or below the riverbed elevation, the relationship remains linear. In the Superposition Model, the Kern River and other simulated streams are consistently disconnected from the aquifer; as a result, this condition does not constitute a source of nonlinearity.
- Aquifer parameters – Where the aquifer is unconfined, aquifer transmissivity changes over time as groundwater levels change. If groundwater level changes are small relative to the total aquifer thickness (typically less than 10 to 20%), the error associated with this nonlinearity is acceptably small (Reilly et al., 1987; Morrison, 2006). For the simulations, the maximum drawdowns resulting from the Recovery Project are within 10 to 20% of the Model Layer 1 thickness and between 1 and 5% of the total aquifer thickness at the pumping locations. Therefore, the effects of unconfined aquifer conditions are within the acceptable range of nonlinearity.

The effects of nonlinearity are considered to be within an acceptable range that allow for use of the Superposition Model as a quantitative tool to support the groundwater impacts analysis for the Recovery Project.

9.1.3 Superposition Model Concept - Applicability

Several comments questioned the suitability of the superposition approach in evaluating groundwater impacts. The use and application of the Principle of Superposition to develop numerical groundwater flow models for real-world projects is well documented in the DEIR (in Appendix D, Attachment A, Table A-1). Table A-1 provides a representative list of 26 reports documenting the use of a superposition models that are publicly available using an internet search.

The use of superposition models has been increasing in recent years with applications for complex projects. The advantage of the superposition models being that the issue being addressed can be evaluated without having to update every other data input in the basin. A brief summary of some major projects listed on Table A-1 that are of similar scale and complexity include:

- The New Mexico Office of the State Engineer utilizes for assessing water rights administration in the adjudicated Taos Groundwater Basin and groundwater-surface water interactions in the Rio Grande Rift Zone for the city of Albuquerque.
- The Idaho DWR uses a superposition model for development of a comprehensive Aquifer Management Plan for the Eastern Snake River Plain.
- Monterey County Water Resources Agency for long-term water resources management planning in Salinas Valley, California.
- Groundwater impacts analysis for the Sacramento River Settlement Contracts for the US Bureau of Reclamation.
- The USGS has used this technique for studies of impacts of groundwater pumping on flows in the adjudicated Colorado River in Arizona and California.

In most cases these models are derived from a regional groundwater model that has been modified to evaluate a specific issue. The report for the Salinas Valley project noted that utilizing the superposition approach removed noted deficiencies noted in the USGS's regional North Marina Groundwater MODFLOW Model of concern for the analysis of their project.

As demonstrated by this representative project list, the superposition approach for numerical modeling has become a well-established method for evaluating complex issues of groundwater impacts, supporting groundwater management, and providing regulatory compliance. The projects also handled nonlinearities of similar or greater complexity in a comparable manner as used for the Recovery Project. The projects listed in Table A-1 demonstrate that the application of the Superposition Model for numerical modeling is now a standard method of evaluating complex conditions similar to those associated with the Recovery Project.

9.1.4 Superposition Model Development

Comments were received that questioned development of the superposition model. The development of a superposition model is typically based on modification of an existing, calibrated, historical groundwater model. The advantage of this approach is that the superposition model incorporates the aquifer basin structure, hydrostratigraphy, and parameter values determined through calibration of the pre-existing model.

The Superposition Model used for the Recovery Project is based on the USGS CVHM. The CVHM is a three-dimensional computer model developed by the USGS to simulate surface water and groundwater flow across the entire Central Valley (Faunt 2009). The geologic framework and aquifer properties of CVHM were developed based on a comprehensive geologic analysis including the USGS Sediment Texture Analysis (Faunt, Hanson, and Belitz 2009).

In adapting the CVHM model grid, layering and aquifer properties from the regional scale to the local scale used for the Superposition Model, we applied standard methods for upscaling data from a regional to a local model to preserve the characteristics of CVHM. Therefore, the Superposition Model is not a completely new MODFLOW model of the area, but is a local model derived from the calibrated regional CVHM model.

Modifications to the CVHM model are described in the DEIR and include the following.

- The increase in the resolution of the grid does not alter the overall representation of the conceptual model but provides additional calculation points within the model's domain to provide greater resolution in solving for the drawdown from the pumping wells. The approach uses the Telescopic Mesh Refinement approach that is documented in the USGS report "Procedures and Computer Programs for Telescopic Mesh Refinement Using MODFLOW" (Leake and Claar 1999) and is incorporated as a feature within the Groundwater Vistas (ESI 2020) an industry-standard MODFLOW interface.
- The final aquifer properties used for the CVHM were extracted and applied to the Superposition Model in a manner to preserve their hydraulic characteristics. To correlate the aquifer properties from multiple CVHM Model Layers to the model layers for the superposition model used, standard techniques were applied for calculating aquifer properties in layered aquifer systems following standard techniques. The approach is described in detail in **Appendix D**, Attachment B, Section B.2.4 of the DEIR. Along with the descriptions are references to standard groundwater textbooks by Todd and Mays (2004); Bear and Verruijt (1987); Freeze and Cherry (1979) and Bouwer (1978).

By following these standard procedures, the superposition modeling approach as implemented for the Recovery Project incorporates detailed information about the hydrostratigraphy and distributions of stresses throughout the basin-wide groundwater system.

9.1.5 Superposition Model Validation

One comment expressed concern about the use of the term "validation" and claims mis-use of the term by describing a very narrow application of model validation. It should be noted that the term "validation" has been the subject of literature debate over the past several decades. Recently, discussion has focused less on semantics and more on the process of confidence building by developing procedures to improve the models and the quality of decisions based on those models. This process of evaluation of a model's representativeness is generally referred to as model "validation" (Law and Kelton, 2000, p. 264).

For this report, we subscribe to this more general definition that model validation is a process to test of the suitability of a model for its given purpose by comparing model results to an independent data set. Rather than the narrow definition expressed in the comments, our approach to "validation" is more

consistent with that of the American Society for Testing and Materials (ASTM) D-5981 (*Standard Guide for Calibrating a Ground-Water Flow Model Application)* definition of *"application verification"* defined as follows:

> …using the set of parameter values and boundary conditions from a calibrated model to approximate acceptably a second set of field data measured under similar hydrologic conditions.

No set rule can determine whether application of superposition will provide acceptable answers in a given instance; each problem must be judged individually. Developing an appropriate validation scenario is challenging in a heavily operated groundwater basin because validation requires simulating a set of historical groundwater stresses that show a clear cause and effect relationship. The overall approach was to assess the ability of the model to simulate historical change in groundwater levels for different aspects of the groundwater issues being addressed in the DEIR in a manner consistent with the application of a screening-level model assessment. For this we developed the following set of scenarios based on available data.

9.1.5.1 Superposition Model Validation Scenario 1

Comments were received that questioned the applicability of comparing the Superposition Model to a previous analytical model used for assessing the potential impacts of the WKWD North Wellfield groundwater extraction wells and recharge basins to local groundwater levels and adjacent wells. This modeling work in documented in Appendix F of the FEIR for the WKWD North Wellfield (ESA 2010). Once again, the comment describes one instance of the comparison of numerical and analytical models but infers that this is the only application. However, the process of multi-model analysis is well documented, and modeling procedures with a much wider range of applications are described in the scientific literature. Our approach for Validation Scenario #1 is consistent with this scientific literature and our definition of model validation above.

The comment further questioned the applicability of Validation Scenario #1. First, we considered the comparing the results of the Superposition Model to the model results presented in Appendix F of the FEIR for the WKWD North Wellfield (ESA 2010) as an appropriate means to assess consistency of results between the WKWD modeling and the Recovery Project modeling.

A second comment questions the quality of the scenario results. A review of the Validation Scenario #1 results (in **Appendix D**, Attachment C, Figure C-2) clearly shows good agreement of the local drawdown at the WKWD wellfield where the maximum drawdown is occurring. Further away from the WKWD wellfield, the Superposition Model simulates greater drawdown than the WKWD model, indicating that the Superposition Model would tend to over-estimate drawdown. Therefore, for the purposes of the groundwater impacts analysis, the drawdown simulated by the Superposition Model provides a conservative assessment of groundwater impacts by simulating drawdowns that range from similar to greater than those from a comparable analysis at one of the areas of interest for this DEIR.

9.1.5.2 Superposition Model Validation Scenario 2

Comments were received that questioned the applicability of Validation Scenario #2. Validation Scenario #2 was done at the request of WKWD and is based on data provided by WKWD in June 2020

from October 2012 through December 2014. In the WKWD comment letter Introduction, WKWD notes their appreciation that those data were used as part of the analysis of the Recovery Project.

A second comment questions the quality of the scenario results. As noted in the DEIR, it became clear that the groundwater level declines at the WKWD North Wellfield were greater than might be predicted by WKWD pumping alone based on data in **Appendix D**, Attachment C, Section C.2.1. Since we could not reasonably separate drawdown from WKWD from other basin pumping in the measured groundwater level data, we took the course of adding the additional pumping. Therefore, approximately 2.1 million AF of regional groundwater banking recovery pumping from the Kern County Subbasin banks was added to the scenario over the 3-year period from 2012 through 2014.

Once this was done, the Superposition Model was able to simulate the change in groundwater levels in the WKWD North Wellfield. The results show that even with this degree of pumping, the relative difference between simulated and measured data was about 14 percent. As discussed in the DEIR, this represents a reasonable level of model accuracy, and also demonstrates that effects of nonlinearities are not significantly affecting model results.

In the comments, one commenter, in trying to criticize the Superposition Model, succinctly stated the following observation:

> The recharge and recovery operations of the Kern River Projects will likely overwhelm the change in head induced by recharge and recovery stresses at the Palms Project

We agree that Validation Scenario #2 demonstrates the accuracy of the above observation. In the scenario, pumping from the WKWD North Wellfield averages 18,728 AFY over an area of about 480 acres. The maximum observed drawdowns at the WKWD North Wellfield ranged from 70 to 180 feet. For the Recovery Project, maximum recovery pumping is 25,000 AFY distributed equally between two wellfields of approximately 1,150 acres. Since the Recovery Project has about 33 percent greater pumping volume distributed over an area three times larger, the drawdown from the Recovery Project would also be overwhelmed by the pumping at the Kern River Projects. This provides additional qualitative support that the groundwater impact analysis results are representative.

9.1.5.3 Superposition Model Validation Scenario 3

The comment received concerning Validation Scenario #3 appears to misunderstand the scenario setup. For Validation Scenario #3, we are only simulating recharge from the Kern River Projects from 1993 to 1998 to provide an assessment of the ability of the Superposition model to simulate groundwater conditions at the Kern River Projects located to the east of the Recovery Project. As noted in the DEIR, developing an appropriate validation scenario is challenging in a heavily operated groundwater basin because validation requires simulating a set of historical groundwater stresses that show a clear cause and effect relationship. In reviewing available data, we found that the data from the early recharge events from 1993 to 1998 in the Kern Fan Projects provided such an opportunity.

As noted again by the commenter, the recharge and recovery operations at the Kern Fan Projects would overwhelm the change in head induced by the recharge and recovery stresses at the Recovery Project and existing Recharge Project. Therefore, simulating the large recharge operations that occurred during 1993

to 1998 provides a maximum stress scenario. This analysis of the "extreme case" is a useful and time-honored procedure in scientific and engineering investigations.

In the DEIR, we provide a statistical summary of the difference between the measured and simulated change in groundwater levels. The residual mean of -3.8 feet in context of the overall range of measurements of 204 feet represents a relative percentage difference of about 2 percent. For the absolute residual mean of 19.8 feet, the average percentage difference is 9.7 percent, and the median percentage difference is 15 percent. Based on these results, this validation scenario demonstrates that the Superposition Model is able to simulate the relative change in groundwater levels.

9.1.6 Recovery Project Scenarios A and B

In the comments received concerning Recovery Project Scenarios A and B, the comments claim there is no justification to remove the historical banking operations during the 2011 to 2020 simulation period. The commenter appears to misunderstand the scenario setup. Recovery Project Scenarios A and B are projected future conditions that include recharge from the existing Palms Project along with the Recovery Project. These are not historical simulations, so the above comment is not relevant to the scenario.

With respect to the comment on groundwater mounding, the simulation of groundwater mounding and drawdown are both governed by Darcy's Law and the Conversation of Mass. Since we assume consistent aquifer properties in the area of the Recovery Project, the Superposition Model solves each phenomenon in the same manner. Therefore, the model cannot simultaneously overestimate mounding and underestimate drawdown. If the commenter believes we are overestimating mounding, then we are also overestimating drawdown, and vice versa.

The effect that is described in the comment is due to the setup of the groundwater impact scenario that was intended to reflect a maximum-case, or worst-case, scenario. Since the Recovery Project represents the recovery phase of the existing Palms Project recharge project, consideration of the groundwater mound is an essential part of evaluating the groundwater impacts of the recovery phase. In this scenario, the full recharge occurs during 1 year at one location which results in high mounding. The Recovery Project recovers 90 percent of the recharge water by pumping over a larger area (14 well locations over 2 wellfields) over a period of 4 years. The setup of the recovery is part of the Recovery Project design to distribute drawdown from the Recovery Project over a larger area to minimize groundwater impacts.

9.1.7 Summary and Opinion

In the above master response to comments concerning the Superposition Modeling, we believe we have demonstrated that the modeling was done in accordance with existing published modeling standards. The validation scenarios provide a basis for assessing the relative accuracy of the model results and show the superposition model results were within 15 percent of the measured data for a range of recharge and pumping conditions both in the vicinity of the Recovery Project and in the area of the Kern River Projects. Furthermore, the validation scenarios suggest that the Superposition Model provides a conservative assessment of groundwater impacts by simulating drawdowns that range from similar to greater than those from a similar analysis at one of the areas of interest for this DEIR.

As noted in Section 2.3.3 of the DEIR, BVWSD entered into a MOU with the KWBA and its Member Entities (including WKWD), which provides that, "…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…" In subsequent years, a JOC has been formed among these parties, which utilizes multiple groundwater models to assess impacts to groundwater from banking and recovery operations. BVWSD will either amend the existing MOU, develop a new MOU, or join the JOC, to address the operation and monitoring of the Recovery Project. Therefore, the intent is to use this mechanism to address issues such as the one outlined in the comment. As part of this process, BVWSD would be willing to consider conforming to the JOC Operations Plan of using the two existing models.

9.2 Master Response #2 – GSA Jurisdiction

Several commenters made comments relating to the GSA jurisdiction for the eastern portion of the Recovery Project Area. Comments argue that the KGA has discretionary approval and authority over the Project. This is not accurate. Figure 2-3 of this FEIR identifies the relevant GSAs in the area surrounding the Project. The DEIR describes the regulatory framework of SGMA [DEIR 3-63 – 3-64]. The groundwater model used to analyze potential impacts to the groundwater basin was not restricted by the jurisdiction of the BVGSA or any other GSA. Rather, all potential impacts resulting from the Project were analyzed [DEIR 3-68 – 3-83]. The DEIR concluded that the Project, as proposed, would create a less-than-significant impact [DEIR, 3-84]. This conclusion is not limited to the BVGSA boundaries, but also includes the identified GSAs in the Project vicinity. As SGMA requires coordination between the GSAs to achieve basin wide sustainability, this is appropriate.

The KGA does not have discretionary approval authority over the Project. Pursuant to the Second Amended and Restated Joint Powers Agreement effective July 22, 2019 (KGA JPA 2019), the KGA, "shall have no power to control, limit or empower a Member's rights and authorities over its own Water Supply Matters." [KGA JPA Sec. 2.04]. Likewise, the KGA shall have no power to interfere with the rights of individual landowners to apply, store, or otherwise use surface or groundwater [KGA JPA Sec.2.04]. Similarly, the KGA GSP does not provide the KGA with discretionary authority over projects proposed by public entities. Finally, the Project Area lands will be removed from the KGA as soon as DWR begins to process GSA boundary modifications. The Project Area lands are "Whitelands" not within the boundary of any water District. Two of the parcels within the Project Area (APNs 159-010-06 & 159-020-04) were initially included within the KGA *via* a contract with RRBWSD. However, by way of letter dated April 22, 2019, the owner of those parcels withdrew from that agreement and from the KGA and elected to be included in the BVGSA. The landowner of the two other parcels in the Project Area (APNs 159-020-14 & 159-030-09) never entered into a "Whitelands Agreement" to be covered in the KGA's GSP. Pursuant to the KGA's own Groundwater Sustainability Plan, non-districted lands, such as those making up the Project Area would be removed from the KGA absent a contract with a KGA member. As these lands are not under contract with a KGA member, they are not under the jurisdiction of the KGA. It is acknowledged in the KGA GSP that the boundaries of the KGA, as submitted to DWR, need to be updated and that absent a contract, any non-district lands (such as the Project Area) will be omitted from the KGA, *see* KGA's GSP stating:

> At the inception of the KGA, Kern County was a member of the KGA to represent lands within the Subbasin and outside of the jurisdiction of a local agency participating in a GSA in the Subbasin – non-districted lands. However, in

December 2018, Kern County supervisors elected to withdraw from the KGA and from that action, approximately 440,950 acres of non-districted lands became not covered by a GSA (Figure 1-3). At the December 19, 2018 KGA Board meeting, the direction provided by the Board was to reach out to the non-districted landowners and extend coverage; however, those non-districted landowners who are not wanting to participate will be eventually removed from the KGA GSA boundary and will then be required to report directly to the State Water Resources Control Board (State Water Board). The KGA reached out to those landowners via a mass mail-out to advise of the County's decision and extended the opportunity to participate in SGMA through the member agencies of the KGA. The coverage to the non-districted lands was handled by the landowners entering into agreements with the KGA member agencies, including associate members, for SGMA coverage under the KGA members' respective management area plans. Assistance from Kern County Water Agency made this coverage possible by lending its jurisdiction under SGMA to the KGA members who have agreements with those non-districted landowners. Through the efforts by the member agencies of the KGA, approximately 242,180 acres of the non-districted lands will be covered and will be compliant with SGMA. The remaining 198,770 acres not covered are typically grazing lands or lands associated with oil production where minimal or no groundwater usage exists (Figure 1-4). The decision to extend SGMA coverage and to revise the KGA GSA boundary to remove non-districted lands not participating with KGA member agencies has been presented and discussed openly at public KGA board meetings since the initial discussion at the December 2018 board meeting.

For those non-districted lands not covered by a member of the KGA, the five Subbasin GSAs have coordinated to cover all those non-districted lands in the water modeling effort for the historic, baseline, and future projections. [KGA GSP Sec. 1.4.1]

Accordingly, the Project Area lands will be removed from the KGA when DWR begins to process boundary modification for GSA's. Notwithstanding, the KGA currently has no discretionary approval over the Project and is not a Responsible Agency for CEQA purposes. The DEIR accurately identified and described the role of the surrounding GSA's and considered the Project's potential impacts to the groundwater basin without limiting consideration to certain GSA's jurisdictional boundaries.

9.3 Master Response # 3 – Water Quality Data

GEI was contracted by BVWSD to provide an evaluation of existing groundwater quality in the Palms Project area to determine if groundwater in the Palms Project area meets the water quality requirements for discharge into the Aqueduct, as defined in the DWR Policy, and to develop a water treatment plan for constituents that don't meet standards. The 2017 GEI memo concluded, "[t]his preliminary water quality assessment provides insight towards potential water quality issues BVWSD may face in developing a PIP. While the data represents a much larger geographic area than the Palms Project, increased awareness of

potential issues enable the Recovery Project team to develop a comprehensive water quality study." When evaluating DWR's Pump-In Policy using BVWSD's historical groundwater results, findings were, "…water quality data is only available for a limited number of District and Landowner wells, the majority of which are outside of the Palms Project area, and the number of samples from each well vary substantially." The memo acknowledged the quantity and quality of available data were limiting factors to conduct a thorough analysis. It was recommended that BVWSD develop and coordinate a comprehensive water quality sampling program in order to develop a PIP for submission for DWR approval.

While some of the data presented in the 2017 GEI memo was also included in the DEIR evaluation, some was excluded because it was not representative of the Recovery Project. For the most recent water quality evaluation, presented in the DEIR and FEIR, BVWSD's STORM database was used in addition to obtaining more water quality data from surrounding water agencies and districts. A data request was made to KCWA since BVWSD's Monitoring Wells 11 and 12 are part of the Kern Fan Monitoring Network. To further understand some anomalies in the water quality data, GEI consulted with Maegan Allen at KCWA (personal communication September 24, 2019, and October 2, 2019). BVWSD's STORM database indicated elevated iron and manganese, as noted in the 2017 GEI memo. Ms. Allen mentioned results prior to 2012 should not be used since they are not representative of the aquifer. Prior to 2012, samples were analyzed for total metals. Collected samples often had high turbidity and elevated iron and manganese levels most likely are a result of sloughing from the well casing, not the aquifer. Samples after 2012 were tested for dissolved iron and manganese and these water quality results better represent the aquifer. While results from samples taken after 2012 were used in the DEIR evaluation, the 2017 GEI Memo was completed prior to the communications with Maegan Allen and presented results based on the full period of record. This discrepancy explains the differences in the results for iron and manganese presented in the two documents.

In addition, to explain the rationale in the paragraph between Tables 3-6 and 3-7 of the DEIR, why BVWSD Monitoring Well 13 – middle zone was used as a representative well, the water quality evaluation conducted for this DEIR focused on water quality results which would be most representative of the current groundwater conditions. Therefore, available water quality data from 2008 to 2019 were used in the DEIR versus all historical data that were evaluated in the 2017 GEI memo. Initial water quality evaluation included all wells listed in DEIR Table 3-6. However, during the evaluation, it was determined the newly constructed wells would pump water from the middle portion of the aquifer, which is anticipated to be consistent with BVWSD's Monitoring Well 13 – middle zone. With this understanding, where available, well construction details were reviewed, water quality data representative of the middle portion of the aquifer were used. By contrast, water quality data were not used for wells where construction data were not available or where the wells were screened in multiple zones. **Table 9-1** details the wells used in the DEIR, this FEIR, and the 2017 GEI Memo. The more detailed analysis described here was conducted for the DEIR and not in the 2017 GEI memo, which explains the difference in water quality discussions. Since more current data were available, which focused on the specific Recovery Project area and anticipated aquifer zones where the new wells would pump from, the evaluation conducted for the DEIR and this FEIR supersedes the 2017 GEI memo.

Table 9-1. Comparison of Wells used in the DEIR and FEIR Water Quality Analysis and 2017 GEI Memo

West of East Side Canal	East of East Side Canal
BVWSD Production Well	BVWSD Private Landowner Well
DW01	D04
DW02	Kern Water Bank
BVWSD Monitoring Well	13D01, **13D02, 13D03**
DMW 11A & 11B	West Kern Water District
DMW 12A & 12B	**NW-1**
DMW 13-Shallow, **13-Middle**, 13-Deep	**NW-2**
BVWSD Private Landowner Well	**NW-3**
D15	**NW-4**
	NW-5

Notes: Bold indicates wells used in DEIR and FEIR; all wells were used for the 2017 GEI Memo except DMW-13.

9.4 Master Response # 4 – Water Quality Impact Analysis

As mentioned in Master Response #3 – Water Quality Data, it is acknowledged that the water quality evaluation conducted is based on the best available data from BVWSD's STORM database, DDW's Drinking Water Watch, and Kern Fan Monitoring Network. Existing water quality data in the area were used to characterize groundwater conditions. Based on the available data, and because of the potential uncertainties, Impact HYDRO-2: "Violate any water quality standards or WDRs or otherwise substantially degrade surface or ground water quality" was found to be potentially significant. Section 3.4.3 of this FEIR discusses the Water Quality Impact Analysis and mitigation measures to be taken. Mitigation measures HYDRO 1 through HYDRO 5 were proposed to mitigate the potentially significant impact to a level of less-than-significant.

It is understood and acknowledged that the blending calculations were conducted to evaluate a treatment alternative, if needed, for a pump-in project. Analyses are based on the best available data of groundwater quality in the Recovery Project area. The Recovery Project proposes to construct several new wells, which will be designed to extract groundwater from the middle zone of the aquifer and water quality is expected to be suitable for all proposed beneficial uses. Until the new production wells are constructed and sampled, as indicated in MM HYDRO-3, there is uncertainty on the final water quality of the new production wells. Existing water quality data will be used a reference for implementing mitigation measures HYDRO 1 through HYDRO 5 and for designing the new production wells. The proposed mitigation measures are anticipated to result in better water quality in the new production wells than in the existing monitoring wells. MM HYDRO-1 through MM HYDRO-4 will be implemented during Recovery Project construction. MM HYDRO-5 will be implemented during Recovery Project operation.

Once the new production wells are constructed, the stated mitigation measures need to be followed to develop a PIP for DWR's review and approval. DWR requires a potential Pump-In Entity to demonstrate water quality will not adversely impact the Aqueduct when submitting a proposal to DWR. If water quality does not meet DWR requirements, DWR will not permit the PIP. Therefore, there is no risk to the water quality of the Aqueduct, because the water quality must meet DWR's requirements prior to being approved for pump in. Once the PIP is approved by DWR, MM-HYDRO-5 will be followed, and the District will follow the water quality monitoring and reporting requirements in the Pump-In Agreement with DWR.

By following the mitigation measures outlined in the DEIR, the impact to HYDRO-2 will be less-than-significant due to the PIP and Pump-In Agreement that needs to be approved and complied with. The PIP will be developed and based on water quality of the new production wells and will follow DWR's most current PIP Policy.

As described in Chapter 3.4.3.5 – Water Quality Impact Analysis of this FEIR, water quality of groundwater in the Recovery Project area is suitable for agricultural use without treatment.

The water quality evaluation conducted for this FEIR meets the Standards of Adequacy of an EIR, as specified in the CEQA Guidelines Section 15151, "An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes environmental consequences into account. An evaluation of environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible…" Further, the EIR meets the requirement to be based on Substantial Evidence, as defined in the CEQA Guidelines Section 15384, "Substantial evidence as used in these guidelines means enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached…".

9.5 Master Response #5 - SGMA

The Recovery Project is among the projects and management actions presented in Section 7 of the BVGSA's BVGSP. The Recovery Project's inclusion in the BVGSP signifies its importance to BVWSD's plan to continue to sustainably manage groundwater in the BVGSA and to contribute to the sustainability of the Kern County Subbasin.

The Project's potential impacts were examined on a basin wide basis without limitation to certain jurisdictional boundaries of surrounding GSAs. Based on the groundwater modeling, the DEIR concluded that the Project, as proposed, would create a less-than-significant impact [DEIR, 3-84]. While currently included within the boundaries of the KGA GSA, the Project Area lands are "Whitelands" and do not have a contract for SGMA coverage with a member of the KGA. Therefore, the Project Area lands will eventually be removed from the KGA and included in the BVGSA. [*see* Master Response #2 and KGA GSP Sec. 1.4.1] As a result, the BVGSP submitted by the BVGSA in January 2020 in conformance with DWR's regulations for preparation of GSPs provides specifics on how the provisions of SGMA would be implemented by the BVGSA and applied to development and operation of the Project facilities. The Project as proposed will comply with all relevant portions of SGMA.

9.5.1 General SGMA Provisions

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 Dickinson, SB 1168 (Pavley), and SB 1319 (Pavley) collectively known as the SGMA. This act lists six sustainability indicators to be used to warn of groundwater conditions occurring throughout a subbasin that, when significant and unreasonable, lead to undesirable results. The six indicators are:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued
2. Significant and unreasonable reduction of groundwater storage

3. Significant and unreasonable seawater intrusion
4. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
5. Significant and unreasonable land subsidence that substantially interferes with surface land uses
6. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

In the BVGSA, undesirable results are associated with four of these sustainability indicators. Significant and unreasonable seawater intrusion is not relevant given the GSA's inland location, and the potential for depletions of interconnected surface waters is not considered given the absence of streams flowing into or through the GSA.

To avoid the occurrence of undesirable results, the BVGSA followed the provisions of SGMA by establishing two SMCs, 1) MTs and 2) MOs as metrics to be observed at representative monitoring sites identified throughout the GSA to guide on-going compliance with SGMA.

Monitoring of these SMCs will inform the GSA as to whether implementation of the BVGSP is meeting the sustainability goals set forth in the plan and to warn about the development of conditions that could lead to undesirable results that would compromise sustainable groundwater management in the Kern County Subbasin. The third SMC, 3) Interim Milestones, is of less importance for management of the BVGSA as the GSA is now being sustainably managed. Thus, the task of the BVGSA is to maintain sustainable management under future conditions, rather than to correct a currently unsustainable condition through a series of actions with progress determined by success in meeting Interim Milestones.

SGMA requires all GSPs in a groundwater basin to be coordinated to achieve basin wide sustainable groundwater management. Accordingly, BVGSA has entered into a coordination agreement with the other GSAs in the Kern County Subbasin. The GSAs in the Kern County Subbasin will continue to work to achieve a coordinated sustainable Kern County Subbasin in compliance with SGMA and acceptable to DWR.

9.5.2 Projects and Management Actions

In addition to presenting detailed descriptions of the SMCs and of the networks of monitoring wells to be used for monitoring groundwater levels, groundwater storage and groundwater quality, the BVWSD GSP also includes a number of Projects and Management Actions designed to enable the BVGSA to remain sustainable in anticipation of the effects of future conditions expected to include:

- Climate change
- Reduced availability of water from the Delta
- Altered timing of flows in the Kern River
- Changes in farming and water management practices

9.5.2.1 Projects

To maintain an effective conjunctive management program needed to sustainably manage groundwater, two types of projects are featured in the BVWSD GSP:

- Replacement of unlined distribution ditches with pipelines to improve BVWSD's ability to serve growers, and
- Construction of dedicated recharge and recovery projects, such as the Palms, to compensate for recharge forgone by pipelining of laterals and to increase BVWSD's capacity to recharge flood flows available through BVWSD's rights to the Kern River and allocations of Article 21 water from the SWP.

As well as supporting groundwater levels and groundwater storage, recharge of high-quality Kern River water is also expected to improve the quality of groundwater stored in the underlying aquifer system. Groundwater recharge will also avoid conditions during prolonged droughts, where withdrawing water from beneath the E-clay would be contemplated, as this step that would reduce the quality of recovered water and threaten to induce subsidence. Therefore, the Palms and other components of the suite of projects proposed in the BVWSD GSP are expected to help the BVGSA sustainably manage groundwater with respect to each of the four relevant sustainability indicators.

9.5.2.2 Management Actions

Management actions presented in the BVWSD GSP include an array of measures that can implemented in the event MTs are breached at RMWs or the productivity of wells in or near the GSA is impacted by lowering of water levels in instances where no breach of MTs takes place. These measures range from gradual reductions in groundwater demand such as land fallowing programs, to rapid responses including curtailment of pumping and well deepening or rehabilitation. Depending upon the cause of the reduction in groundwater levels that triggers a pumping curtailment, the BVGSA may choose to make supplemental surface water available to the affected area to substitute for the reduced access to groundwater. Although not presented in the BVGSA's GSP, another measure aimed at maintaining compliance with SGMA is Mitigation Measure CUM-1 of the DEIR. This measure would defer groundwater recovery prior to groundwater levels reaching their MTs at RMW locations outside of the BVGSA in WKWD and RRBWSD.

A further provision of the BVWSD GSP relevant to operation of the Palms is the language on adaptive management. This language reads as follows,

> As uncertainties and data gaps are reduced with information and insights obtained from the GSA's monitoring networks and from assessment of the performance of newly implemented projects, management actions will be amended accordingly. Furthermore, if in the future DWR mandates certain corrective actions, the GSP will be adjusted to accommodate those new requirements in the Sustainable Groundwater Management Program, GSP Emergency Regulations Guide, p. 4 (DWR, 2016). In this way, projects and management actions can be pursued which reflect the evolving condition of groundwater management within the GSA and the Subbasin, and the current status of SGMA regulations.

Together, these measures are expected to be important for protection of private domestic wells because, as described in Section 5 of the BVWSD GSP – Minimum Thresholds, Measurable Objectives, and Interim Milestones, domestic wells tend to be shallower than other categories of wells and therefore are more vulnerable to interference from the operation of nearby wells. Further, as shown in Section 5 of the BVGSP – Minimum Thresholds, MTs have been set at most representative monitoring sites at levels protective of the operation of nearby production wells. However, due to the greater depth to groundwater in the vicinity of the Project, some wells have been identified where operations would be jeopardized as groundwater elevations approach MTs. Thus, while the cumulative impact modeling presented in the DEIR's Modeling Report indicates groundwater levels at the locations of RMWs RMW-113 and RMW-112 would remain well above the MTs set at these wells, the mitigation measures presented in the BVWSD GSP would be available should production at neighboring wells be affected.

9.5.2.3 Subsidence

As presented in Section 5.7 of the BVWSD GSP – Subsidence, no infrastructure within BVWSD has been observed to have been damaged by subsidence. Thus, while monitoring of land surface elevations described in the BVWSD GSP has detected small levels of subsidence, there is insufficient evidence presented in the BVGSA GSP or in GSPs and other studies developed in neighboring areas to offer a correlation between land surface elevations and groundwater elevations sufficient to allow groundwater levels to serve as a proxy for ongoing or incipient inelastic subsidence.

Given these uncertainties, the BVGSA will join the other GSAs in the Subbasin "to develop a joint subsidence monitoring program to better understand the cause and impacts of subsidence. The intent of the KGA and the other GSAs in the Subbasin is to develop MTs for subsidence for inclusion in the 2025 GSP update." (KGAGSP 2020).

9.5.3 Monitoring and Mitigation

As noted in clarifications made to the Recovery Project description in this FEIR, in areas where the project lies within the boundaries of the BVGSA, the project will adhere to the monitoring and mitigation measures established by the BVGSA GSP. In areas that now lie outside of the BVGSA, the monitoring measures and mitigation measures of the KGA GSA will apply. In the event the District joins the JOC, then the monitoring standards and mitigation measures applicable to facilities operated under the oversight of the JOC would be applied uniformly for the Palms Project. Mitigation measures should be applied recognizing that, as shown in the DWR draft BMP 6 (DWR 2017) and stated in Section 3.3 of the KGA GSP, occasional, localized exceedances of MTs—especially when occurring early in the GSP implementation period or during prolonged droughts—are acceptable and are not violations of SGMA.

9.6 Master Response # 6 – Biology

Several comments related to biological resources indicated the DEIR description of field surveys that were conducted for the proposed Project was inadequate and suggested that the surveys themselves were inadequate for evaluating Project-related impacts on special-status species. The comments also recommended conducting focused surveys for special-status species. As indicated in Section 3.2.1 of the DEIR, multiple biological field surveys were conducted in 2019 and 2020. Additional information about the scope and focus of these surveys is provided below and has been added to this FEIR (Chapter 3.2.1).

As recommended in the CDFW comment letter regarding the NOP, habitat suitability assessments and/or focused species surveys were conducted for special-status plants and animals in the anticipated project footprint and suitable habitat within 50 to 500 feet, depending on the species, habitat conditions, and access.

The most recent and intensive survey effort occurred in early September 2020 and included walking transects in remnant native habitat within 500 feet of the northeast portion of the Recovery Project site anticipated at the time these surveys were conducted (i.e., the Alternative Northeastern Area Layout shown in Section 5.6.2 of the DEIR). Qualified biologists searched for San Joaquin (Nelson's) antelope squirrels (*Ammospermophilus nelsoni*) and physical sign (e.g., suitable burrows/dens, tail drag, tracks, scat, etc.) indicating potential presence of blunt-nosed leopard lizard (*Gambelia sila*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*), and American badger (Taxidea taxus). Vehicle-based surveys were conducted in the remaining portions of the Recovery Project site and adjacent areas, which are dominated by existing roadways and other disturbed land cover, agricultural crops, and existing recharge areas. These surveys were conducted by slowly driving the pipeline alignments and searching for potential features (e.g., burrows and dens) associated with special-status wildlife such as San Joaquin kit fox and western burrowing owl (*Athene cunicularia*), which can occur in human-altered habitats.

Potential San Joaquin kit fox dens were observed within 500 feet of the Alternative Northeastern Area Layout; there was no sign indicating active use of these potential dens by kit fox, but potential for future use was acknowledged. Suitable burrows for both Tipton and giant kangaroo rats were also observed in the survey area, including within 50 feet of this alternative project footprint; however, hay stacking was only observed at burrows farther than 50 feet from the footprint. This portion of the survey area also was identified as suitable habitat for blunt-nosed leopard lizard. In contrast, no San Joaquin antelope squirrels were observed during the field surveys. Because visual detection surveys for this species were consistent with CDFW recommendations regarding timing and temperature, it was determined that this species is absent from suitable habitat adjacent to the northeast portion of the Recovery Project site.

As indicated in Figure 5-2 of the DEIR, the location of wells and pipeline in the northeastern portion of the Recovery Project area was revised for the proposed Project to provide a minimum buffer of 50 feet between the construction footprint and native scrub habitat. Therefore, no suitable habitat for species such as blunt-nosed leopard lizard, Tipton kangaroo rat, or giant kangaroo rat occurs within 50 feet of the Project footprint evaluated in the DEIR, including where protective fencing would be installed as described in Mitigation Measure BIO-1. This mitigation measure has been augmented in this FEIR (*see* Chapter 3.2.3) to clarify that no ground disturbance related to fence installation, maintenance, or removal would occur within 50 feet of suitable habitat for blunt-nosed leopard lizard. Because Tipton kangaroo rat and giant kangaroo rat occur in similar habitat, impacts on suitable habitat for these species also would be avoided.

9.7 Master Response #7 – Regional Groundwater Elevation Contour Mapping and Flow Analysis

Several comments relate to the general description of groundwater levels and flow direction in the vicinity of the Recovery Project. To address these comments, this master response is subdivided into four sections. A brief summary of the content and findings for each of these sections is provided below.

For the "Regional Groundwater Elevation Contour Mapping and Flow Analysis" section, a series of contour maps of measured groundwater elevations were developed to address comments regarding the groundwater flow direction. These maps cover BVWSD and adjacent areas including the KWB, RRBWSD, Semitropic Water Storage District (SWSD), and WKWD as shown on **Figure 9-1**. The groundwater elevation data was compiled from multiple sources including the BVWSD, KFMC and Semitropic Monitoring Committee. Five mapping periods were selected to assess recent groundwater flow patterns under varying hydrologic conditions.

The findings of this analysis are consistent with the interpretation presented in the DEIR. The analysis shows that the Upper Zone groundwater flow across much of BVWSD is southeastward. Furthermore, groundwater flow patterns within the Upper and Lower Zones are distinctly different in areas where the E-clay is more highly developed. In the vicinity of the Recovery Project, groundwater generally flows generally eastward to southeastward. During periods of intensive recharge at the groundwater banks, a more complex local pattern develops where groundwater that inflows into BVWSD from the adjacent banking areas then outflows into western RRBWSD.

In Chapter 9.7.2 – Evaluation of Modeling Results in Context with Regional Groundwater Level Contour Maps, the simulated drawdown from the Recovery Project wells based on the DEIR groundwater modeling results is superimposed onto the groundwater elevation contour maps using the Principle of Superposition (Reilly, Franke and Bennett 1984, 1987). This analysis delineates the estimated area of influence for the Recovery Project wells to better illustrate the areas affected by Project pumping. The findings of this analysis indicate that the groundwater pumped by the Recovery Project under a range of hydrologic conditions is primarily derived from within BVWSD but does extend into the WKWD North Wellfield and the far western areas of RRBWSD.

For Chapter 9.7.3 – Comparison to Other Groundwater Elevation Maps section, groundwater level contour maps of the Recovery Project area were compiled from multiple sources and compared to those prepared for this master response to address comments requesting additional historical groundwater data. The findings demonstrate that the regional groundwater flow in BVWSD, including the general southeasterly groundwater gradient across the southern BVWSD, has been previously documented on groundwater contour maps developed by several agencies, including the commenting agencies, in a manner consistent with the analysis provided in the DEIR.

Chapter 9.7.3 – Hydrogeological Conceptual Model section summarizes the relevant hydrogeological data and interpretations for the western Kern County Subbasin based on readily available documents. This summary demonstrates that the underlying hydrogeological conceptual model incorporated into the technical analysis for the groundwater impacts assessment in the DEIR and this master response are based on well-established technical analyses developed over a period of decades by the USGS, local agencies and others.

The following sections provide a more detailed discussion of the analyses summarized above. The general conclusion of this additional analyses presented here supports the conclusion of the DEIR groundwater impacts analysis that the Recovery Project may cause a potentially significant impact to the groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD that require the DEIR to include mitigation measures.

9.7.1 Regional Groundwater Elevation Contour Mapping and Flow Analysis

For this master response, a series of groundwater elevation contour maps were developed using measured data from BVWSD and other adjacent water agencies to evaluate recent groundwater flow conditions under varying hydrologic conditions.

9.7.1.1 Definition of Aquifer Zones

The regional aquifer system in the Kern County Subbasin is typically subdivided into an Upper and Lower Zone based on the presence of clays, primarily the E-Clay (also referred to as the Corcoran Clay) or its equivalent, that act as local aquitards with differing zones of confined, semiconfined, or unconfined groundwater conditions. These aquifer zone designations are consistent with the aquifer descriptions in the KGA GSP (KGA 2020) and other GSPs in the Kern County Subbasin (**Figure 9-2**). Groundwater elevation contour maps were developed for the zones are defined as follows:

- The Upper Zone is defined as groundwater occurring above the E-clay, or its equivalent. This is consistent with the "Upper Zone" in SWSD defined by Ken Schmidt and Associates (KSA 2020). In the BVGSA, this Upper Zone is referred to as Deep Aquifer zone (*see* Nomenclature of Aquifer Zones in the BVGSA, below). The Recovery Project proposes pumping to occur only in the Upper Zone. The location of Upper Zone wells used in contouring the Upper Zone are shown on **Figure 9-3**.
- The Lower Zone is the primary aquifer zone or "main production zone" which is generally confined below the E-clay and unconfined to semiconfined outside the extent of the E-clay that extends over most of the Kern County Subbasin (**Figure 9-5**). This is consistent with the "Forebay Area and Lower Zone" in SWSD defined by KSA (2020). In BVWSD, the Lower Zone maps include the BVWSD "*Deeper Confined Aquifer*" (*see* Nomenclature of Aquifer Zones in the BVGSA). The location of wells used in contouring the Lower Zone are shown on **Figure 9-4**.

In the Kern Fan area in the RRBWSD and KWB area, the E-clay is not considered to be present (KWBA 2019); however, there are numerous discontinuous clay layers that locally restrict vertical flow. Based on several monitoring well clusters in the banking area, these clay layers create a separation between a shallow unconfined and deeper, semi-confined zones within the regional aquifer (RRBWSD 2020). For this analysis, these zones are mapped with the Upper Zone and Lower Zone, respectively.

The BVGSA's has developed a separate nomenclature for naming the various aquifer zones due to the presence of multiple shallower groundwater zones within their district. Because of this, these designations may have resulted in some confusion on the correlation of these different aquifer zones. For this analysis, the BVWSD aquifer zone "*Deep Aquifer*" is included in the Upper Zone maps and the "*Deeper Confined Aquifer*" are included in the Lower Zone maps.

9.7.1.2 Data Sources Used in Analysis

Groundwater elevation data for each zone were compiled from local groundwater level monitoring data. Due to the proximity of these various monitoring programs, several monitoring locations are including in two or more of these data sources. These data sources include:

- BVWSD Monitoring Program – BVWSD measures groundwater levels for their groundwater management program from 22 District-owned wells and 57 grower wells (BVWSD 2014). Of these wells, four wells are completed in the Lower Zone and the rest are completed in the Upper Zone. Thirteen of the District-owned are included in BVGSA's SGMA monitoring network (BVGSA 2020). In addition, BVWSD collects data from an additional 80 piezometers, but these are for a local perched aquifer above the Upper Zone and are not included on these maps.
- SWSD Water Banking Project Monitoring Program – A monitoring committee was established to develop, review, and oversee a groundwater monitoring program of the SWSD water banking project. SWSD collects water level measurements from numerous water supply and dedicated monitoring wells within SWSD and compiles additional measurements from surrounding agencies. These data are reported in biennial groundwater monitoring reports (SWSD GSA 2020, KSA 2020).
- Kern Fan Monitoring Committee – The KFMC monitors groundwater levels from over 50 monitoring wells, including several nested well locations that monitor multiple vertical zones, in the lower Kern River or Kern Fan area (Todd Groundwater 2018; KFMC 2021). The Kern Fan Monitoring Plan describes frequencies for water level measurements in both monitoring wells and recovery wells (KWBA 2019).
- Kern County Subbasin SGMA Monitoring – To meet the ongoing requirements of SGMA, semi-annual groundwater level measurements from a basin-wide network of over 200 monitoring wells were documented in the Kern County Subbasin GSA's annual report (Todd Groundwater 2021). This document was submitted to the DWR to satisfy the Department's SGMA reporting requirements.

9.7.1.3 Approach

The mapping data set was developed for the period from 2015 through 2019. This period represents a range of recent seasonal and operational conditions, including severe drought, high rainfall years, and active groundwater banking operations. The mapping data was not extended beyond 2019 because a complete data set for 2020 was not available at the time of this analysis. Groundwater elevations in this discussion are provided in feet relative to msl with positive values being above msl and negative values being below msl. Separate groundwater elevation contour maps were constructed of the Upper and Lower Zones for five different periods from 2015 to 2019 to represent differing hydrologic conditions.

Aquifer zone assignments for monitoring well data remained consistent with the zone designations from the original data source. The contouring of these data was conducted using the SURFER geologic mapping software by Golden Software by applying the kriging gridding method. Groundwater elevation contour maps were prepared using the available data from each of the above-listed groundwater monitoring programs.

Groundwater flow is also influenced by the local geology. **Figure 9-5** illustrates important geologic structures and the approximate extent of the continuous layer of E-Clay based on mapped interpretation by Croft (1972), Page (1986) and PGA (1991). Additional information on the definition of the aquifer zones, distribution of the E-clay, and the structural geology is provided in the sections entitled *Hydrogeological Conceptual Model*.

9.7.1.4 Upper Zone Groundwater Elevation Contour Maps

Upper Zone groundwater elevation contour maps were developed for the following five periods, and are shown on the following figures:

- **Figure 9-6** – Spring 2015
- **Figure 9-7** – Fall 2016
- **Figure 9-8** – Spring 2017
- **Figure 9-9** – Spring 2018
- **Figure 9-10** – Spring 2019

The Upper Zone maps (**Figures 9-6** – **9-10**) shows some general trends. The highest groundwater elevations typically occur the northern areas of BVWSD and SWSD with groundwater elevations as high as 210 feet msl. Groundwater levels in the south, primarily in the Kern Fan area (KWB and RRBWSD), are highly affected by groundwater banking operations. Groundwater flow is primarily southward except near the groundwater banks.

In the far northern areas of SWSD, Upper Zone groundwater flow is generally towards the southeast from an area of high groundwater levels in the vicinity of the Kern Wildlife Refuge. In areas of BVWSD and SWSD where the E-clay is a thick, continuous clay layer, it forms an effective hydraulic barrier to vertical groundwater flow (BVWSD 2014, BVGSA 2020, SWSD GSA 2020, KSA 2020). In the southern areas of SWSD, few to no contours are shown because of a lack of Upper Zone wells. In this area, the E-clay is interpreted to become increasingly discontinuous towards the south and southeast (**Figure 9-5**) resulting in limited areas of Upper Zone groundwater (SWSD GSA 2020, KSA 2020)**.**

A persistent area of high groundwater elevations occurs in the far northern areas of BVWSD. From this area, groundwater flow bifurcates with a northeastward flow component towards SWSD and a southeastward component through the central areas of BVWSD (**Figures 9-6 – 9-10**). This bifurcation appears related to the adjacent geologic structure of the Buttonwillow Anticline. Across the southern BVWSD area, groundwater flow is generally towards the southeast. Groundwater from BVWSD generally flows into RRBWSD and KWB areas south of the Bowerbank Anticline.

In the KWB and RRBWSD areas, groundwater levels are highly affected by groundwater banking operations. In 2015, significant groundwater pumping occurred to recover banked water. As a result, the Upper Zone groundwater elevations are as low as 30 feet msl (**Figure 9-6**). In 2016 and early 2017, there was less groundwater recovery but limited recharge. During these times, the lowest groundwater elevations (50 feet msl) occurred in the KWB (**Figures 9-7**, **9-8**). In Spring 2017 (**Figure 9-8**), higher groundwater elevations along the Kern River reflect increased recharge from the river due to high seasonal rainfall that year. However, this map is based on data collected early to the initiation of major recharge

operations at the groundwater banks, so the Spring 2017 map does not show the development of a groundwater mound in those areas.

During 2018 and 2019, groundwater elevations in the KWB and RRBWSD of over 200 feet msl occur as a result of significant recharge in prior years. During these periods, the lowest groundwater elevations (less than 90 feet msl) occurred in the RRBWSD (**Figures 9-9**, **9-10**). The low groundwater levels in this area reflect the absence of an effective E-Clay which allows for increased vertical groundwater flow from the Upper Zone to the Lower Zone that contributes to a depression in the Upper Zone groundwater elevations seen in this area.

In the vicinity of the Recovery Project, groundwater flow in the Upper Zone is highly variable due to operations of the major Kern Fan groundwater banking projects. When groundwater recovery is occurring, groundwater flow continues southeastward from BVWSD towards the major Kern Fan groundwater banking projects (**Figures 9-6**, **9-7**, **9-8**).

During periods of significant groundwater recharge by the Kern Fan groundwater banking projects, groundwater flows radially away from the major recharge locations. At these times, groundwater flow near the Recovery Project area has a local northerly or westerly component. Where this westerly groundwater flow from the Kern Fan groundwater banks meets the southeasterly flow from the northern areas of BVWSD, the groundwater gradient curls around to the northeast so that groundwater flows into far western areas of RRBWSD south of the Bowerbank Anticline (**Figures 9-9**, **9-10**).

9.7.1.5 Lower Zone Groundwater Flow Discussion

Lower Zone groundwater elevation contour maps were developed for the following five periods and are shown on the following figures:

- **Figure 9-11** – Spring 2015
- **Figure 9-12** – Fall 2016
- **Figure 9-13** – Spring 2017
- **Figure 9-14** – Spring 2018
- **Figure 9-15** – Spring 2019

The Lower Zone maps (**Figures 9-11 – 9-15**) also shows some general trends. The highest groundwater elevations typically occur the southern areas whereas the lowest groundwater elevations occur in the north. The Lower Zone, the lowest groundwater elevations occur in northern SWSD where groundwater elevations ranging from -60 to -100 feet msl (note: these are below sea level). The highest groundwater elevations in the Lower Zone occur in the RRBWSD and KWB in the southern parts of the mapped area; however, the groundwater elevations in this area are highly variable due to ongoing groundwater banking operations.

Groundwater flow in the Lower Zone in generally northward and appears unaffected by the presence of geologic structures. This is interpreted to represent that below the E-Clay, the stratigraphic sequence is thick and generally permeable with no major clay layers that affect either vertical or horizontal

groundwater movement within the Lower Zone. Therefore, the groundwater elevation contours typically show a more continuous flow pattern in the Lower Zone than in the Upper Zone.

In BVWSD, the Lower Zone groundwater flow direction is generally from west to northwest towards the area of lowest groundwater in SWSD. As noted above, groundwater flow in the Lower Zone is not affected by the presence of geologic structures. In the vicinity of the Recovery Project, groundwater flow in the Lower Zone is also affected by the major nearby groundwater banking projects; however, the Lower Zone groundwater flow near the Recovery Project is generally northward.

During 2015, significant pumping in the Kern Fan area resulted in groundwater elevations of as much as 20 feet below sea level in the KWB (**Figure 9-11**), whereas the highest 2015 groundwater elevations occurred in RRBWSD with groundwater elevations above 60 feet msl. Groundwater flow near the Recovery Project in 2015 had an eastward component towards the KWB in addition to the general northerly groundwater flow direction (**Figure 9-11**).

In 2016 and early 2017, less groundwater recovery occurred, and some limited groundwater recharge occurred. During these years, the highest groundwater levels of over 60 feet msl occurred along the Kern River (**Figures 9-12, 9-13**). Groundwater flow in the Lower Zone near the Recovery Project was primarily to the north and northeast.

In 2018 and 2019, during periods of significant groundwater recharge by the Kern Fan groundwater banking projects, groundwater flowed radially away from these major recharge locations. During this time, the highest groundwater elevations reached over 200 feet msl in the KWB due to the groundwater recharge (**Figures 9-14**, **9-15**). In 2018 and 2019, the Project area received local groundwater inflow from the KWB; however, this flow shifts around to a more northerly direction to the north of the Recovery Project area (**Figures 9-14**, **9-15**).

9.7.1.6 Summary

Regionally, the groundwater maps show distinct differences between the Upper and Lower Zone (**Figures 9-6 – 9-15**). Groundwater flow in the Upper Zone is generally southward, except near the groundwater banks where it is highly variable, whereas groundwater flow in the Lower Zone is generally northward. Groundwater flow in the Lower Zone appears unaffected by the presence of geologic structures and the groundwater flow shows a more continuous pattern than in the Upper Zone.

The groundwater elevations are highly influenced by the character of the E-Clay (**Figure 9-5**). Where the E-clay is a continuous confining layer, groundwater elevations and flow directions in the Upper Zone are distinct from those in the Lower Zone. In BVWSD and SWSD, the E-Clay forms an effective hydraulic barrier to vertical groundwater flow that separates the Upper Zone from the Lower Zone (**Figure 9-2**). In this area, the difference in groundwater elevations between the Upper and Lower Zones is up to 200 to 300 feet, whereas in the south, where the E-clay is discontinuous or absent, the difference is in the tens of feet or less.

Upper Zone groundwater flow in this area is also affected the geologic structures, especially the northwest-southeast oriented anticlines and synclines (**Figures 9-5**; **9-6** – **9-10**). The E-Clay is interpreted as being deposited prior to the deformation that formed these geologic structures (Croft 1972, Bartow 1991). In

areas where the elevation of the E-Clay over the Buttonwillow, Bowerbank and Semitropic Anticlines is higher than the measured groundwater elevations, the anticlines form a barrier to groundwater flow in the Upper Zone. In these areas, groundwater typically flows along the axis of the adjacent syncline but not over the anticline (Wood and Davis 1959, Croft 1972, Page 1986). Additional discussion of the geologic influences on groundwater flow is provided in the section titled "*Hydrogeological Conceptual Model"*.

In the Recovery Project area, these groundwater contours and flow directions for the Upper Zone (**Figures 9-6 – 9-10**) show a general southeasterly groundwater flow direction across BVWSD. During periods of intensive recharge at the Kern Fan groundwater banking operations, groundwater flow from this area affects the southern areas of BVWSD causing a local westward groundwater flow along the boundary with BVWSD that then curls around to the northeast and flows into western areas of RRBWSD. A similar phenomenon is observed in the Lower Zone; however, groundwater flow in the Lower Zone away from the Kern Fan groundwater banking operations shows a more consistent northward flow direction (**Figures 9-11 – 9-15**).

9.7.2 Evaluation of Modeling Results in Context with Regional Groundwater Level Contour Maps

One advantage of the superposition modeling approach used in the DEIR is that the model results can be applied to measured data to evaluate the scale of the simulated change in groundwater levels relative to measured data at the equivalent time. The purpose of this analysis is to evaluate the potential drawdown from the Recovery Project in the context of regional groundwater flows to address concerns that pumping by the Recovery Project would affect the water supply in areas outside of BVWSD.

Figure 9-16 shows the total drawdown that occurred during the 1st year of the Operational Scenario A as described in **Appendix D** of this FEIR. The 1st-year drawdown was calculated by subtracting the simulated groundwater elevations from the month prior to pumping from those from the last month of pumping. Under this scenario, a total of 25,000 AF of pumping is evenly distributed among the 14 Recovery Project wells. By applying the 1-year drawdown without including the effects of the associated recharge is a conservative assumption for this analysis. Using the SURFER geologic mapping software, the calculated 1-year drawdown from the superposition model is applied to the appropriate Upper Zone groundwater elevation map (**Figures 9-6 – 9-10**). Five maps were developed that include:

- **Figure 9-17** – Superposition model results applied to the Upper Zone Spring 2015 groundwater elevation contour map
- **Figure 9-18** – Superposition model results applied to the Upper Zone Fall 2016 groundwater contour map
- **Figure 9-19** – Superposition model results applied to the Upper Zone Spring 2017 groundwater contour map
- **Figure 9-20** – Superposition model results applied to the Upper Zone Spring 2018 groundwater contour map
- **Figure 9-21** – Superposition model results applied to the Upper Zone Spring 2019 groundwater contour map

The results of this assessment show that the drawdown from the Recovery Project does not significantly change the regional groundwater flow directions. Comparing **Figures 9-17** through **9-21** to **Figures 9-6** through **9-10** shows that only the contours in the immediate vicinity of the Recovery Project are affected while the regional groundwater flow patterns remain the same. In addition, the estimated area of influence for the Recovery Project wells is shown as the shaded areas on **Figures 9-17** through **9-21**. The estimated areas of influence are hand-drawn based on applying standard groundwater flow line analysis for defining the estimated area of influence for the Recovery Project wellfield by extending it upgradient within the area of calculated drawdown. This analysis shows the effect of varying groundwater conditions in the Kern Fan Area on the potential source areas for the Palms Recovery wellfield. The estimated areas of influence on all five maps (**Figures 9-17 – 9-21**) are located primarily within BVWSD but extend into adjacent areas near the WKWD North Wellfield and western RRBWSD.

To evaluate the potential impacts from multi-year pumping, a similar approach was applied using the results of Operational Scenario B (**Appendix D** of this FEIR) including the recharge event. In Operational Scenario B, the simulated groundwater banking operations represent a maximum scenario where the recovery pumping is applied in 4 consecutive years. This scenario follows the sequence described below:

- 1-year of groundwater recharge (100,000 AFY) within BVWSD
- A gap year with no Project recharge or pumping
- 4 years of pumping at the Recovery Project wells to recover 90% of the Project recharge (90,000 AF) with the remaining 10% (10,000 AF) representing a planned leave-behind of recharge water for the benefit of the basin

The drawdown at the end of the 4th year of groundwater pumping (**Figure 14**, **Appendix D** of DEIR) is applied to the Fall 2016 Upper Zone groundwater elevation contour map (**Figure 9-7**). The Fall 2016 groundwater elevation map provides a realistic hydrologic background condition for operation of the Recovery Project during a severe drought. The groundwater contour map for Fall 2016 already incorporates the effects of the existing groundwater banking operations. The sequence is equivalent to recharge applying recharge in BVWSD in 2011, which was a wet year, followed by pumping occurring at the Recovery Project during the drought years of 2013 through 2016.

The resulting groundwater elevations and areas of influence of applying the simulated drawdown after 4 years of pumping applied to the Fall 2016 map are shown on **Figure 9-22**. Overall, the drawdown associated with the pumping is distributed over a wider area. The estimated area of influence is distributed over southern areas of BVWSD and extends into some adjacent areas with a pattern similar to that shown on **Figure 9-18**.

The purpose of this analysis is to address comments that the Recovery Project would affect the overall water supply in areas outside of BVWSD. The analysis shows the estimated area of influence is located primarily within BVWSD; however, it does extend into adjacent areas primarily in the WKWD North Wellfield and adjacent areas of RRBWSD. The result of this analysis is, therefore, consistent with the DEIR conclusion that the Recovery Project may cause a potentially significant impact to the groundwater levels at the WKWD North Wellfield and the far western areas of RRBWSD that required the DEIR to include mitigation measures.

9.7.3 Comparison to Other Groundwater Elevation Maps

Groundwater elevation contour maps have been developed by other monitoring programs. These maps are provided here for comparison to the groundwater elevation maps developed herein. In general, these maps are based on comparable data sets and demonstrate that the groundwater flow in the Upper and Lower Zones in and around the BVWSD Palms Recovery Site has been consistently mapped by various local agencies over time.

9.7.3.1 BVWSD Monitoring Program

BVWSD has a monitoring network of over 50 wells that is used to develop groundwater elevation contour maps over the entire district (BVWSD 2014, BVGSA 2020). BVWSD refers to these as the "deep aquifer" maps, which corresponds to the Upper Zone as defined in this master response (*see* "*Nomenclature of Aquifer Zones in the BVGSA"* below). The following figures provide Upper Zone groundwater elevation contour maps developed by BVWSD as part of their ongoing groundwater monitoring program. These maps include:

- **Figure 9-23** – Upper Zone for Spring 2013
- **Figure 9-24** – Upper Zone for Spring 2014
- **Figure 9-25** – Upper Zone for January 2015
- **Figure 9-26** – Upper Zone for October 2019
- **Figure 9-27** – Upper Zone for March 2020

Figure 9-23 through **9-27** show a series of maps from 2013 through 2020. These maps show a consistent southeasterly groundwater flow direction in the Upper Zone across the central and southern areas of BVWSD. This general southeasterly groundwater flow in BVWSD conforms with interpretations of groundwater outflow along the southeastern margin of BVWSD described by Sierra Scientific Services (2013).

Along the southeastern margin of the BVWSD, groundwater flow directions are more variable as they are strongly influenced by the intensive groundwater recharge projects at the KWB and other banking projects. During periods of high rates of recovery at the groundwater banks, the groundwater flow direction remains southeastward across the Recovery Project area due to the extensive drawdown at the groundwater banks (**Figures 9-23, 9-24, 9-25**). However, during periods of high recharge, groundwater flow directions in southern areas of BVWSD shift to a northwestward direction in response to groundwater mounding in the Kern Fan area (**Figures 9-26, 9-27**). Where this westerly groundwater flow from the Kern Fan groundwater banks meets the southeasterly flow from the northern areas of BVWSD, the groundwater contours show the formation of a small depression, but groundwater may also flow into far western areas of RRBWSD.

9.7.3.2 SWSD Water Banking Project Monitoring Program

The SWSD Water Banking Project Monitoring Program was established to 1994 to monitor the effects of water banking operations based on groundwater levels in areas within and adjacent to SWSD. Biennial groundwater monitoring reports provide annual groundwater elevation contour maps of spring

groundwater conditions. These reports are provided to members of the monitoring committee representing the SWSD and five adjoining districts, the SWSD banking partners, the KCWA, and other interested parties who participate in committee activities (SWSD GSA 2020, KSA 2020).

The recent Biennial Report (KSA 2020) contained groundwater elevation contour maps for Spring 2017, 2018 and 2019 for both the Upper and Lower Zones. The following figures provide the portion of these groundwater elevation contour maps that most closely corresponds to the mapped area shown in **Figures 9-6** through **9-15** to provide a more direct comparison of the maps. These maps include:

- **Figure 9-28** – Upper Zone for Spring 2017
- **Figure 9-29** – Upper Zone for Fall 2018
- **Figure 9-30** – Upper Zone for Spring 2019
- **Figure 9-31** – Lower Zone for Spring 2017
- **Figure 9-32** – Lower Zone for Spring 2018
- **Figure 9-33** – Lower Zone for Spring 2019

The area covered by **Figures 9-28** through **9-33** does not extend beyond the southern boundary of the SWSD. However, these maps do overlap a large part of the Upper and Lower Zones included in this master response (**Figures 9-6 – 9-15**). Overall, the Upper Zone groundwater contours and flow directions from the SWSD maps (**Figures 9-28, 9-29, 9-30**) show a strong correlation to the master response Upper Zones maps (**Figures 9-8, 9-9, 9-10**). There are some minor discrepancies in contouring in the Upper Zone on how groundwater flow is mapped in the vicinity of the Buttonwillow, Bowerbank, and Semitropic Anticlines (**Figure 9-5**). With respect to groundwater flow in the Upper Zone within BVWSD, these maps show a general southeasterly groundwater flow direction that is consistent with the groundwater flow shown on **Figures 9-8, 9-9,** and **9-10** and as described in the DEIR.

Similarly, the Lower Zone groundwater contours and flow directions on the SWSD maps (**Figures 9-31, 9-32, 9-33**) show a general northward groundwater flow direction consistent with the master response Lower Zones maps (**Figures 9-13, 9-14, 9-15**).

9.7.3.3 Kern Groundwater Authority Umbrella GSP

For the KGA GSP (KGA 2020), groundwater elevation contour maps were developed for Spring 2015 for both the Upper and Lower Zones (**Figure 9-2**). The following figures provide the portion of these groundwater elevation contour maps that correspond to the mapped area shown in **Figures 9-6** through **9-15** to provide a more direct comparison of the maps. These maps include:

- **Figure 9-34** – Upper Zone for Spring 2015
- **Figure 9-35** – Lower Zone for Spring 2015

The master response groundwater elevation contour map for Spring 2015 (**Figure 9-6**) is consistent with on the KGA map for this same time period (**Figure 9-34**). Groundwater elevations during Spring 2015 in the Upper Zone in the north central part of the Subbasin ranged from 220 ft msl to 160 ft msl (KGA 2020). In the northern half of the mapped area, groundwater in the Upper Zone flows northeasterly. Within the

southern half of the mapped area, groundwater flows southeasterly; however, locally this flow may be affected by the Buttonwillow, Bowerbank, and Semitropic Anticlines (**Figure 9-5**).

The master response groundwater elevation contour map for Spring 2015 (**Figure 9-11**) is consistent with the KGA map for this same time period (**Figure 9-35**). Groundwater elevations during Spring 2015 in the Lower Zone (main production zone) of the aquifer system ranged from less than -100 ft msl in the north-central part of the Subbasin to greater than 300 ft msl in the eastern and southeastern part of the Subbasin. In general, groundwater flow directions reported are consistent with historical trends. Groundwater north of the Kern River generally flows to the north toward concentrations of groundwater pumping wells in the north.

9.7.3.4 Kern Fan Monitoring Committee

The KFMC monitors groundwater levels from numerous monitoring wells and recovery wells in the lower Kern River area following the Kern Fan Monitoring Plan (Todd Groundwater 2018, KWBA 2019). There was a period when the KFMC produced groundwater elevation contour maps for the Kern Fan Area; however, more recent maps are unavailable. The following figures show groundwater elevation contours for the following periods:

- **Figure 9-36** – Middle Zone for Spring 2007
- **Figure 9-37** – Middle Zone for Spring 2008
- **Figure 9-38** – Middle Zone for Spring 2009
- **Figure 9-39** – Middle Zone for Spring 2010

On all four of these maps, the area under BVWSD is mapped as a separate area with the note "*Contours in this area represent shallow groundwater*." This area shows a consistent southeasterly groundwater flow direction on all four maps. The area is outlined by a dashed line, and the contours to the east do not correspond to those in the BVWSD area. Groundwater flow in this area in consistently to the north on all four maps. The Middle Zone used for these maps is generally consistent with the Upper Zone defined for this master response; however, the northern area of this map appears to represent a transition between the Upper and Lower Zones.

Figures 9-36 and **9-37** represent a period following extensive groundwater recharge in the Kern Fan area. As a result, groundwater elevations over 300 feet msl are noted in Spring 2007 (**Figure 9-36**); however, these decline to a maximum of about 220 feet msl in Spring 2008 (**Figure 9-37**). **Figures 9-38** and **9-39** represent a period of extensive groundwater recovery in the Kern Fan area. Groundwater levels below 100 feet msl are noted in Spring 2009 (**Figure 9-38**); however, these declined to below 60 feet msl in Spring 2010 (**Figure 9-39**).

In the Recovery Project Area, the groundwater flow patterns are consistent with those observed on the 2015 to 2019 maps (**Figures 9-6 – 9-15**) as discussed above. During periods of extensive groundwater recharge, the direction of groundwater flow in the Recovery Project area has a local north and west component. In the southern areas of BVWSD, the flow from the Kern Fan groundwater banks meets the general southeasterly flow from the northern areas of BVWSD. Where water from these two sources meet, the groundwater gradient curls around to the north and northeast. During periods of groundwater recovery

in the Kern Fan area, groundwater flow continues southeastward from BVWSD towards the major Kern Fan groundwater banking projects.

9.7.3.5 Summary

Overall, the groundwater contours and flow directions shown on **Figures 9-23** through **9-39** that were produced by several different monitoring programs show a strong correlation to the groundwater contours and flow directions shown on **Figures 9-6** through **9-15**. In the Upper Zone, these maps show a general southeasterly groundwater flow direction in the central and southern BVWSD area that is consistent with the direction of groundwater flow shown on **Figures 9-6** through **9-10** and as described in the DEIR. This compilation of maps demonstrates that the groundwater flow directions described in the DEIR are consistent with the accepted interpretations of groundwater gradients and flow made by multiple water agencies in the area.

9.7.4 Hydrogeological Conceptual Model

The groundwater elevation contour maps, primarily for the Upper Zone, took into consideration the influences of distribution of the E-Clay and geologic structures shown on **Figure 9-5**. The following provides some additional information on the local hydrogeology.

9.7.4.1 Nomenclature of Aquifer Zones in the BVGSA

Within the BVGSA, the Tulare Formation is subdivided by three clay layers (A, C, and E-clay layers) that form distinct groundwater zones within the District and are described below:

- The Perched Aquifer is above the uppermost of the clay layers, the A-clay that is found throughout the northern portion of the BVGSA. The A-clay occurs 20-30 feet bgs and is the cause of the shallow, perched groundwater identified in piezometers throughout the northern part of the BVGSA.
- The shallow aquifer is between the A- and C-clays. The C-clay is about 30 feet thick and occurs at a depth of about 200 feet bgs. The C-clay is laterally discontinuous and has little influence on regional groundwater flow.
- The deep aquifer is between the C- and E-clays. The E-clay occurs at depths ranging from 300-450 feet bgs and is a known barrier to vertical flow of groundwater. This zone provides the primary groundwater supply within BVWSD and is mapped as the Upper Zone for this master response.
- The deeper confined aquifer occurs below the E-clay. Monitoring wells completed in this zone are located in the southernmost areas of BVWSD and this zone is not used for groundwater production because of concerns regarding water quality and the risk of inducing subsidence. This zone is mapped as the Lower Zone for this master response.

Shallow groundwater occurs locally above the A-Clay or C-Clay in both BVWSD and SWSD (BVWSD 2014, BVGSA 2020, SWSD GSA 2020, KSA 2020). However, groundwater occurring above the A-Clay or C-Clay forms localized perched zones that do not result in consistent regional patterns of groundwater flow due to the lateral discontinuity of these clay units (KGA 2020). Therefore, these shallow perched zones are not included in the groundwater maps presented in this master response.

9.7.4.2 Geologic History Overview

A key factor affecting the regional aquifers is the geologic deformation associated with the development of the Valley. **Figure 9-5** shows the location of the major geologic structures termed anticlines and synclines in the area. Anticlines are folds that form a ridge where the limbs of the fold dip away from the crest. Synclines are folds that form a trough where the limbs of the fold dip towards the trough. These geologic structures influence the occurrence and movement of ground water in western Kern County (Wood and Davis 1959, Wood and Dale 1964, Bartow 1991, Page 1986).

The primary geologic structure is the San Joaquin Valley Syncline. Throughout the Late Jurassic, Cretaceous, and early Tertiary Periods of geologic time, the greater Valley was a large marine basin which was being filled with marine sediments shed into the region from the rising Sierra Nevada (Bartow 1991). These sediments formed a thick accumulation of sandstones, siltstones, and shales referred to as the Great Valley Sequence (Page 1986). Formation of the basin created a large, asymmetrical, northwestward-trending syncline along the western side of the Valley. Locally within Kern County, the San Joaquin Valley Syncline is referred to as the Buttonwillow Syncline (BVGSA 2020) or the Buena Vista Slough (Croft 1972).

During Pliocene and Pleistocene times, the Valley was filled with a thick sequence of continental sediments (Page 1986, Croft 1972, Wood and Dale 1964). Two formations are defined that are generally differentiated based on the source area of the sediments. The Tulare Formation occurs in western Kern County Subbasin and contains up to 2,200 feet of interbedded sand and, clay layers derived primarily from Coast Range sources. The Kern River Formation includes from 500 to 2,000 feet of poorly sorted, lenticular deposits of clay, silt, sand, and gravel derived from the Sierra Nevada. The combined Tulare and Kern River Formations for the primary Principal Aquifer for the Kern County Subbasin (KGA GSA 2020).

A major feature of the Pleistocene paleogeography was the large lake, the Corcoran Lake, that occupied nearly the whole valley for a brief interval near the middle of the Pleistocene (Bartow 1991). Six clay tongues, representing deposits formed from this lake formed the southwestern Valley area. These are designated in descending order by the letters A through F (Croft 1972). The E-Clay layer is identified as a regional aquitard in western Kern County that divides the Tulare Formation into upper and lower aquifer zones (KGA GSA 2020). During the deposition of the E-Clay, the topographically low San Joaquin Valley Syncline (**Figure 9-5**) was inundated by the Pleistocene Corcoran Lake and that led to the distribution of the E-Clay in BVWSD and SWSD (Croft 1972).

The westside fold belt extends along the southwest side of the valley syncline in the southwesternmost Valley and Temblor Ranges (Wood and Davis 1959, Wood and Dale 1964, Bartow, 1991). This area is characterized by Cenozoic folds and faults that formed by compressional stress associated with the San Andreas fault system and development of the Coast Ranges. These features trend, for the most part, along a northwest-southeast direction. The first folds in the Temblor Range date from the late early Miocene, whereas the easternmost anticlines in the fold belt (Buttonwillow, Bowerbank, and Semitropic anticlines) are entirely Pleistocene in age (Bartow 1991).

The E-Clay was deposited prior to the deformation of the westside fold-belt; therefore, the E-Clay was originally deposited as an essentially flat layer. However, it was later deformed during the development

of the westside fold belt. As a result, the E-Clay occurs at varying depths that are higher over the anticlines and lower within the synclines (Bartow 1991; Croft 1972).

Over the Buttonwillow, Bowerbank and Semitropic Anticlines, there appear to be areas where the elevation of the base of the E-Clay is topographically higher than the Upper Zone groundwater elevations. Where this occurs, the anticlines form barriers to groundwater flow across the anticlines. As are result, Upper Zone groundwater in the area of these folds tends to flow parallel to occur within the synclines between the anticlines. Thus, the Upper Zone ground water is interrupted or deflected in several places by these southeastward-trending anticlinal structures (Bartow 1991; Wood and Davis 1959; Croft 1972; Page 1986). The contours on **Figure 9-40** show that the bottom of the E-Clay has lower elevations in the synclines and higher elevations over the anticlines as a result of the deformation that took place during the development of the westside fold belt (PGA 1991).

9.7.4.3 Distribution of the E-Clay

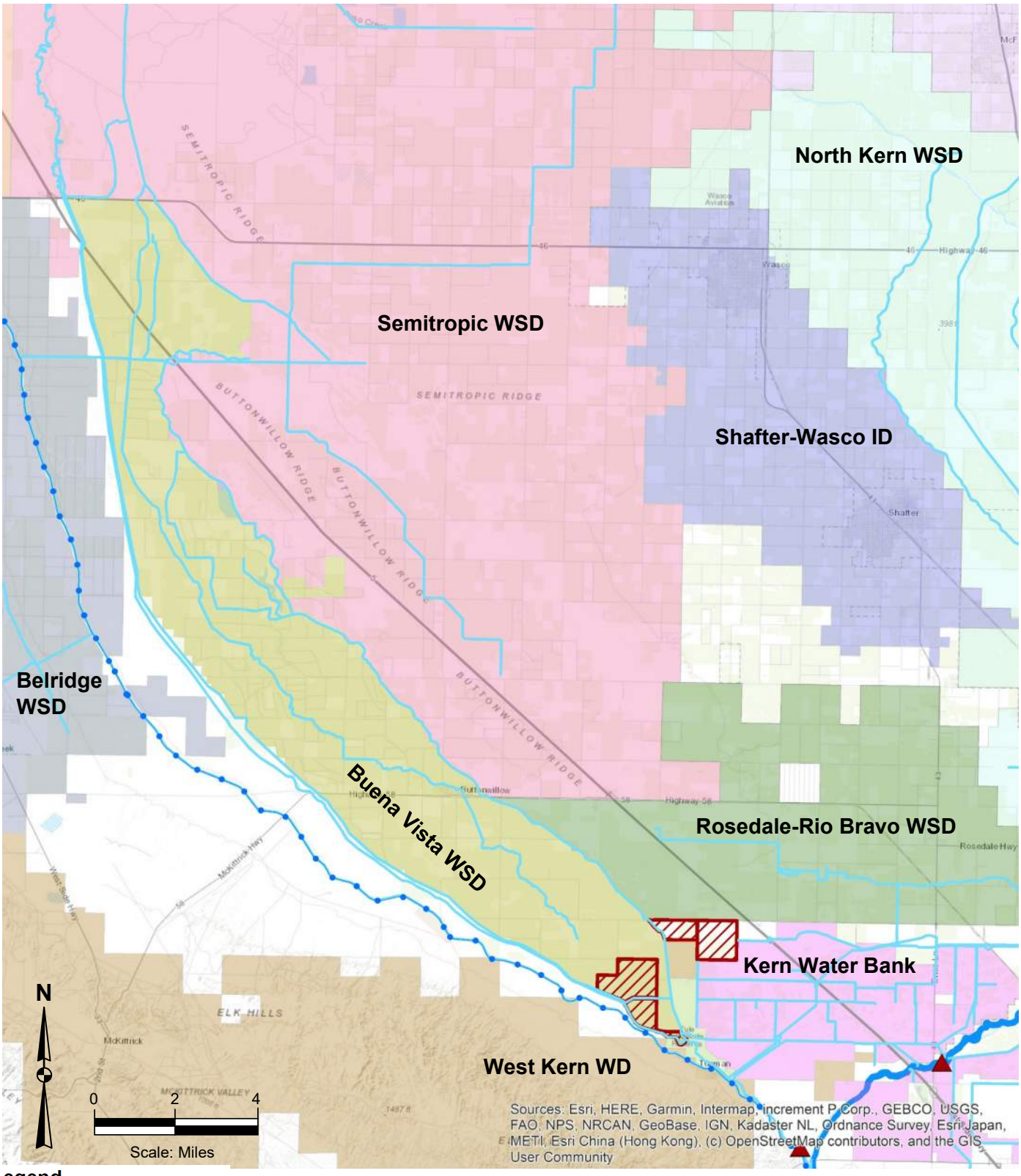
Within the Tulare Formation, several distinct clay layers, or members, are defined using letter designations with the A-clay being the shallowest and the E-Clay, the deepest. The most significant clay layer with respect to groundwater is the E-Clay. As described previously, where the E-Clay is present (**Figure 9-5**), the aquifer system is typically defined as a deeper confined zone (Lower Zone) and an upper unconfined zone (Upper Zone). **Figure 9-40** shows the extent and elevation of the E-Clay based on the 1991 KCWA report (PGA 1991).

The E-Clay ranges from 20 to 100 feet in thickness and ranges in depth from 300 feet 450 (bgs) (Faunt et al, 2009 SWSD GSA 2020, KSA, 2020). The E-clay is present under much of BVWSD and SWSD but becomes discontinuous to absent in areas to the south. Marginally, the E clay bifurcates into multiple layers that probably represents fluctuating lake levels of the Pleistocene Corcoran Lake during deposition, thus making the margin of the E-clay is difficult to identify in this area (Croft 1972; Bartow 1991).

Several different interpretations of the extent of the E-clay have been defined by the USGS and others (Croft 1972; Page 1983, 1986; PGA 1991) as shown on **Figure 9-5**. In general, these interpretations generally agree except along the margins. In the vicinity of the Recovery Project, these interpretations have some differences. The Page (1986) interpretation defines the E-clay as underlying the western KWB and the Project area, whereas the PGA (1991) ends the E-clay north of the KWB and Project area. The Croft (1972) includes a narrow band of E-clay along the Elk Hills that underlies the Project area but does not extend under the KWB.

In most of the area south of Seventh Standard Road and east of Wasco (**Figures 9-5, 9-40**), the E-Clay layer is discontinuous or absent and the aquifer system is typically described as a single aquifer (KSA 2020). The fine-grained strata present in this area within the interval correlated to the E-Clay are assumed to not function as effective confining beds. As a result, groundwater levels in shallow and deep water-producing strata in the forebay area tend to be at about the same depth at most locations during periods of minimal pumping. However, even in these areas, the presence of local discontinuous clay layers restricts vertical flow creating a separation between a shallow unconfined aquifer and a deeper semi-confined aquifer that results in the groundwater elevation differences observed in nested monitoring wells.

9.7.5 Figures for Master Response #7



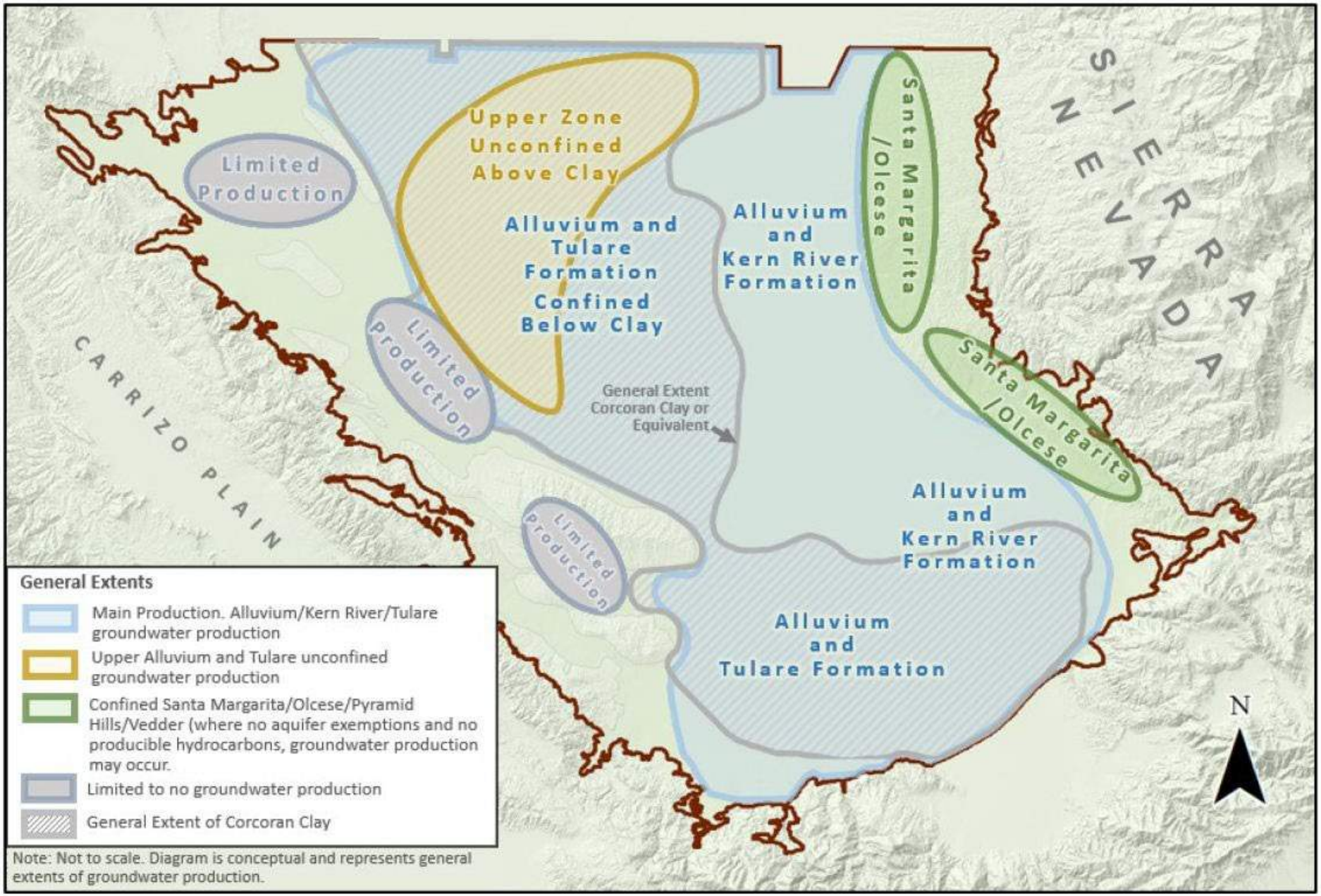
Legend

- Kern River Gauge
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Geologic Structure
- Kern River

July 2021

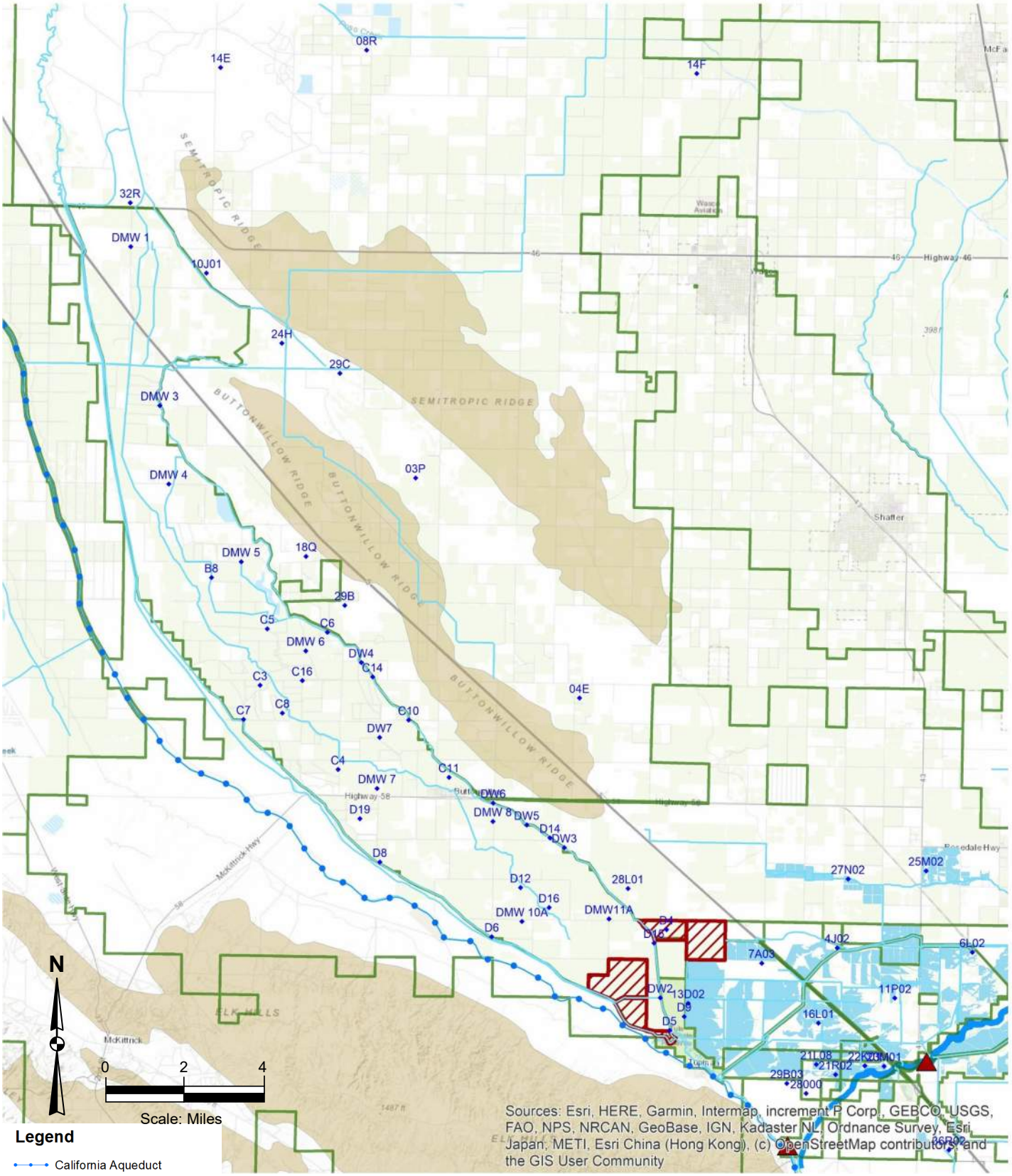
TODD GROUNDWATER

Figure 9-1
Location Map



Source: Figure 2-22 from the KGA Groundwater Sustainability Plan (KGA, 2020)

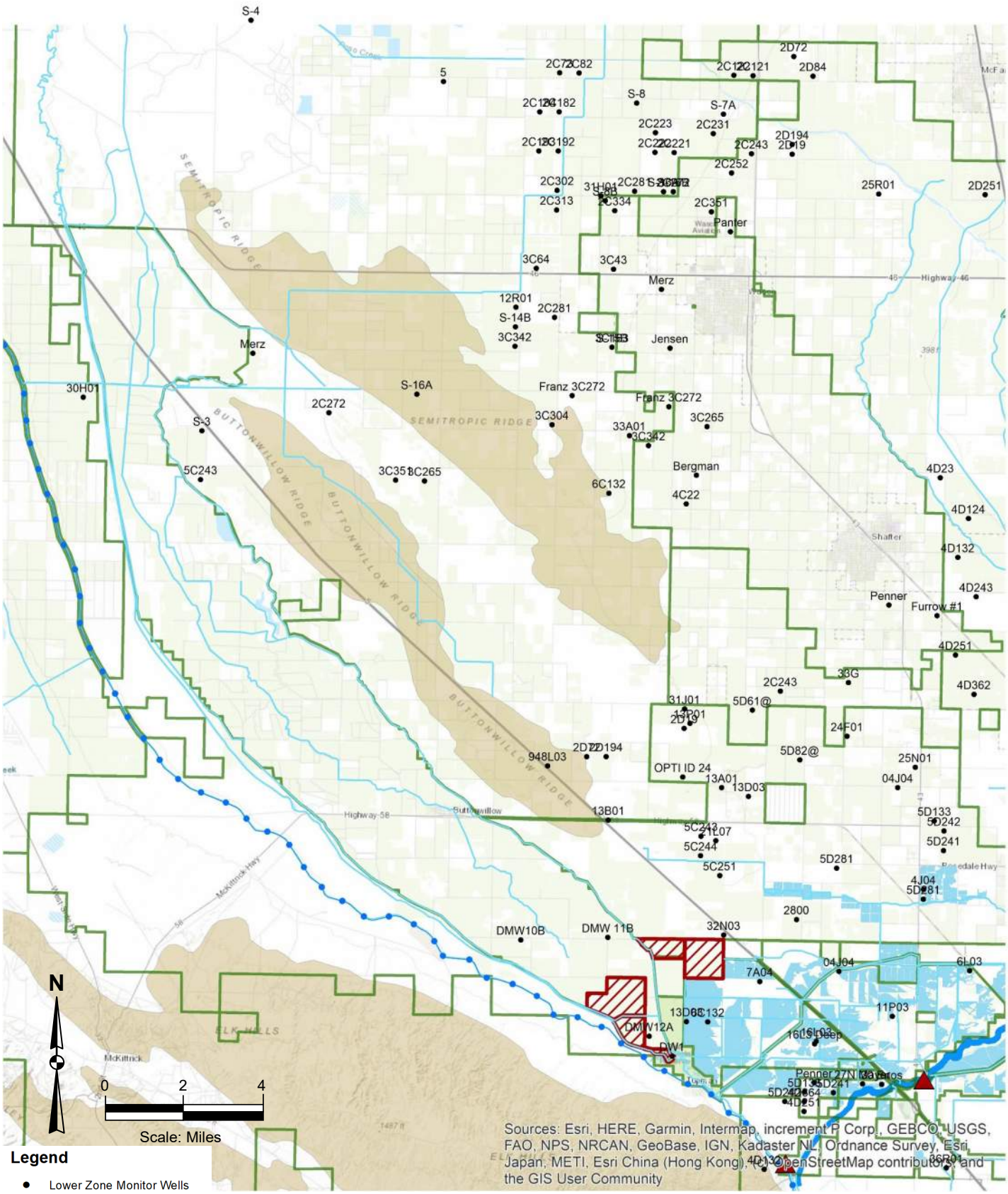
July 2021	Figure 9-2 General Distribution of Kern County Subbasin Principal Aquifers
TODD GROUNDWATER	



July 2021

TODD GROUNDWATER

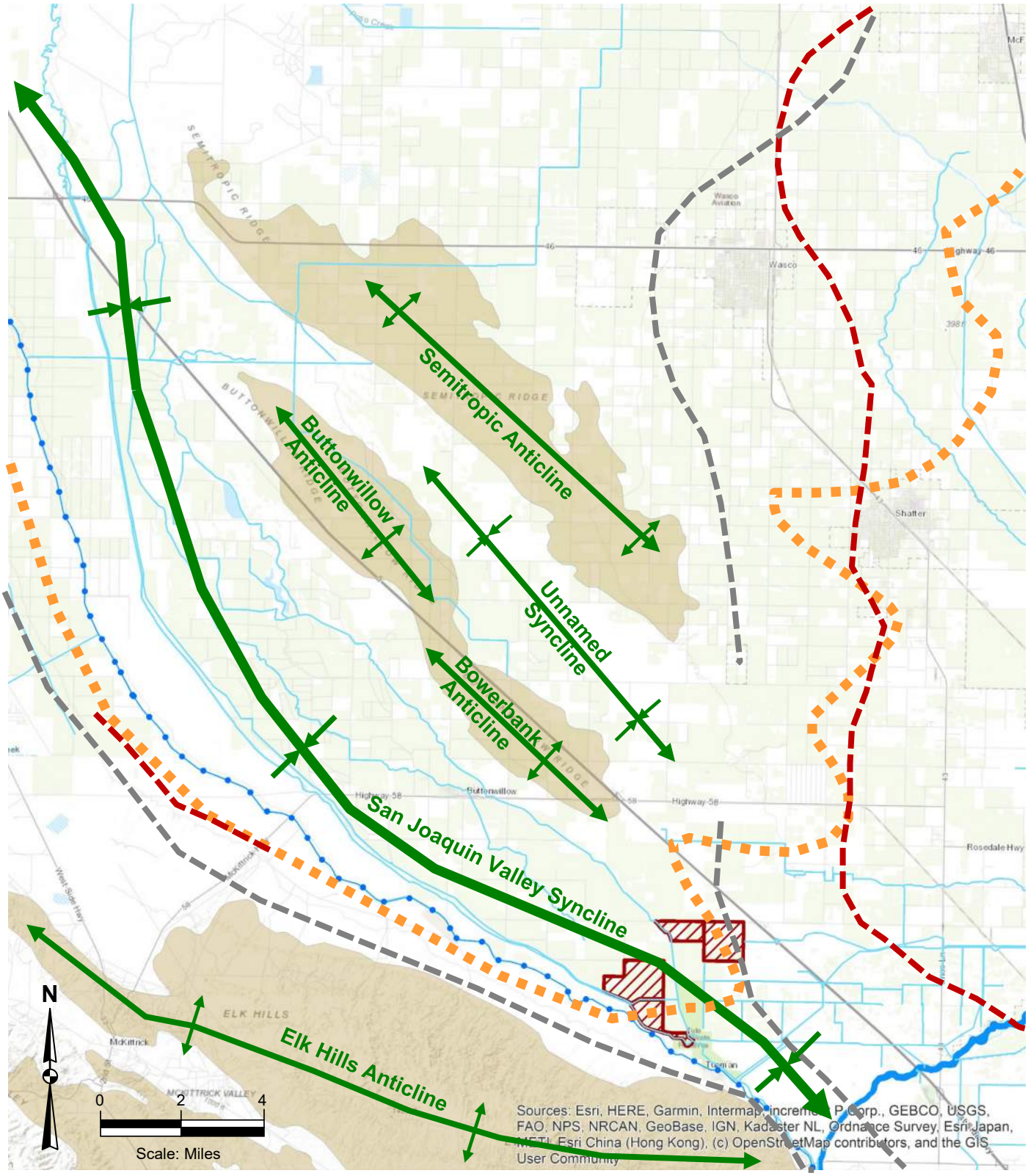
Figure 9-3
Location of Upper Zone Wells Used in Contouring



July 2021

TODD GROUNDWATER

Figure 9-4
Location of Lower Zone Wells Used in Contouring



Legend

- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Geologic Structure
- Kern River

Approximate Extent of E-Clay

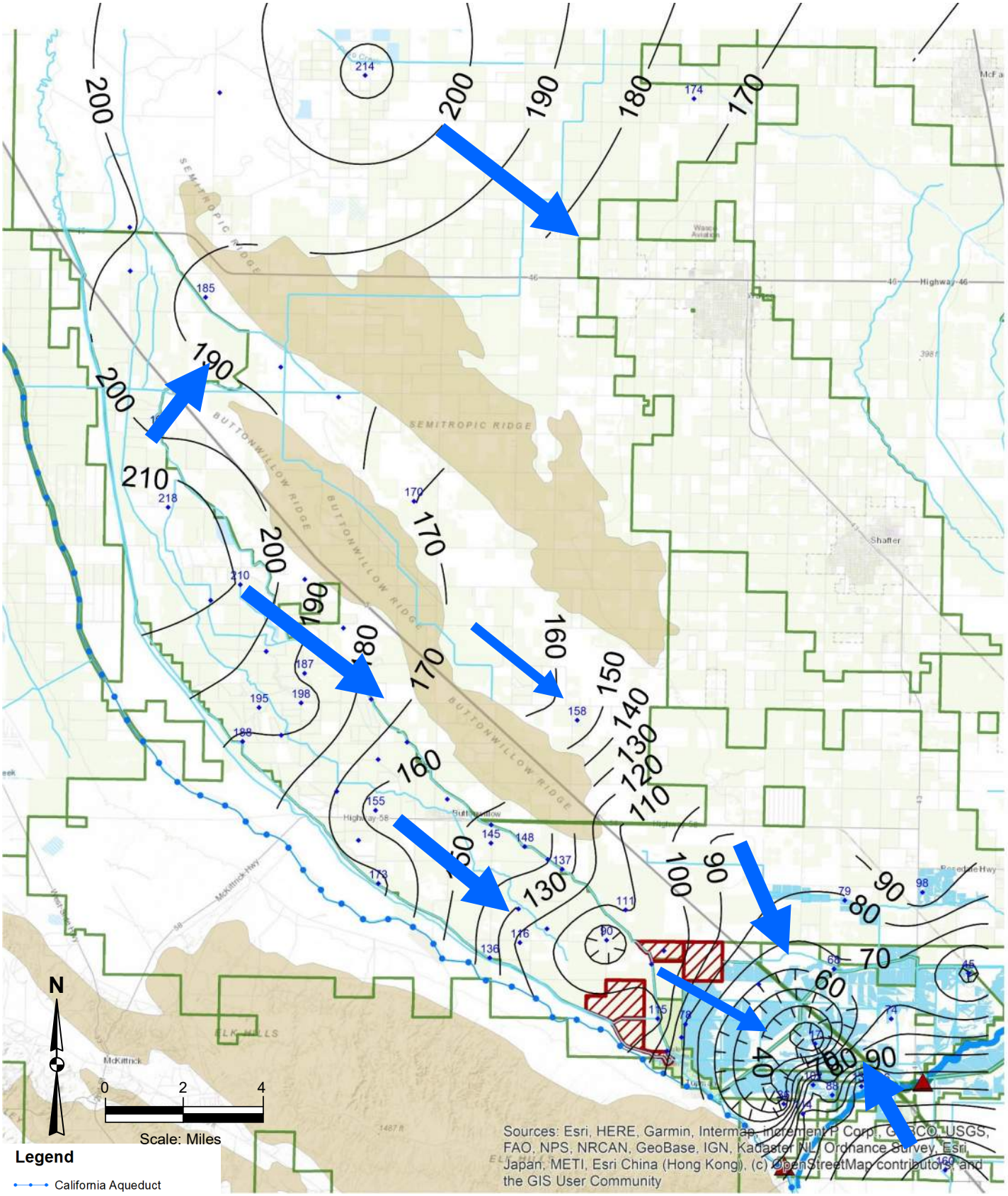
- Croft, 1972
- Page, 1986
- PGA, 1991

Anticline **Syncline**

July 2021

TODD GROUNDWATER

Figure 9-5
Location Map of
E-Clay Extent and
Major Geologic Structures

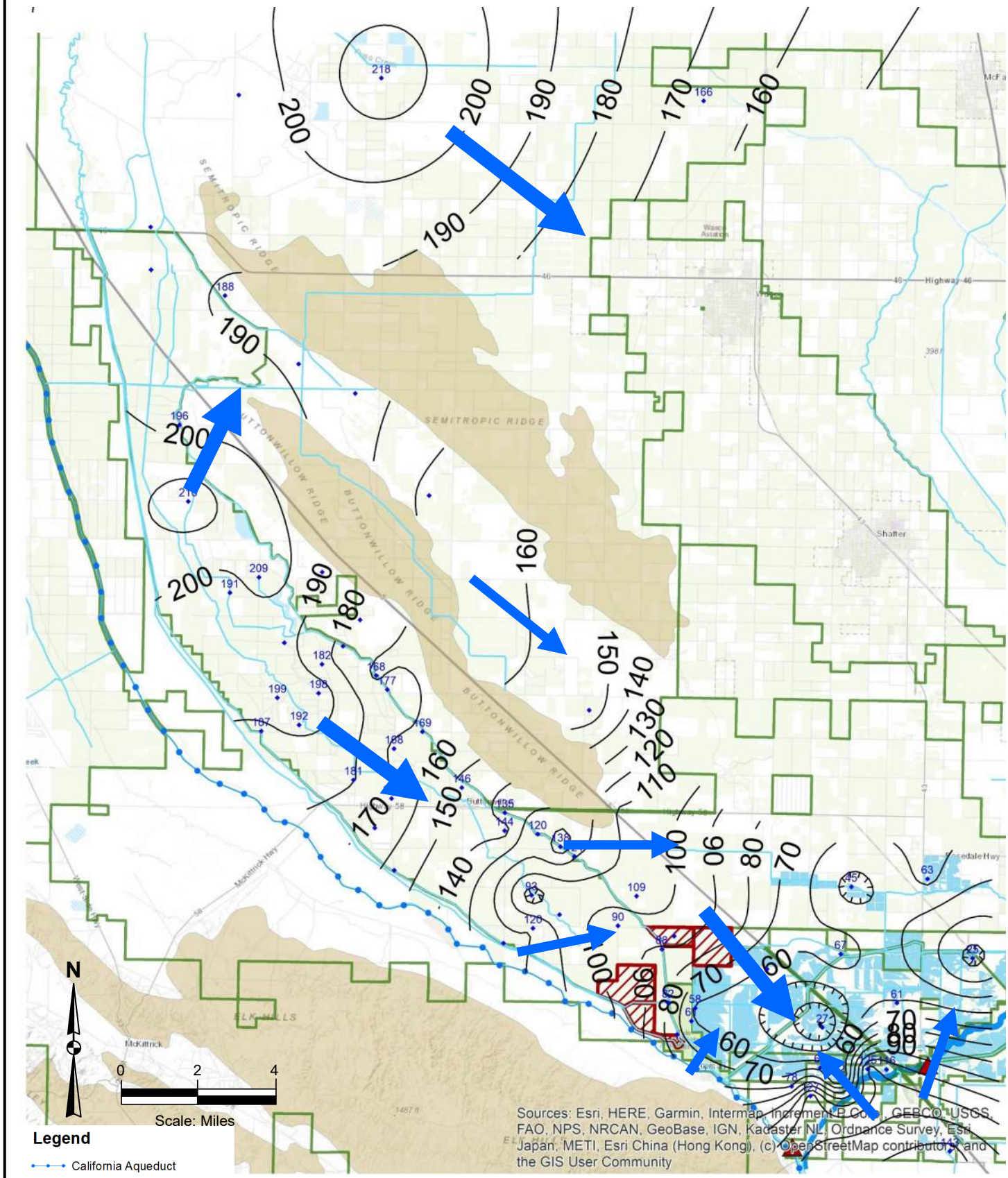


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-6
Upper Zone
Groundwater Elevation
Contour Map - Spring 2015

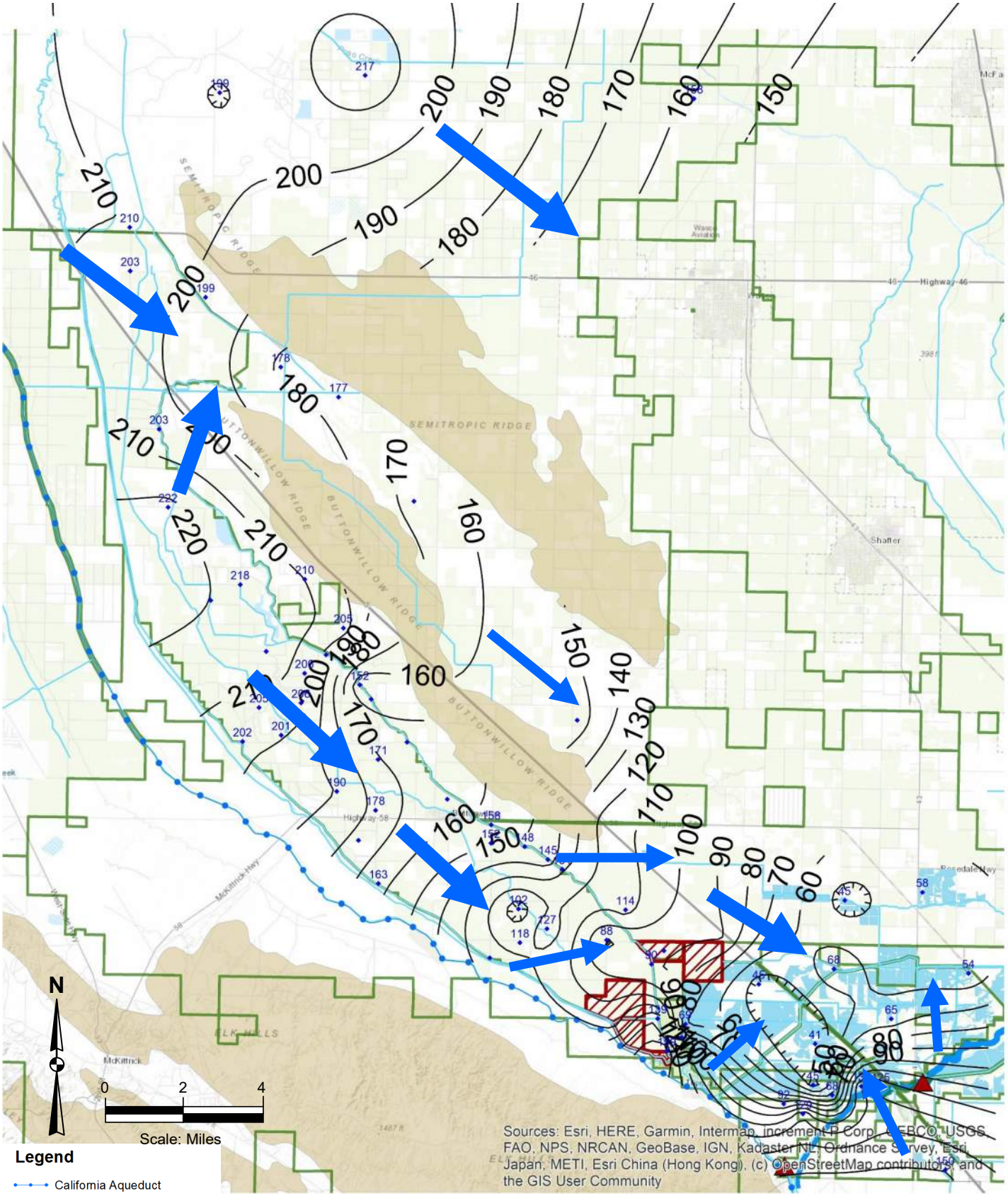


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-7
Upper Zone
Groundwater Elevation
Contour Map – Fall 2016

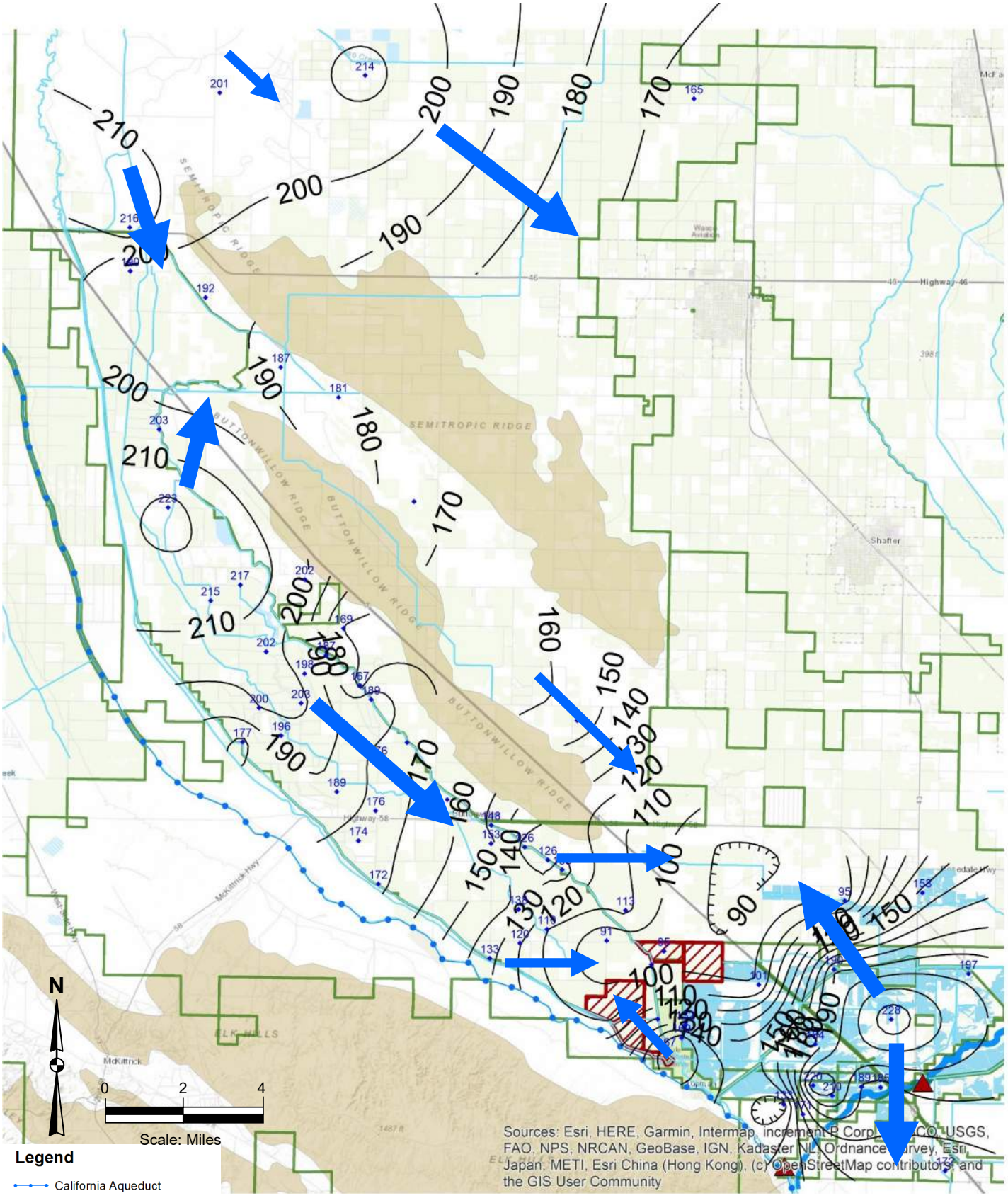


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-8
Upper Zone
Groundwater Elevation
Contour Map - Spring 2017

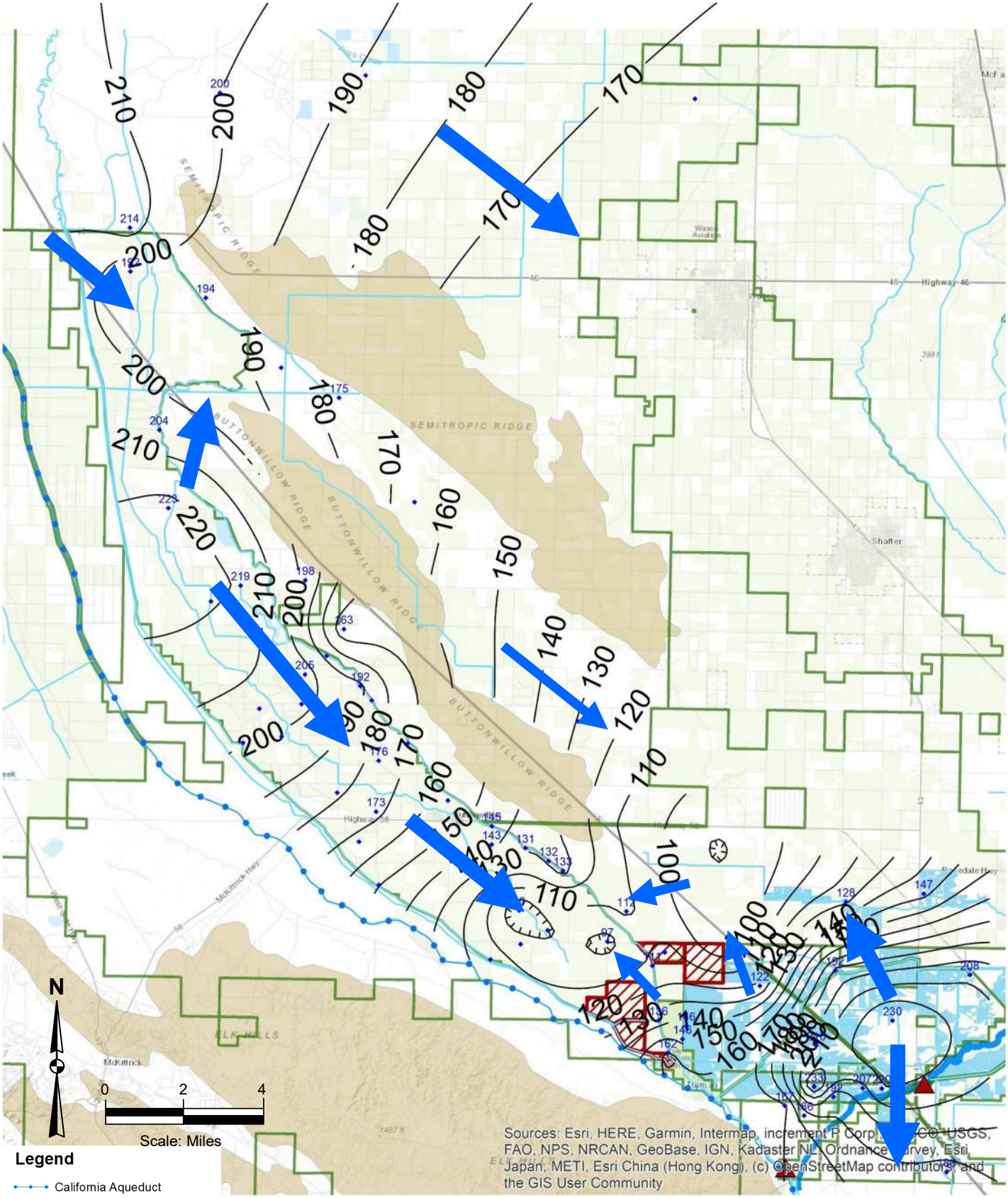


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-9
Upper Zone
Groundwater Elevation
Contour Map - Spring 2018

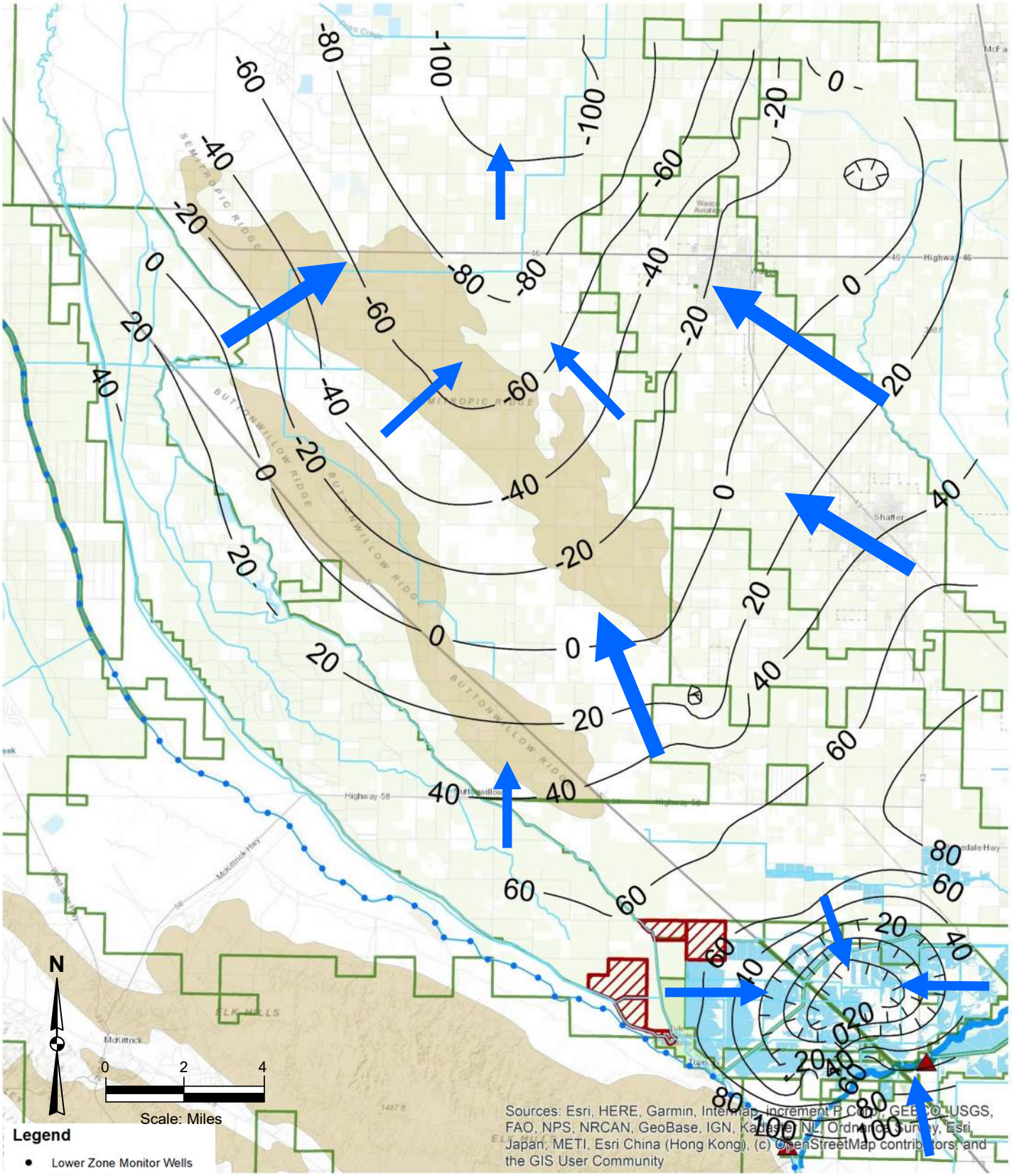


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-10
Upper Zone
Groundwater Elevation
Contour Map - Spring 2019

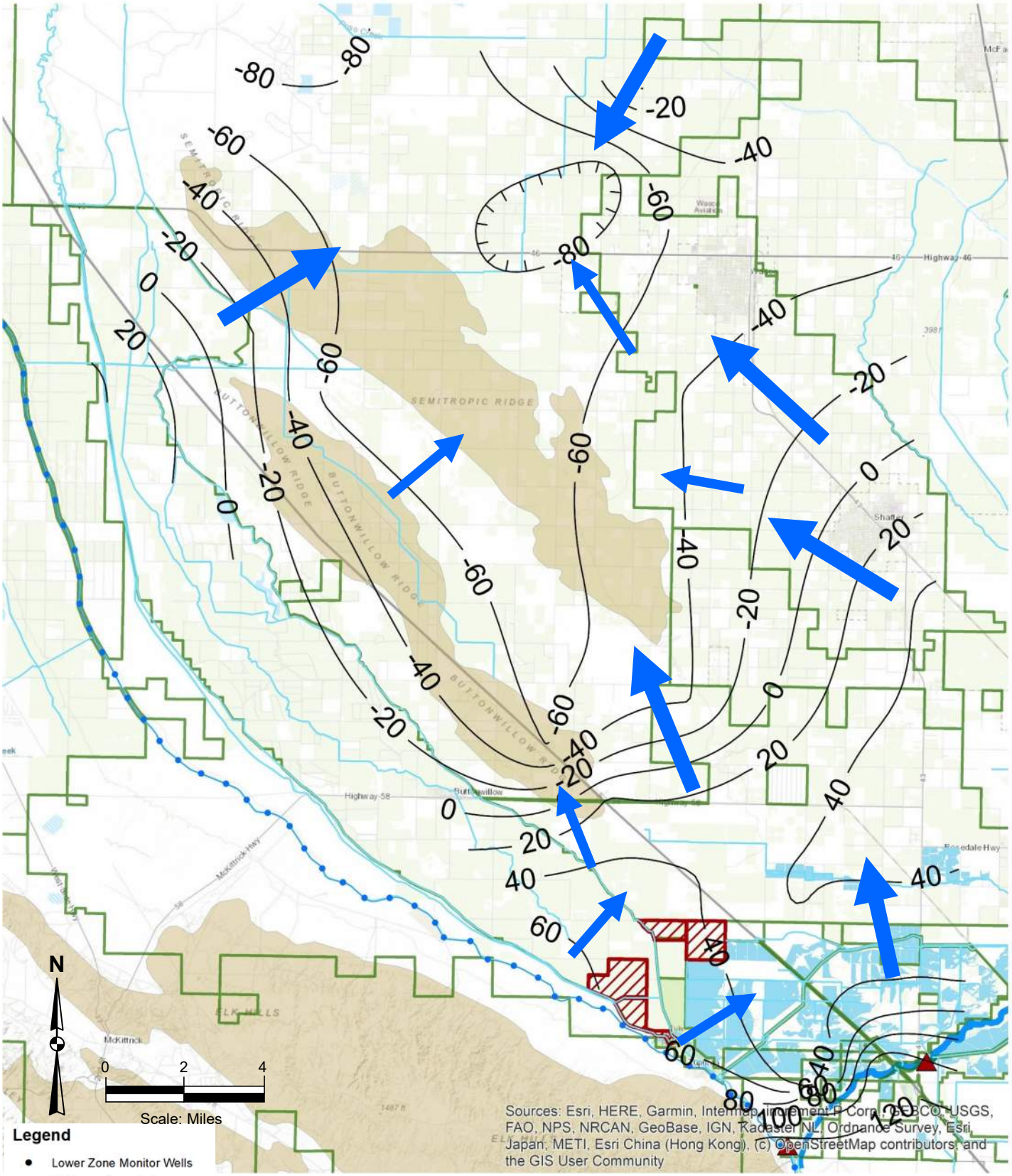


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-11
Lower Zone
Groundwater Elevation
Contour Map - Spring 2015

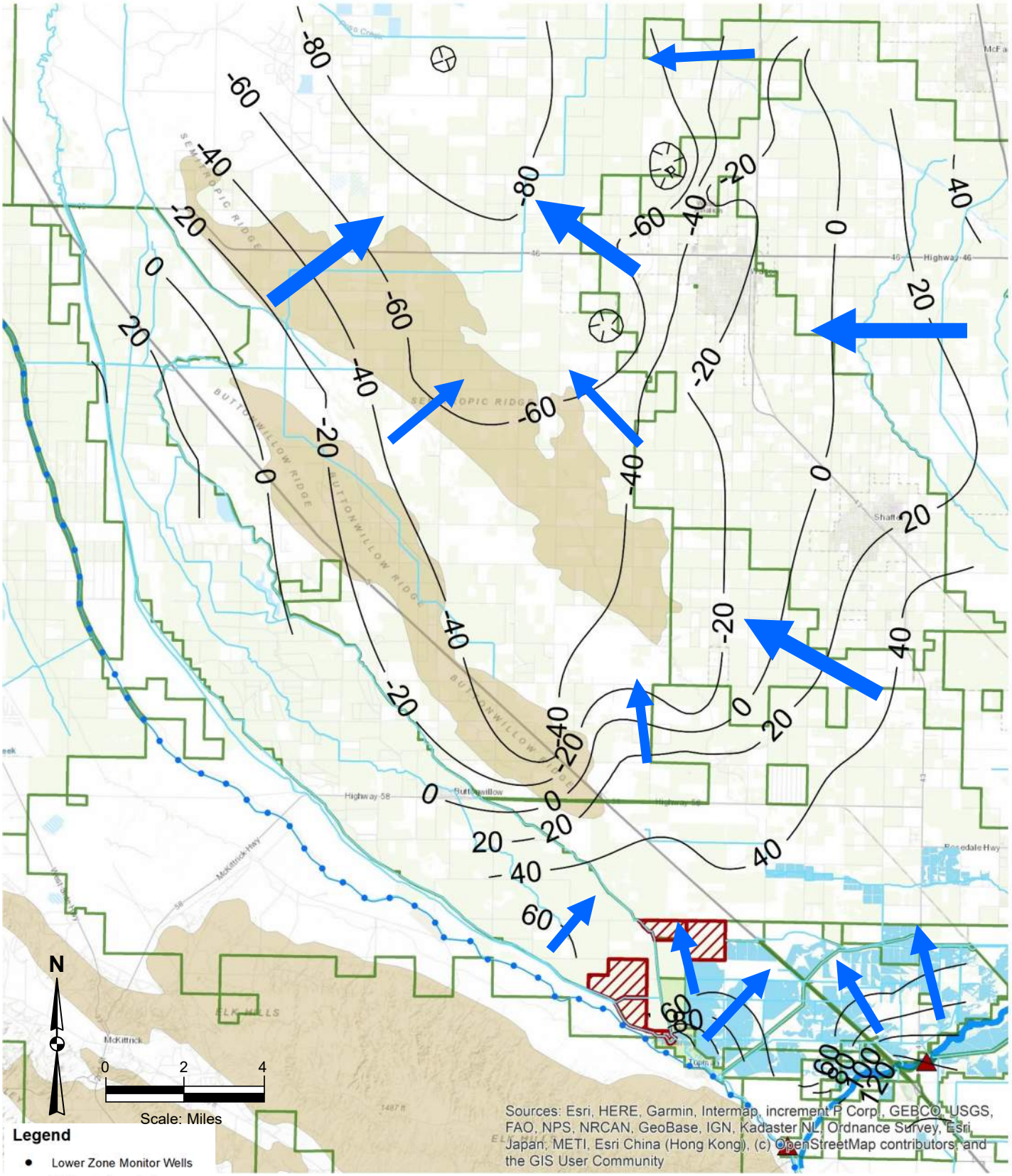


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-12
Lower Zone
Groundwater Elevation
Contour Map – Fall 2016



Legend

- Lower Zone Monitor Wells
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds

Groundwater Flow Direction

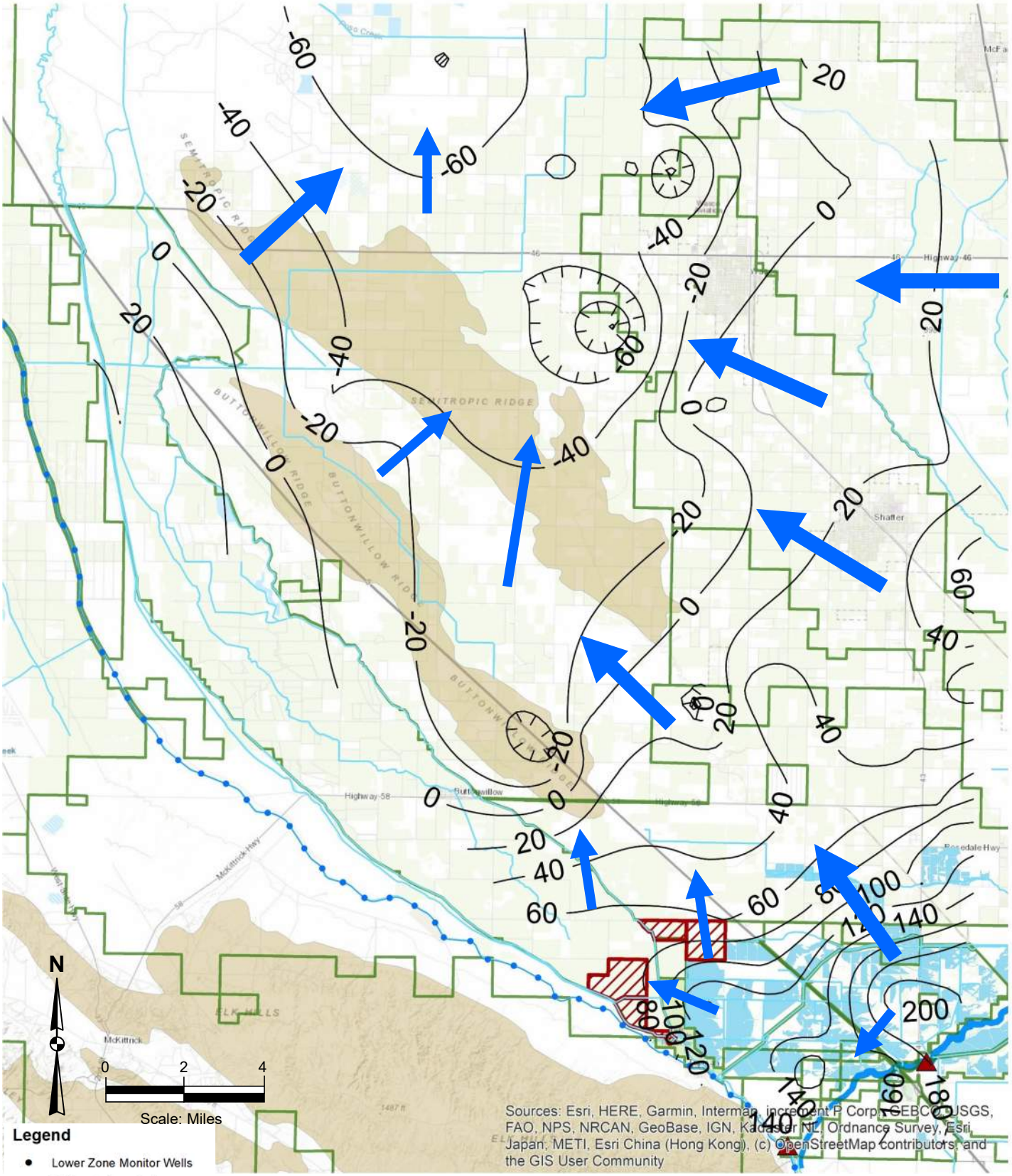
60 — **Groundwater Elevation Contour**

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-13
Lower Zone
Groundwater Elevation
Contour Map – Spring 2017



Legend

- Lower Zone Monitor Wells
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds

Groundwater Flow Direction

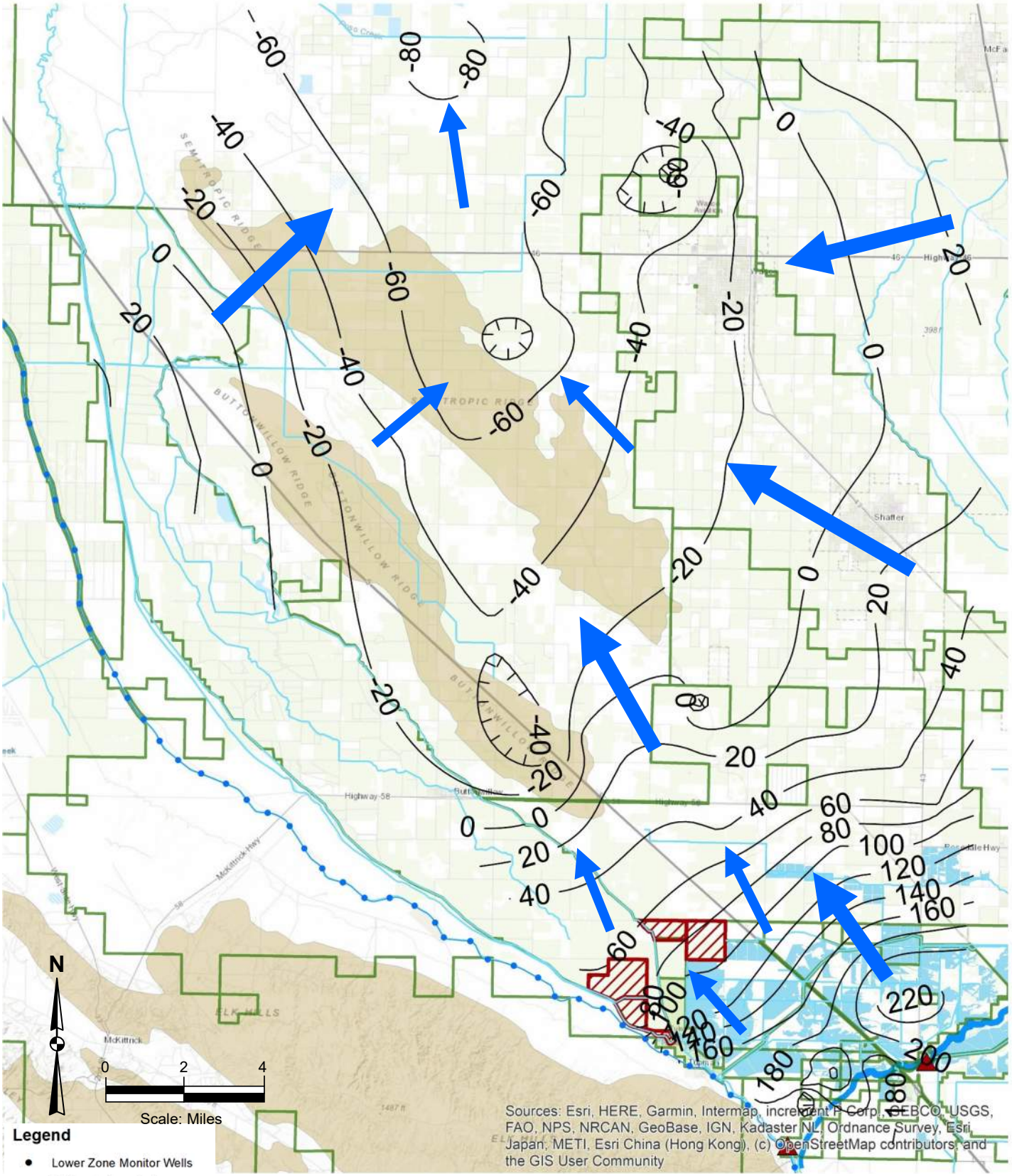
60 — **Groundwater Elevation Contour**

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-14
Lower Zone
Groundwater Elevation
Contour Map - Spring 2018

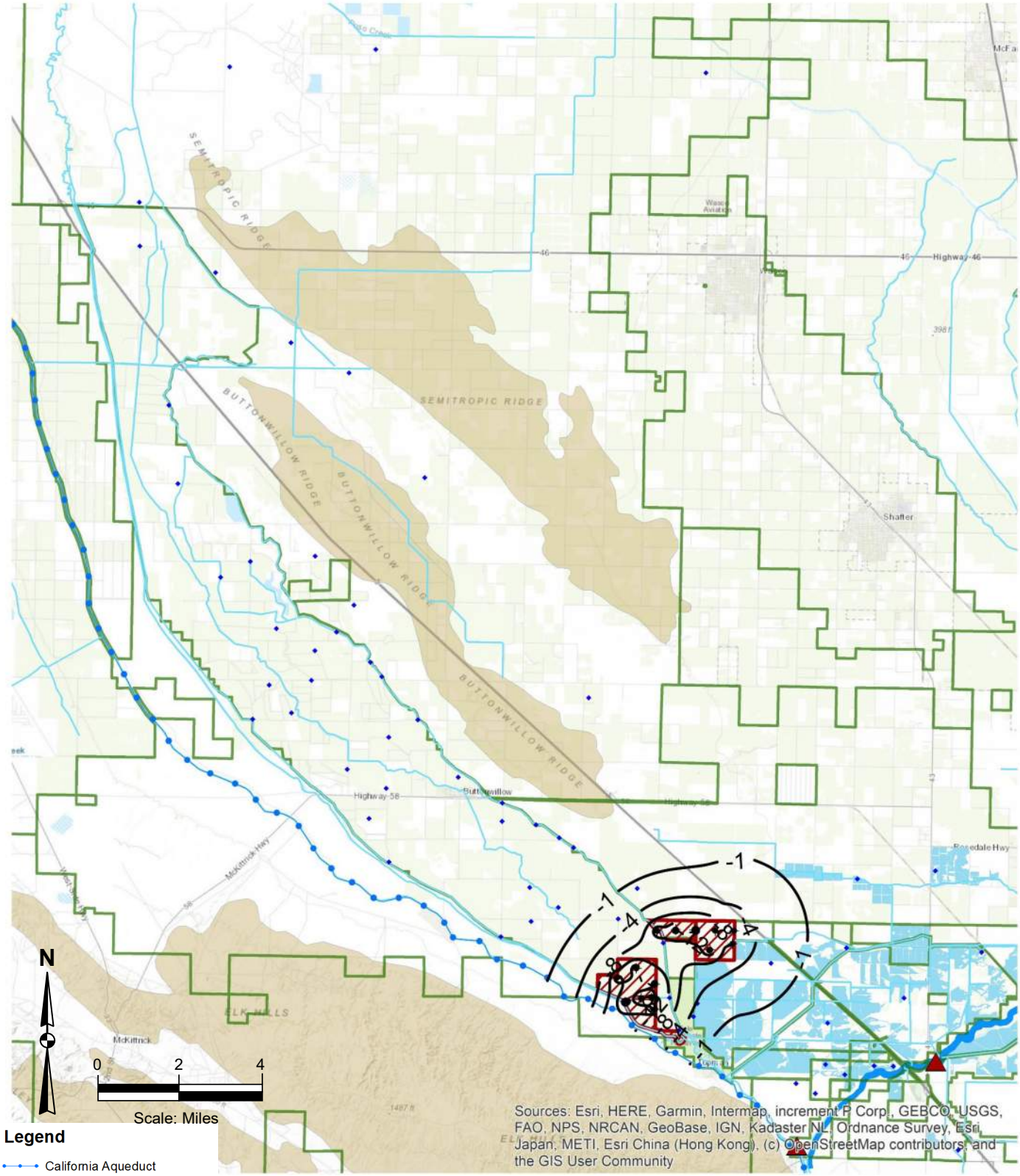


Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-15
Lower Zone
Groundwater Elevation
Contour Map - Spring 2019



Legend

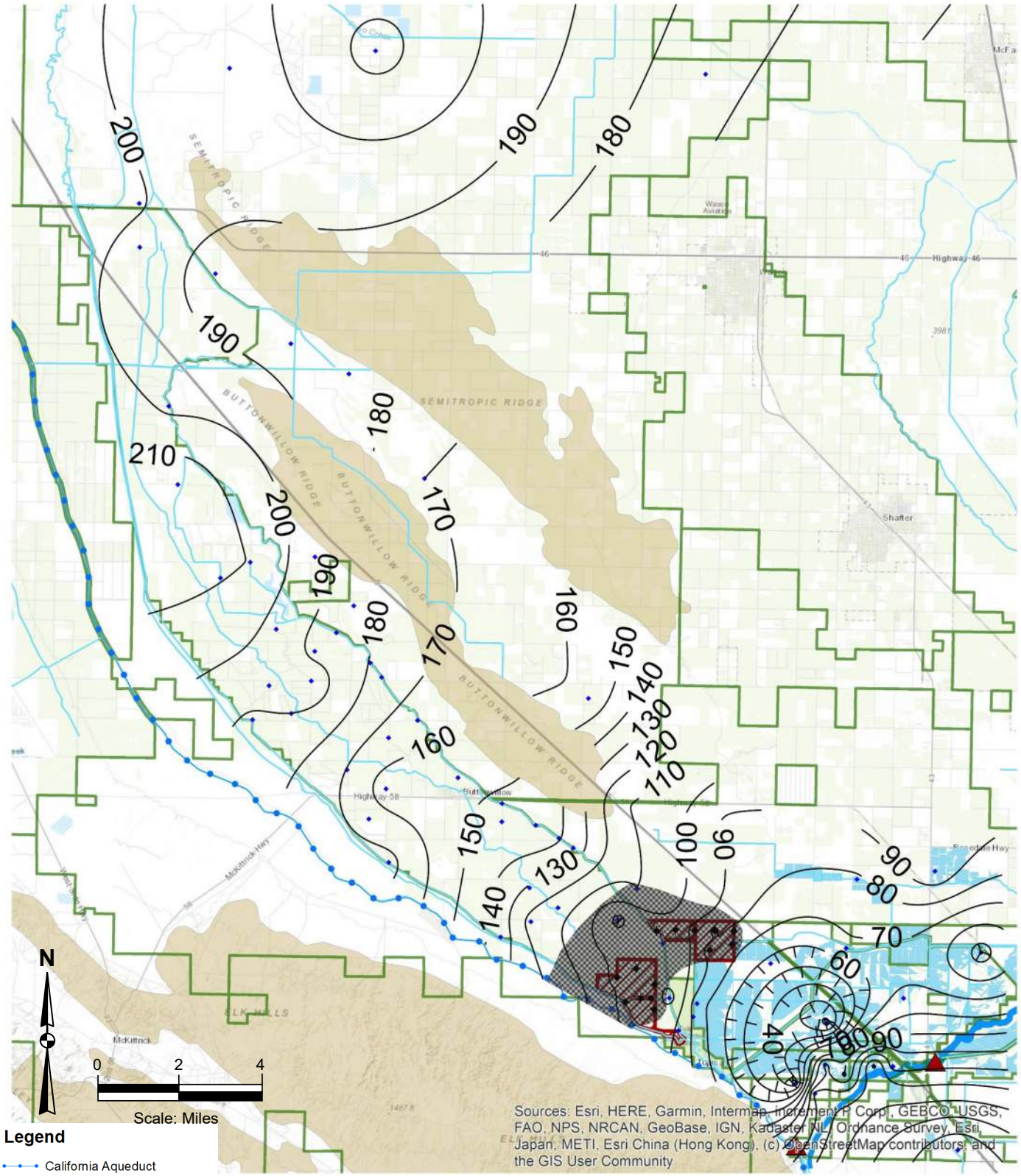
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well
- -4 — Simulated Drawdown Contour

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-16
Superposition Model Results
Palms Recovery Project
One-Year Drawdown



Legend

- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well

Estimated Recovery Well Area of Influence

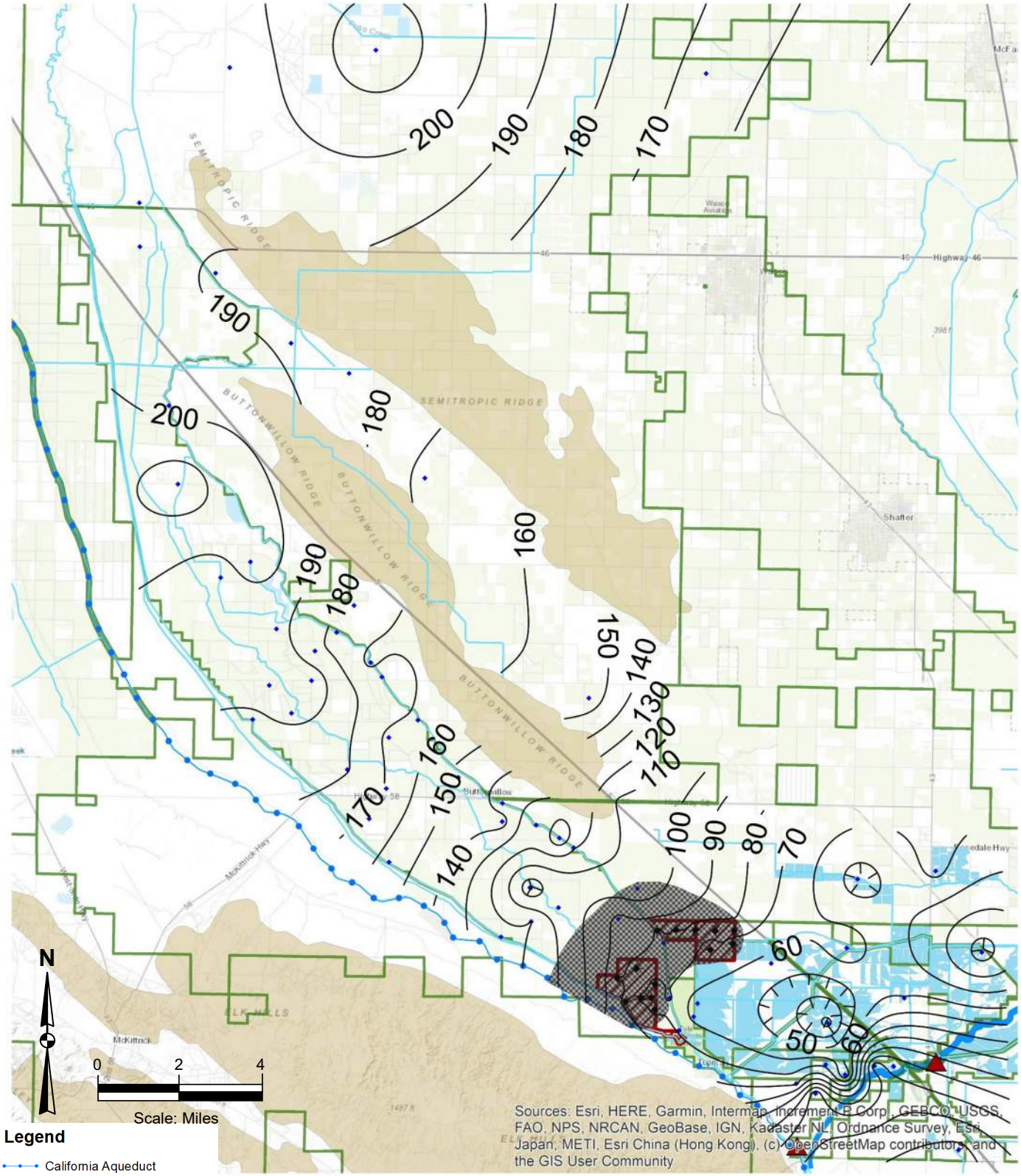
60 — **Groundwater Elevation Contour**

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-17
Simulated One Year Drawdown Added to Spring 2015 Groundwater Elevations



Legend

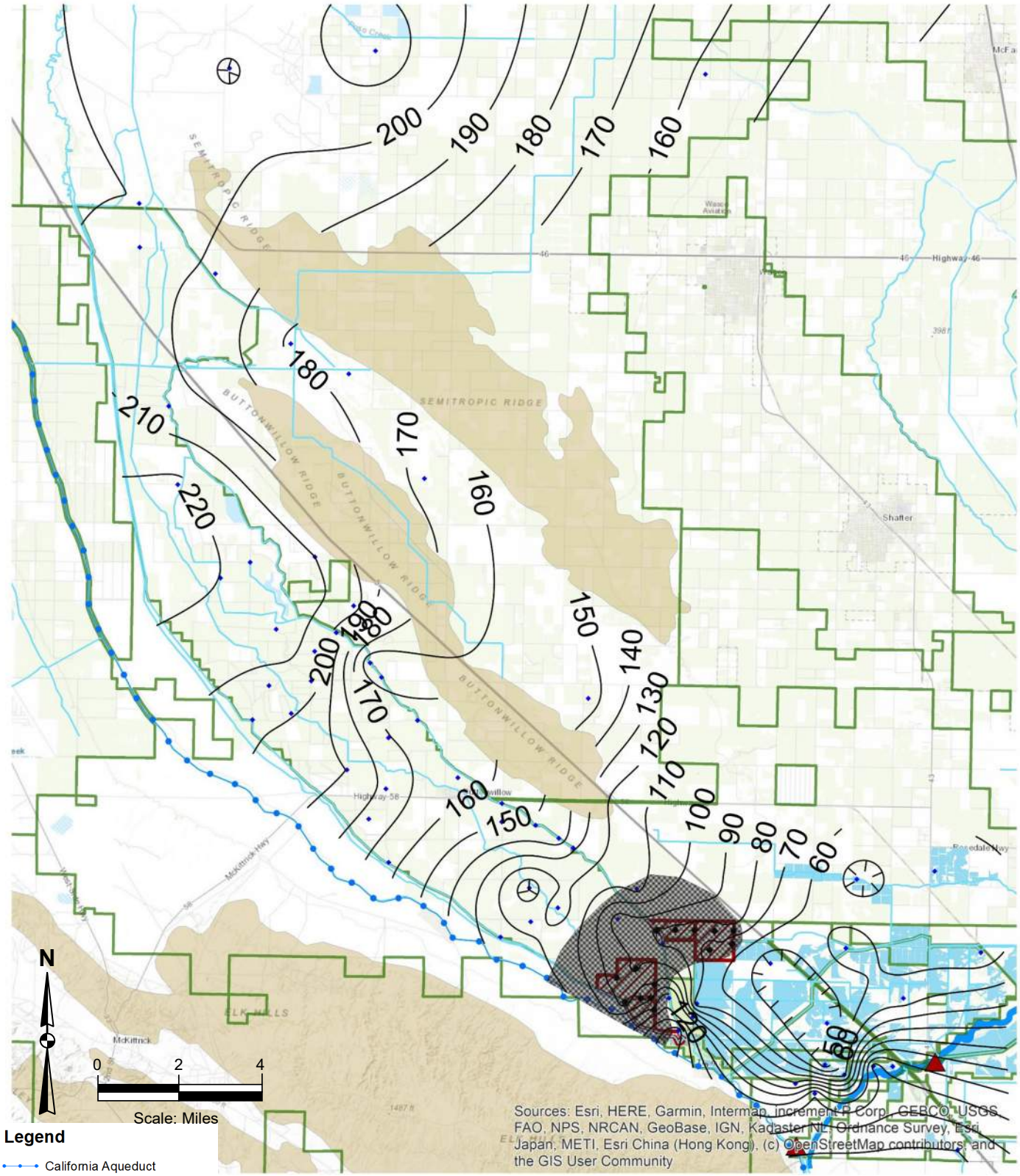
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well
- Estimated Recovery Well Area of Influence
- 60 — Groundwater Elevation Contour

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-18
Simulated One Year Drawdown Added to Fall 2016 Groundwater Elevations



Legend

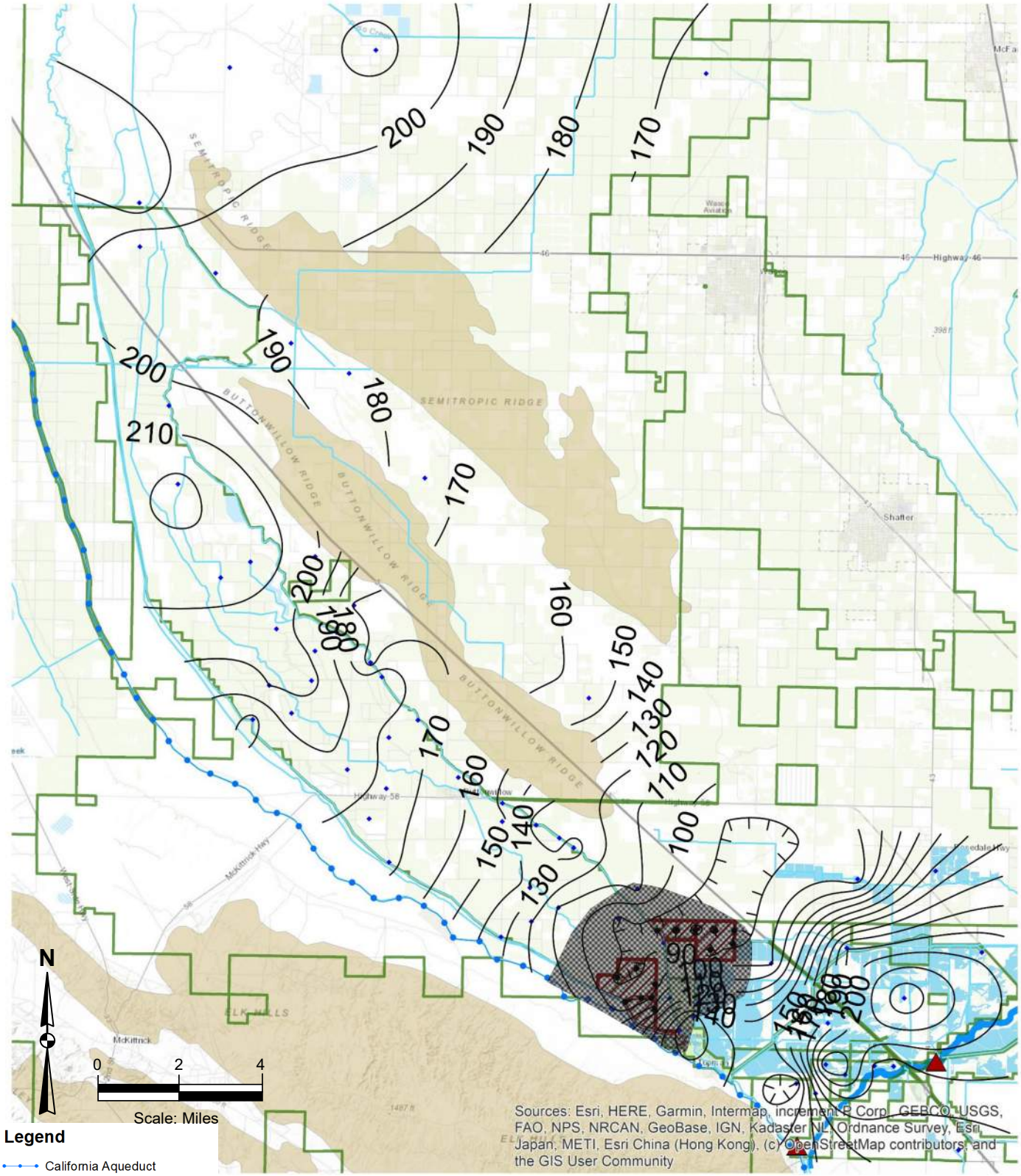
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well
- Estimated Recovery Well Area of Influence
- 60 — Groundwater Elevation Contour

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-19
Simulated One Year Drawdown Added to Spring 2017 Groundwater Elevations



Legend

- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well

Estimated Recovery Well Area of Influence

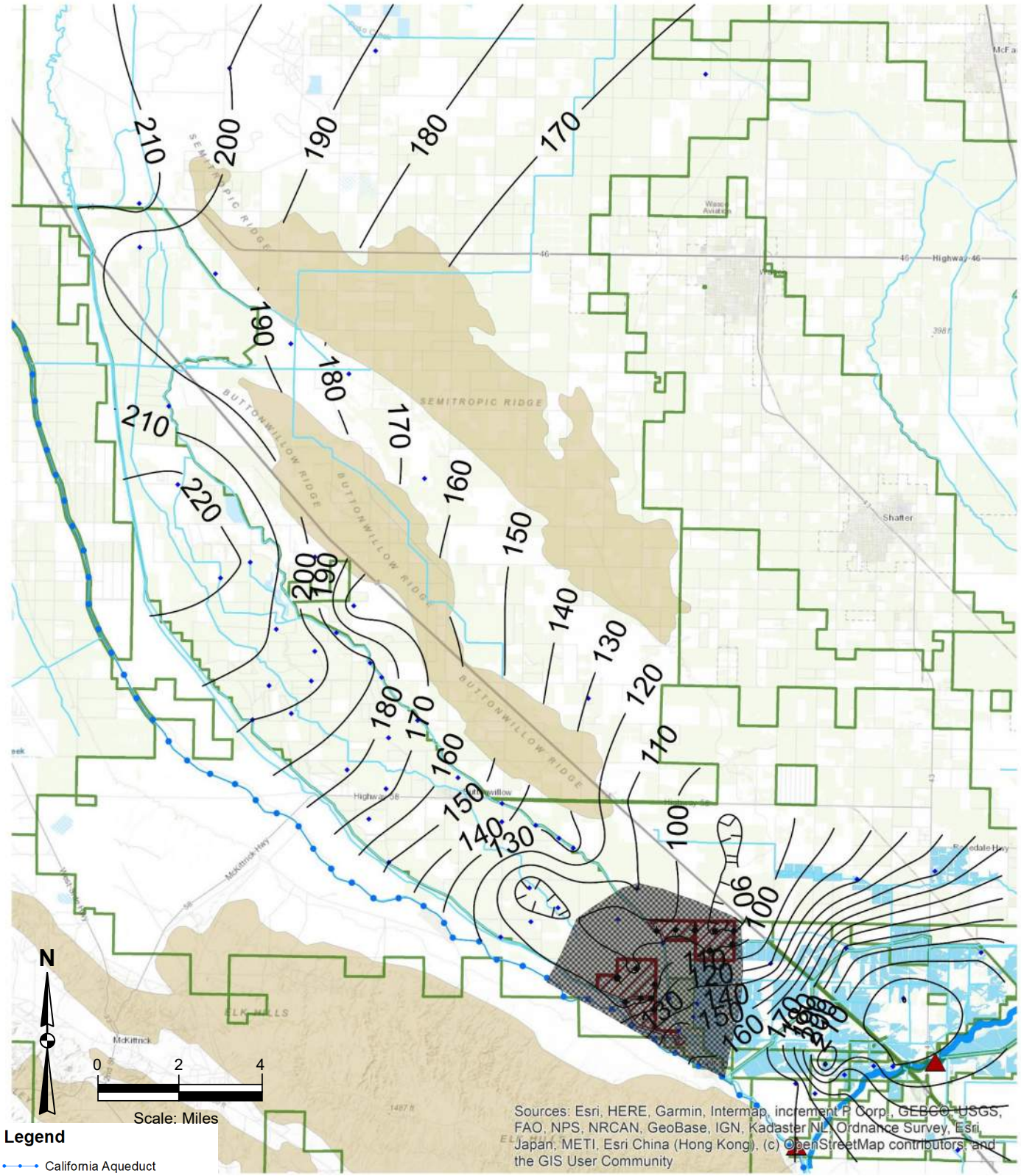
60 — **Groundwater Elevation Contour**

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-20
Simulated One Year Drawdown Added to Spring 2018 Groundwater Elevations



Legend

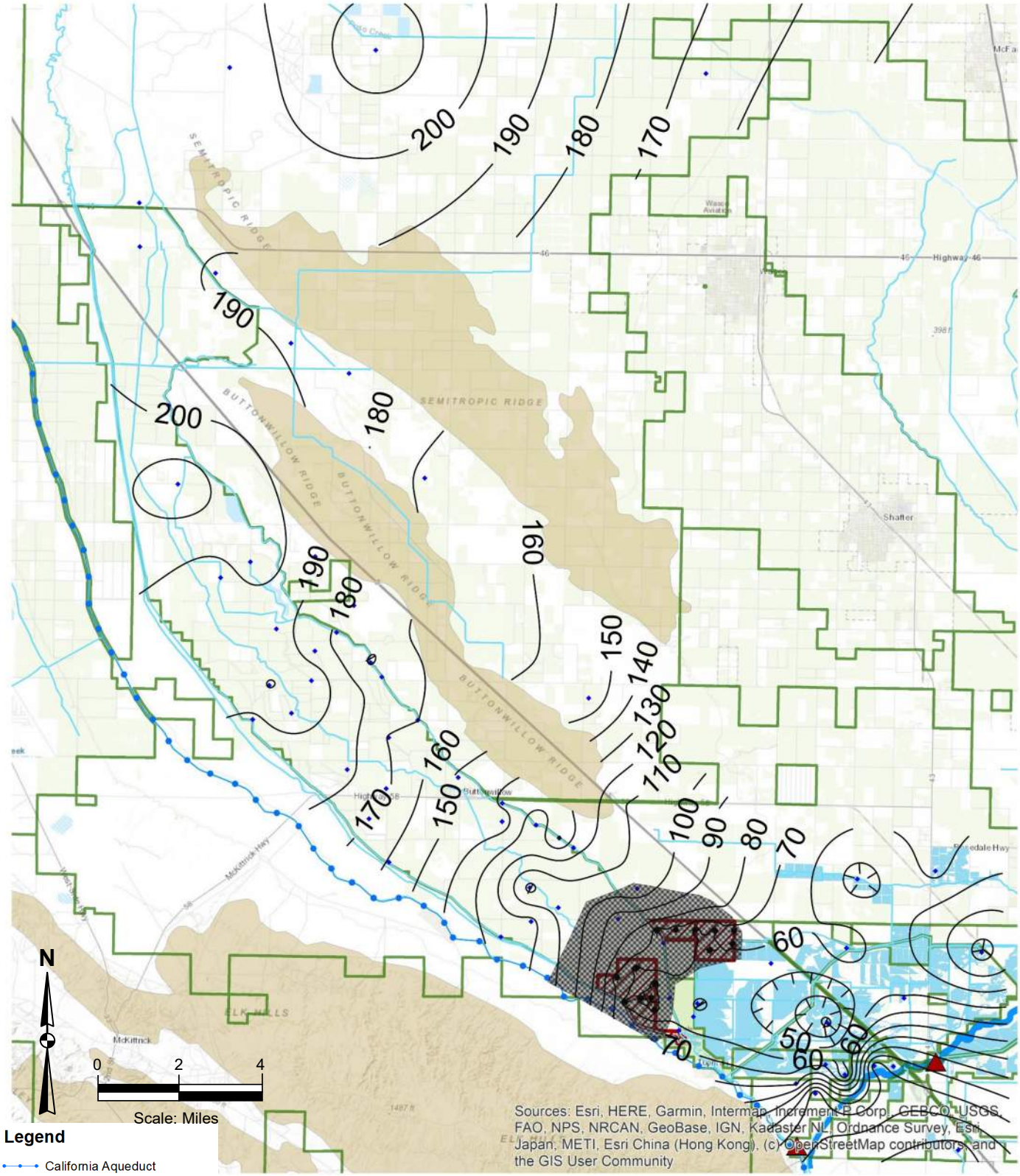
- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well
- Estimated Recovery Well Area of Influence
- 60 — Groundwater Elevation Contour

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-21
Simulated One Year Drawdown Added to Spring 2019 Groundwater Elevations



Legend

- California Aqueduct
- Kern County Canals
- Palms Recovery Project Site
- Water District
- Geologic Structure
- Recharge Ponds
- Upper Zone Monitor Well

Estimated Recovery Well Area of Influence

60 — **Groundwater Elevation Contour**

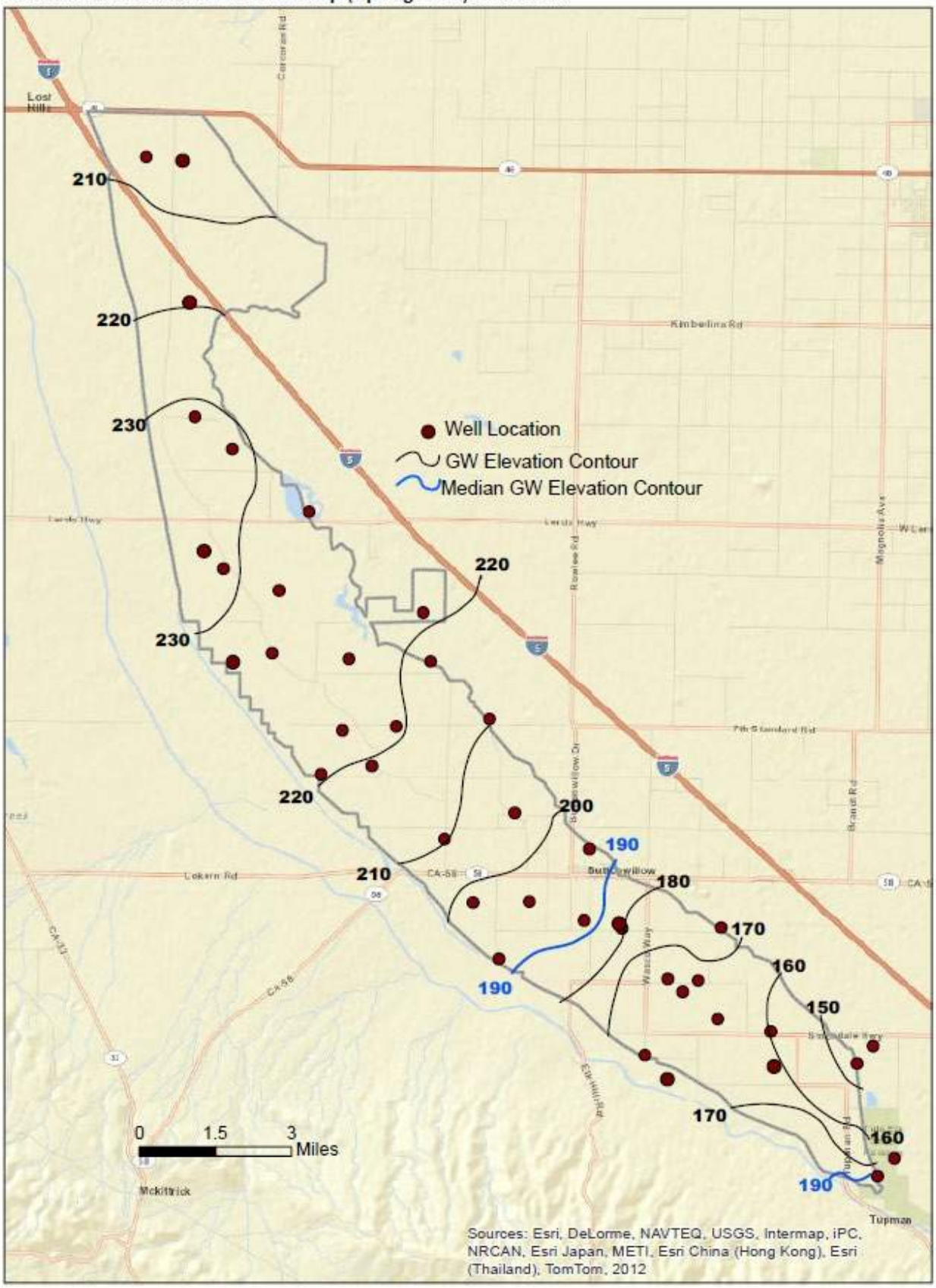
Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-22
Simulated Four Year Drawdown Added to Fall 2016 Groundwater Elevations

Groundwater Elevation Contour Map (Spring 2013) in ft AMSL

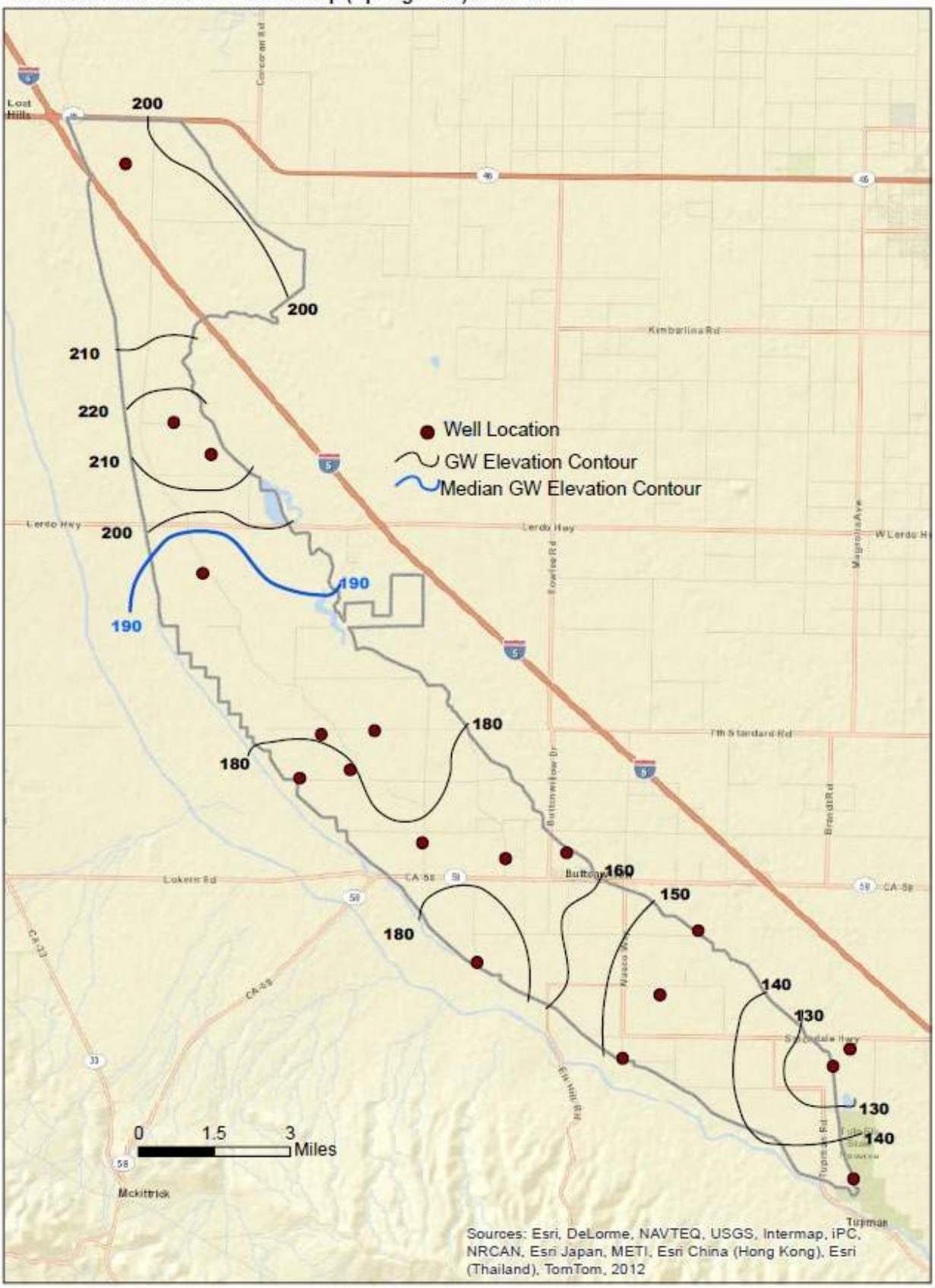


Source: Map provided by BVWSD

Note: Groundwater elevations in feet

July 2021	Figure 9-23 BVWSD Upper Zone Groundwater Elevation Contour Map Spring 2013
TODD GROUNDWATER	

Groundwater Elevation Contour Map (Spring 2014) in ft AMSL



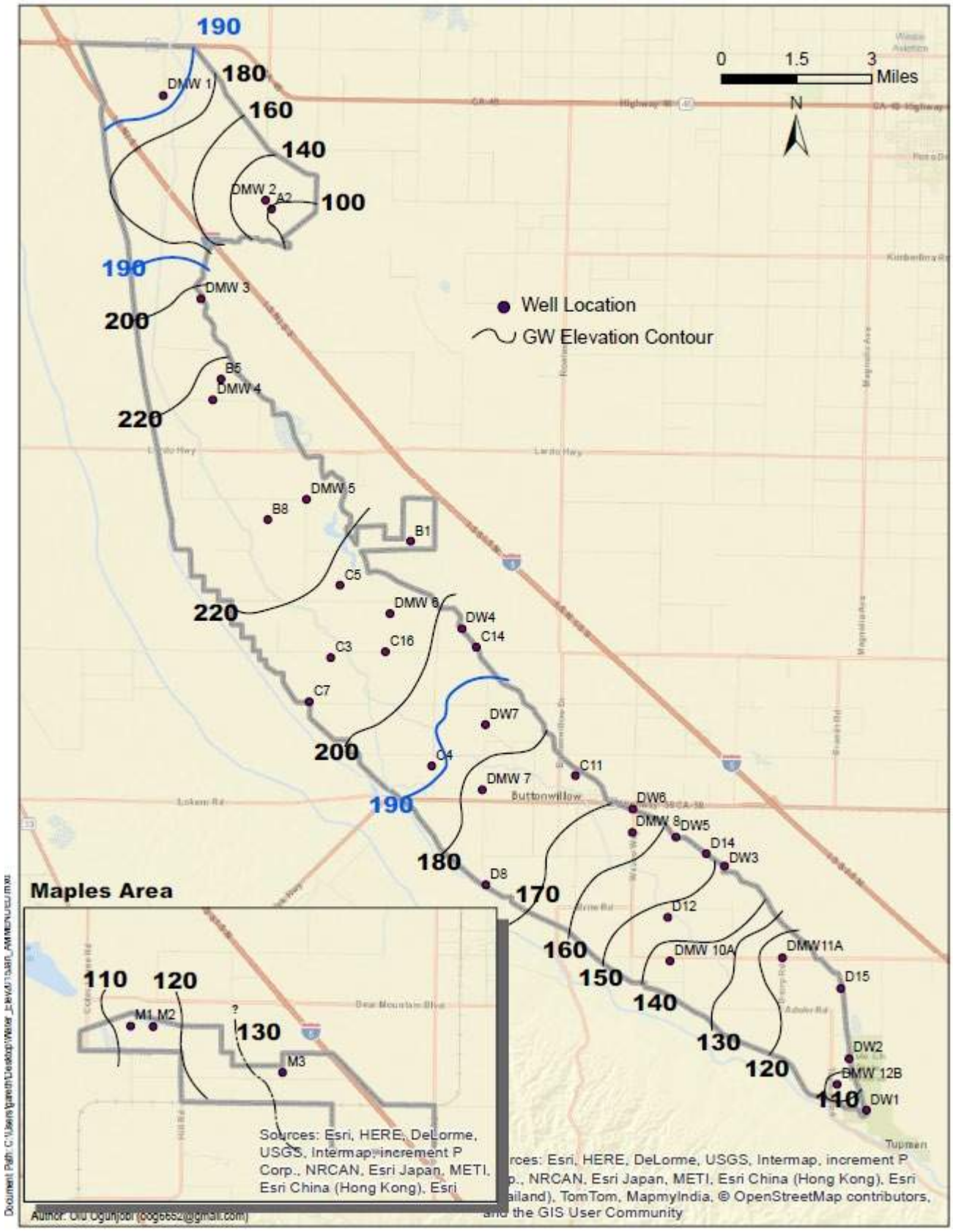
Source: Map provided by BVWSD

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-24
BVWSD Upper Zone Groundwater Elevation Contour Map Spring 2014



Source: Map provided by BVWSD

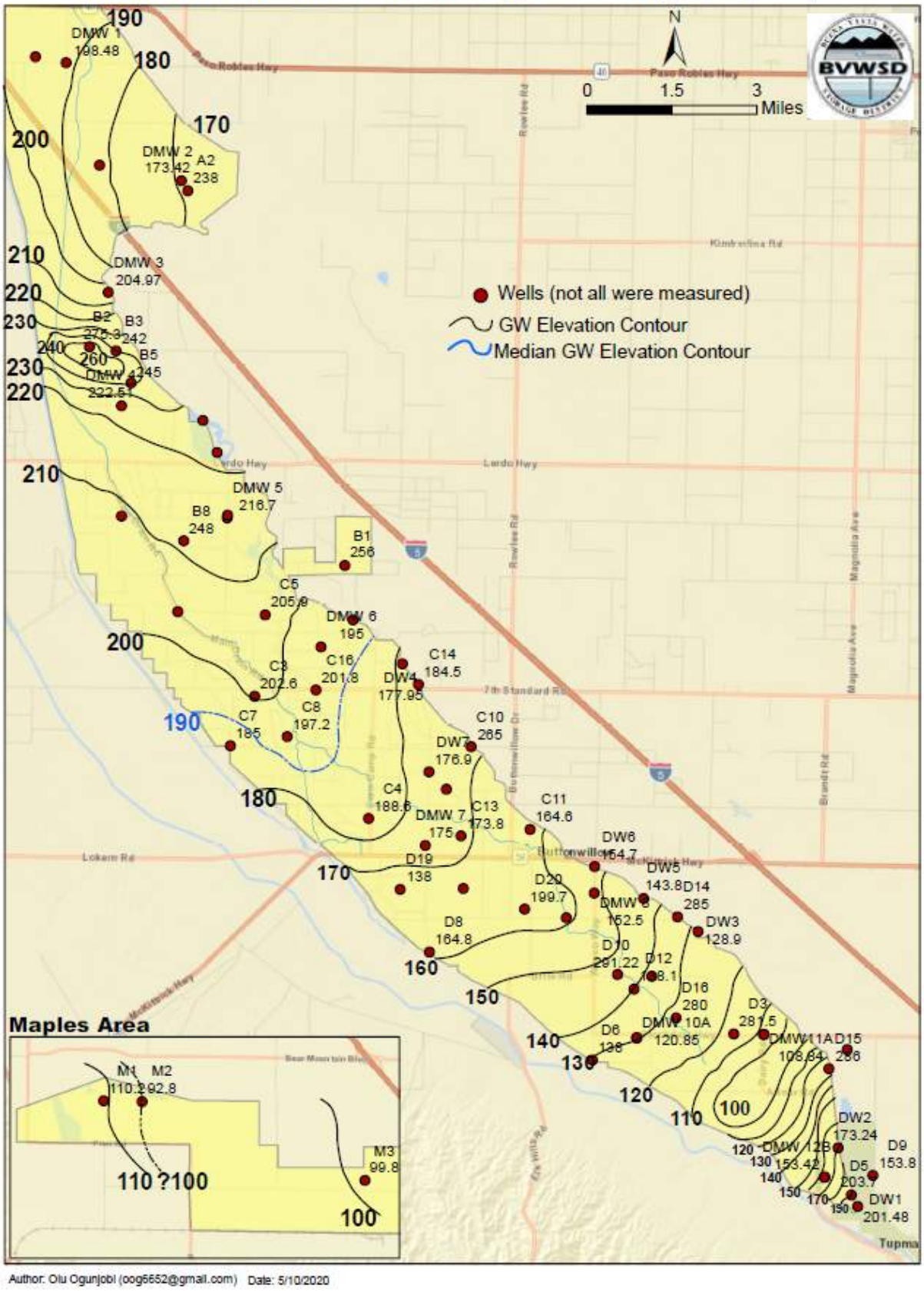
Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-25
BVWSD Upper Zone Groundwater Elevation Contour Map January 2015

Groundwater Elevation Contour Map -Oct 2019 (ft above SL)



Source: Map provided by BVWSD

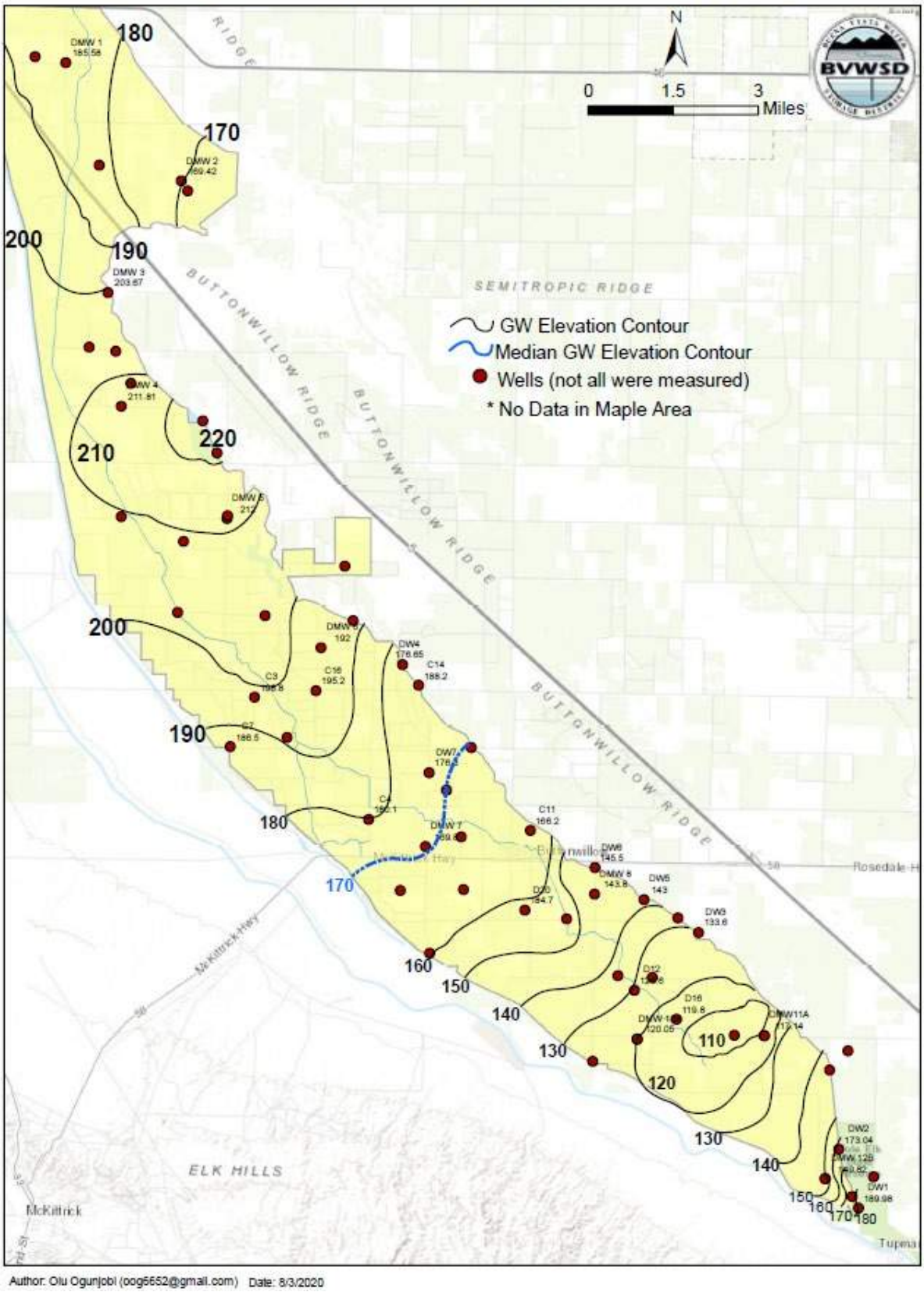
Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-26
BVWSD Upper Zone Groundwater Elevation Contour Map October 2019

Groundwater Elevation Contour Map -March 2020 (ft Above SL)



Author: Olu Ogunjobi (oog6652@gmail.com) Date: 8/3/2020

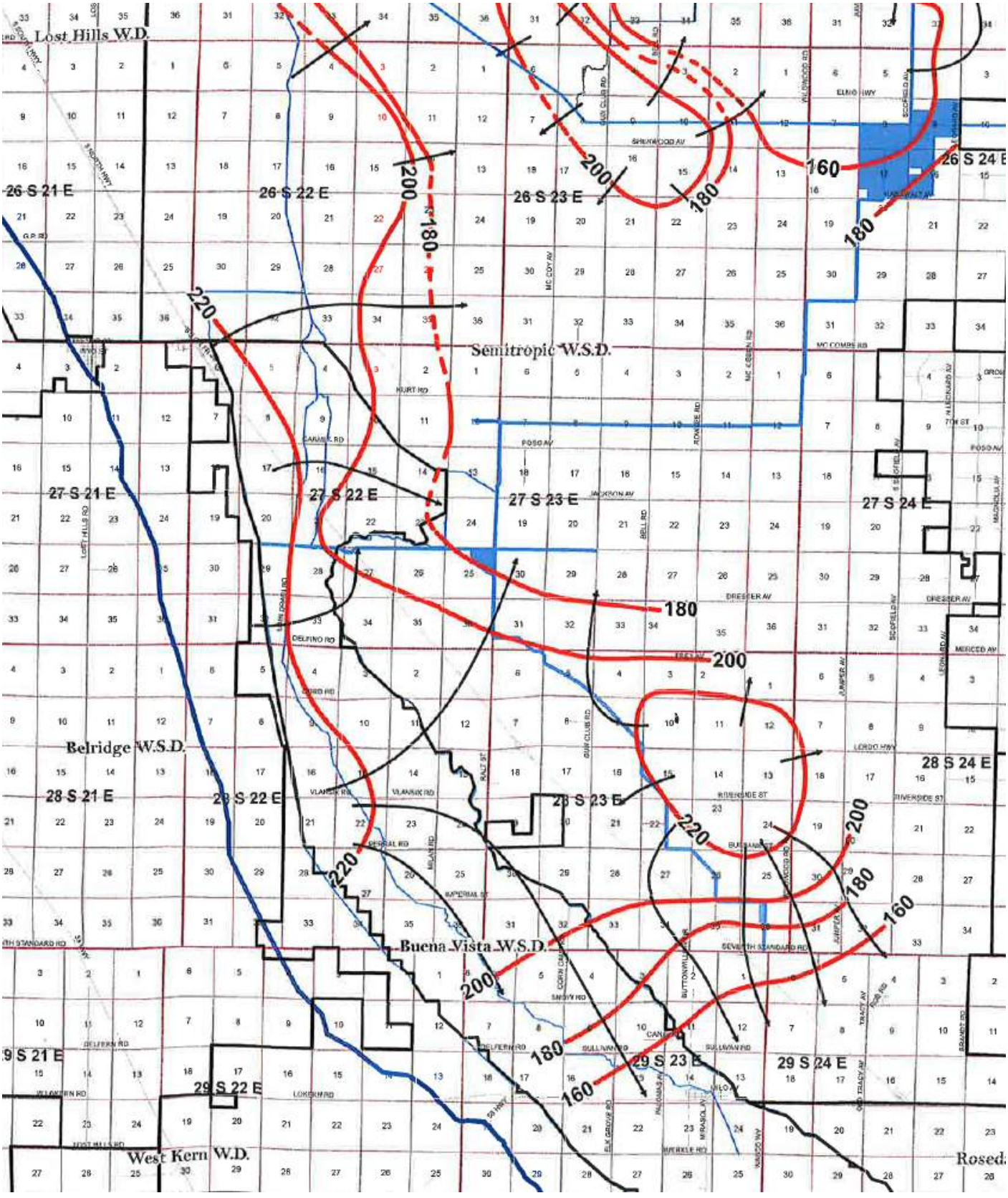
Source: Map provided by BVWSD

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-27
BVWSD Upper Zone Groundwater Elevation Contour Map March 2020



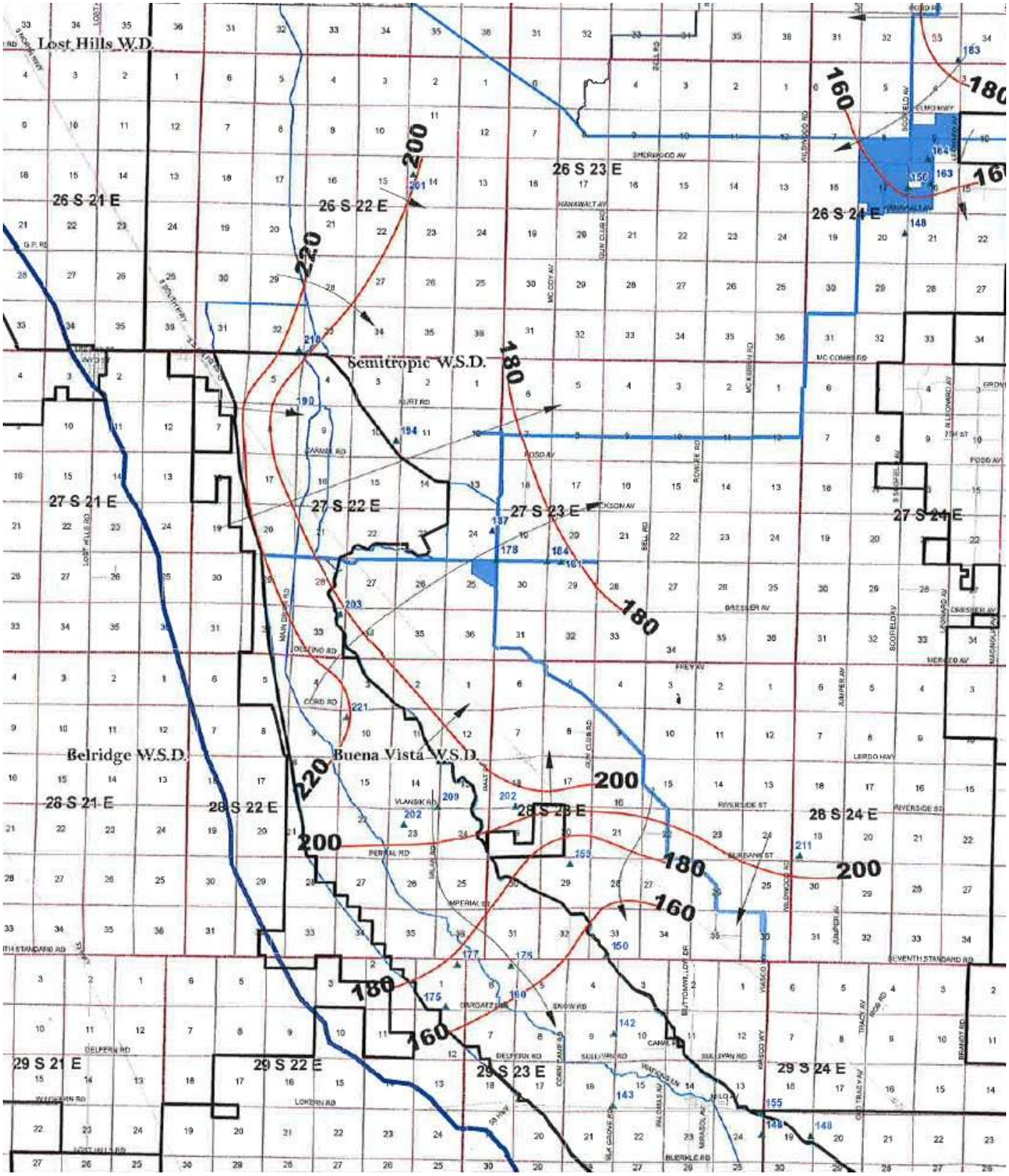
Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

Figure 9-28
SWSD Monitoring Report
Upper Zone GW Elevations
Spring 2017



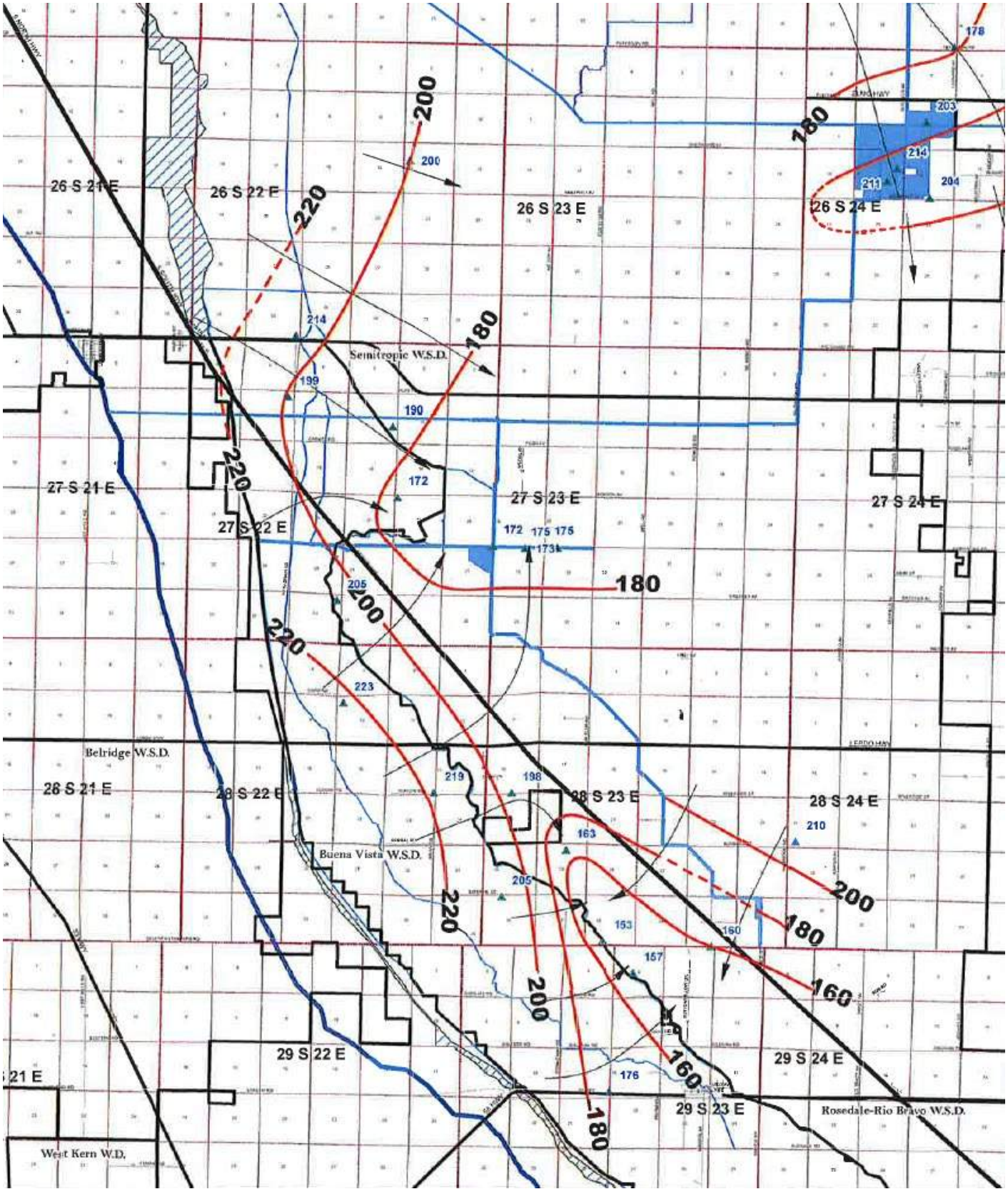
Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

July 2021

TODD GROUNDWATER

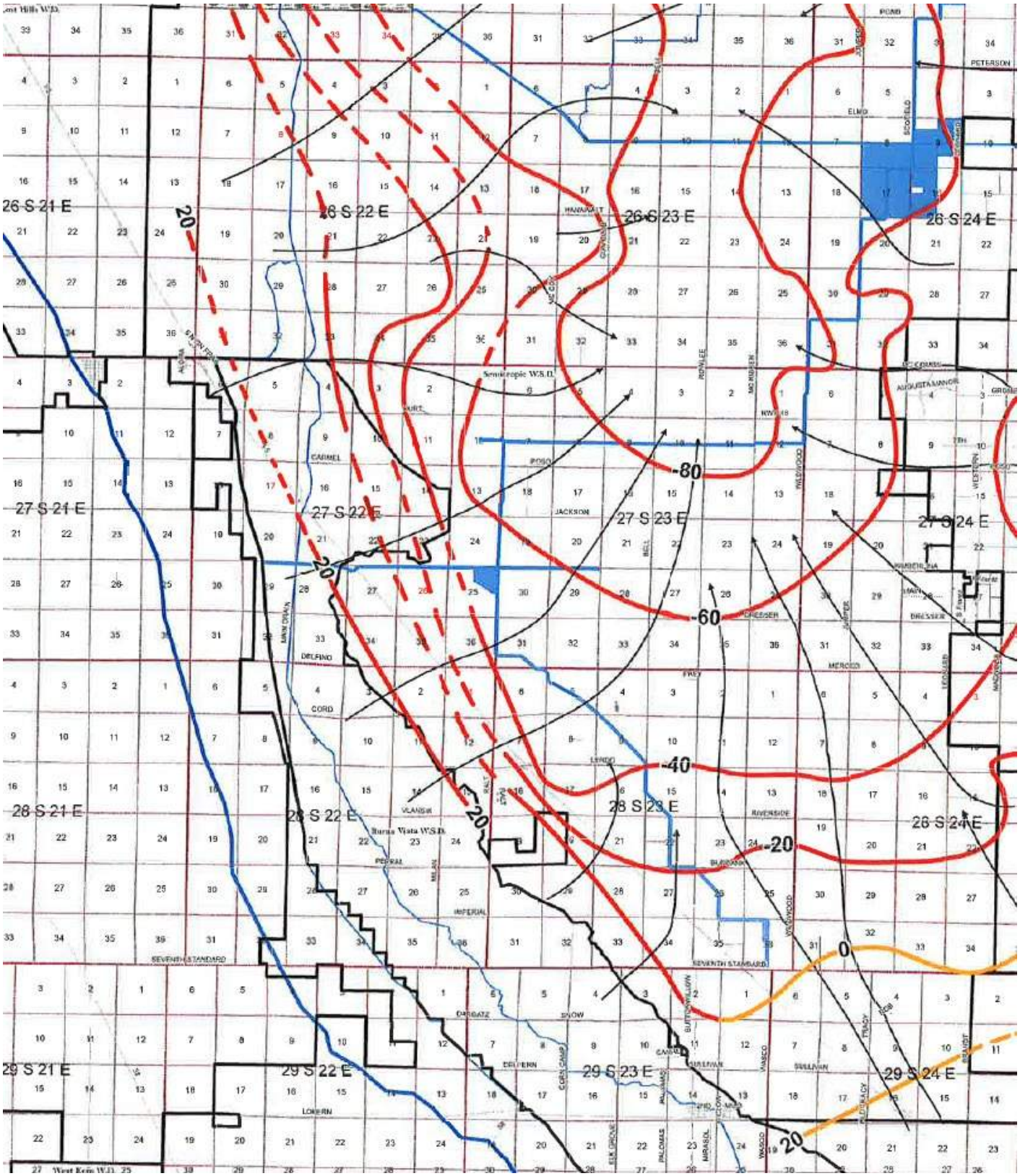
Figure 9-29
SWSD Monitoring Report
Upper Zone GW Elevations
Spring 2018



Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

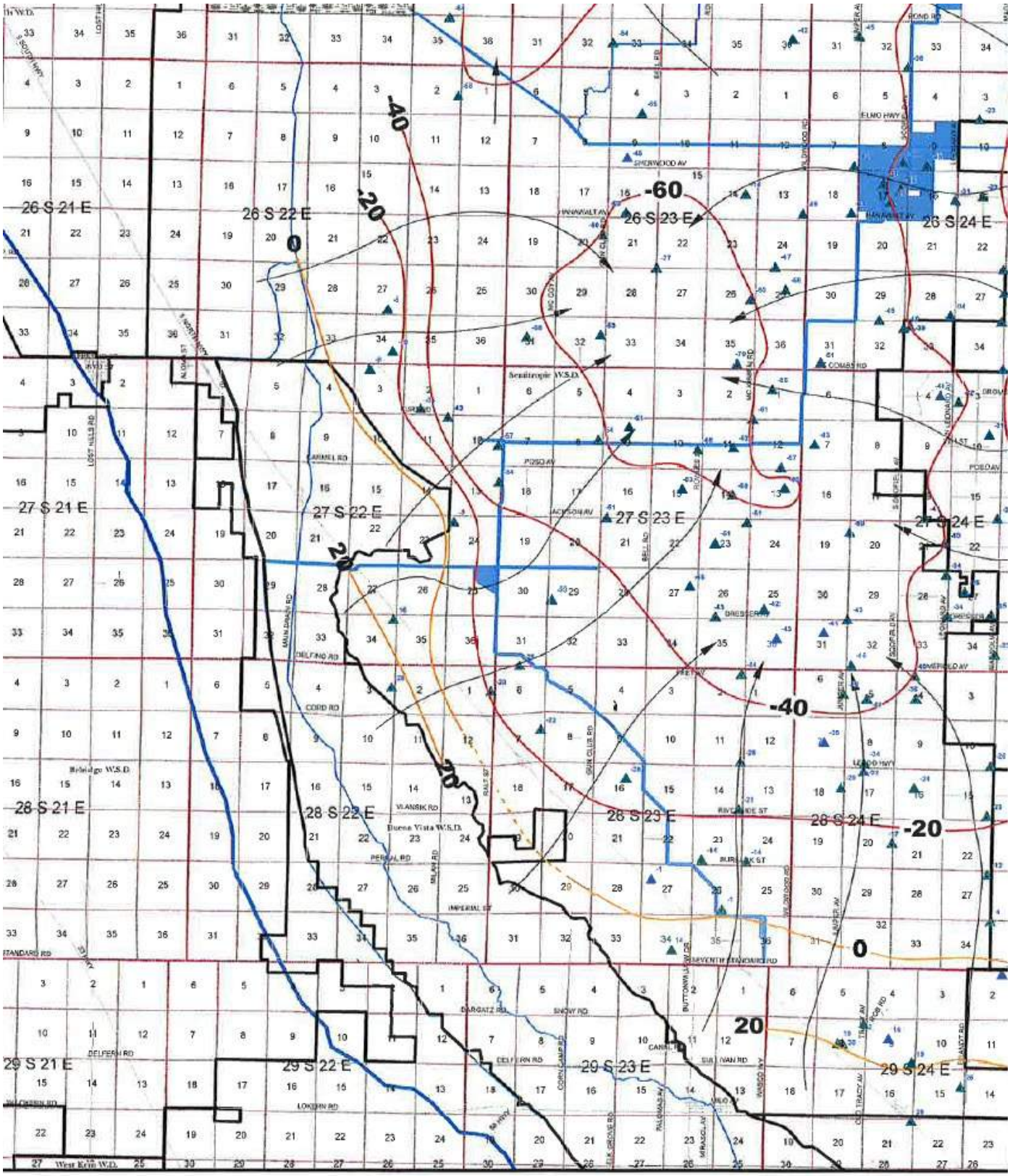
July 2021	Figure 9-30 SWSD Monitoring Report Upper Zone GW Elevations Spring 2019
TODD GROUNDWATER	



Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

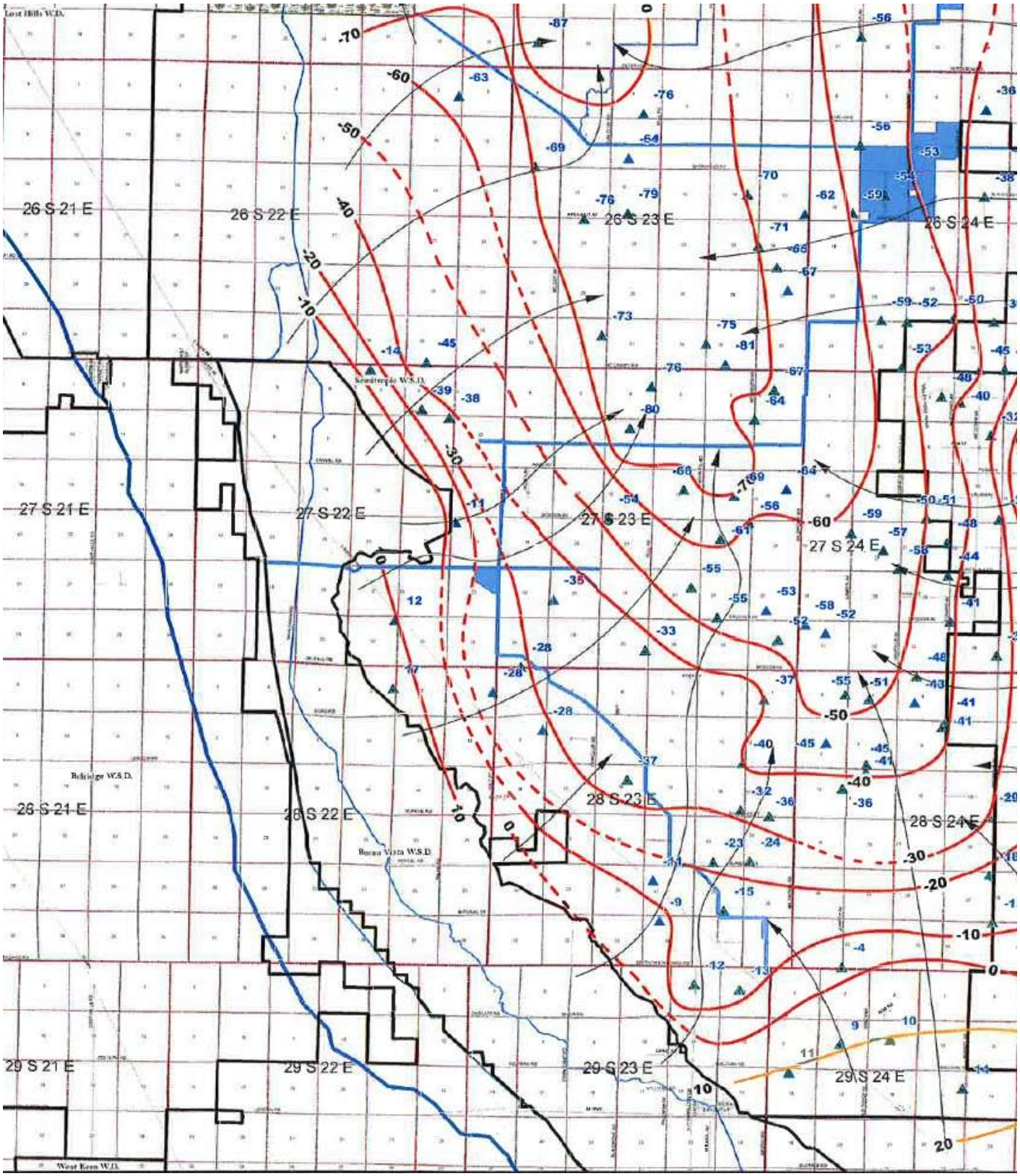
July 2021	Figure 9-31 SWSD Monitoring Report Lower Zone GW Elevations Spring 2018
TODD GROUNDWATER	



Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

July 2021	Figure 9-32 SWSD Monitoring Report Lower Zone GW Elevations Spring 2018
TODD GROUNDWATER	



Source: 2020 Biennial Report (Schmidt, 2020)

Note: Groundwater elevations in feet

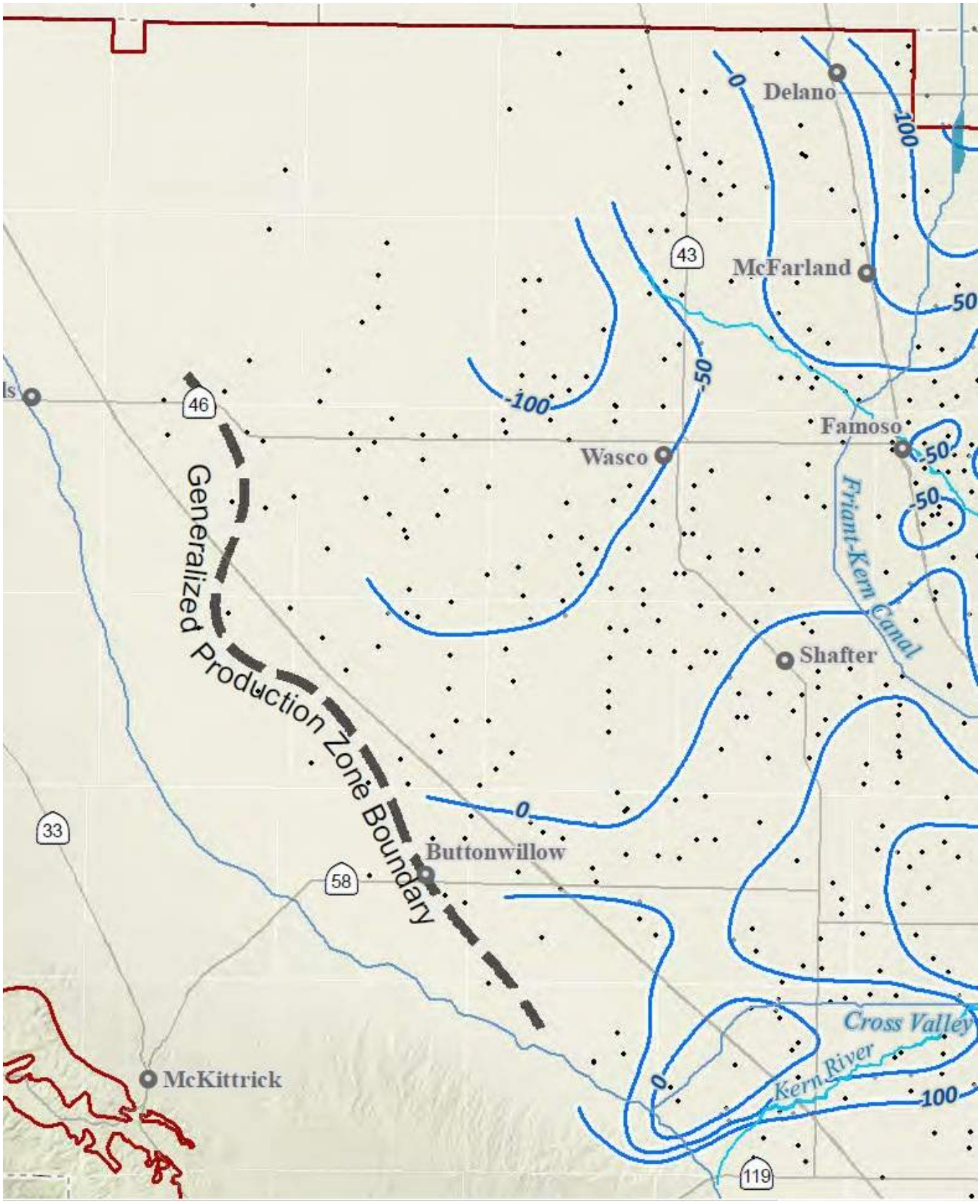
July 2021	Figure 9-33 SWSD Monitoring Report Lower Zone GW Elevations Spring 2019
TODD GROUNDWATER	

Source: Excerpt from **Figure 2-32 -** *SPRING 2015 UPPER ZONE GROUNDWATER ELEVATIONS – from KGA Umbrella GSP, January 2020 (KGA, 2020)*

July 2021

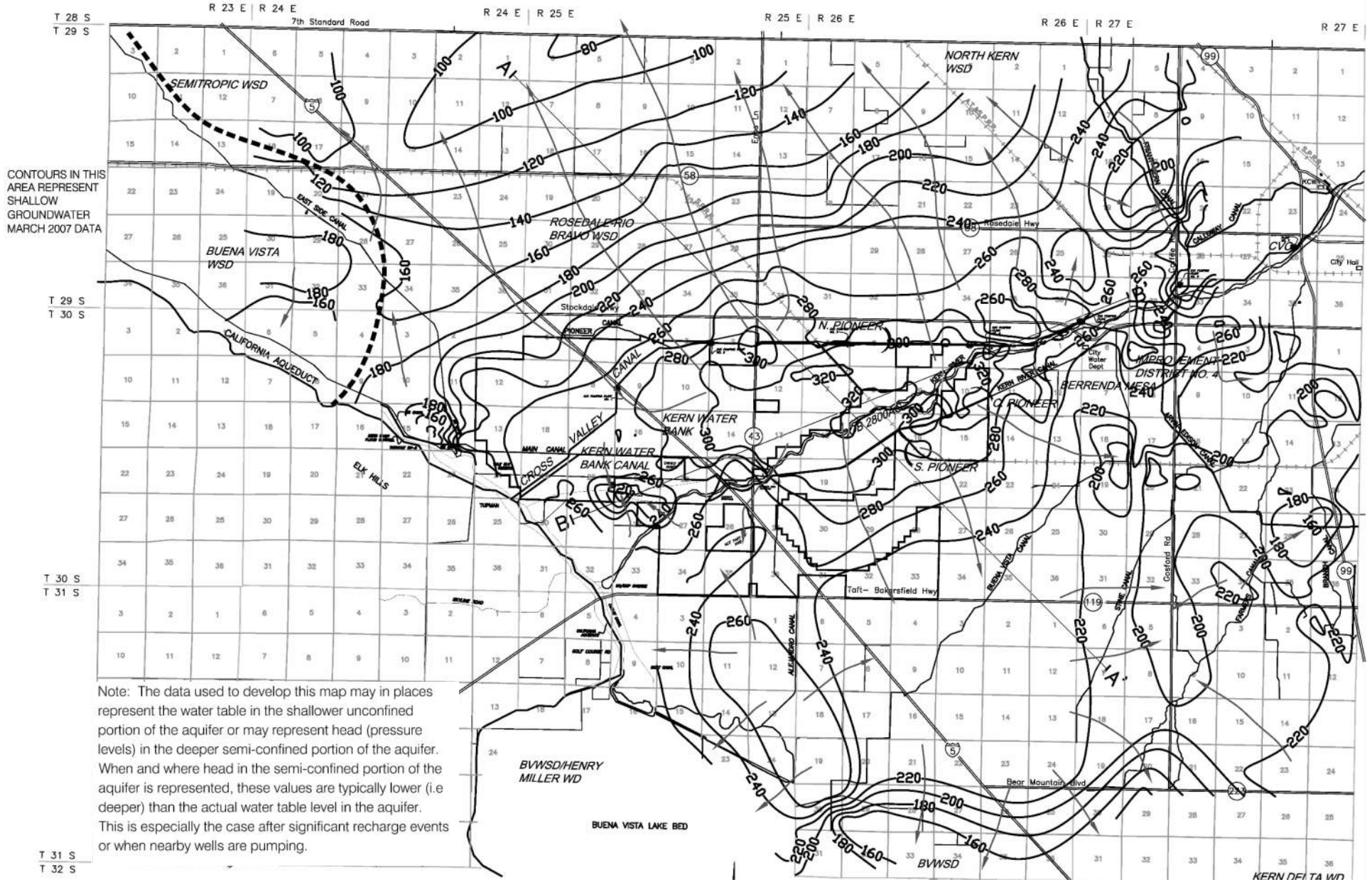
TODD GROUNDWATER

Figure 9-34
KGA GSP – Upper Aquifer Groundwater Elevation Contour Map - Spring 2015



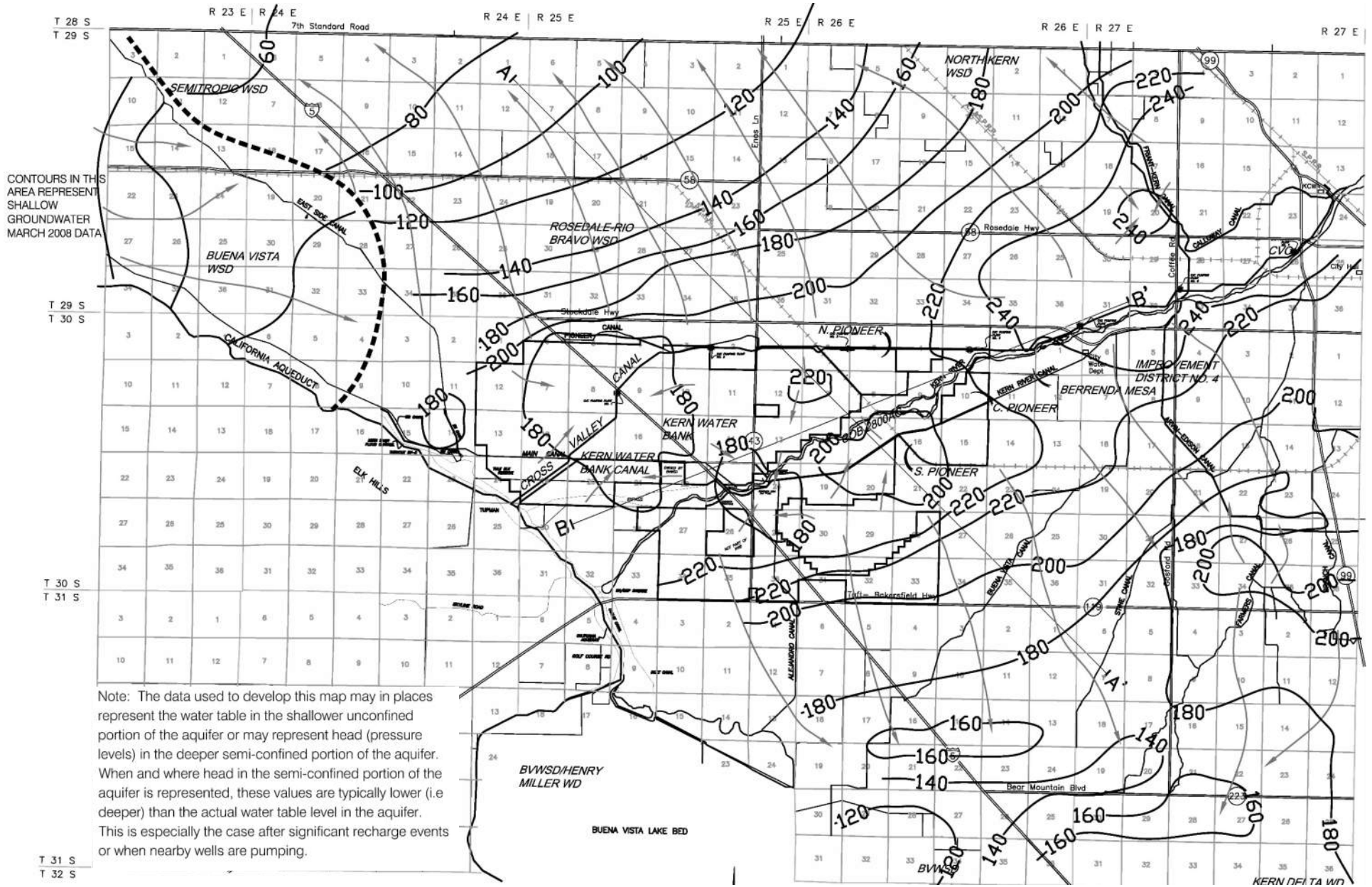
Source: Excerpt from **Figure 2-31 -** *SPRING 2015 REGIONAL GROUNDWATER ELEVATIONS – from KGA Umbrella GSP, January 2020 (KGA, 2020)*

July 2021	**Figure 9-35** **KGA GSP - Regional Aquifer Groundwater Elevation Contour Map - Spring 2015**
TODD GROUNDWATER	



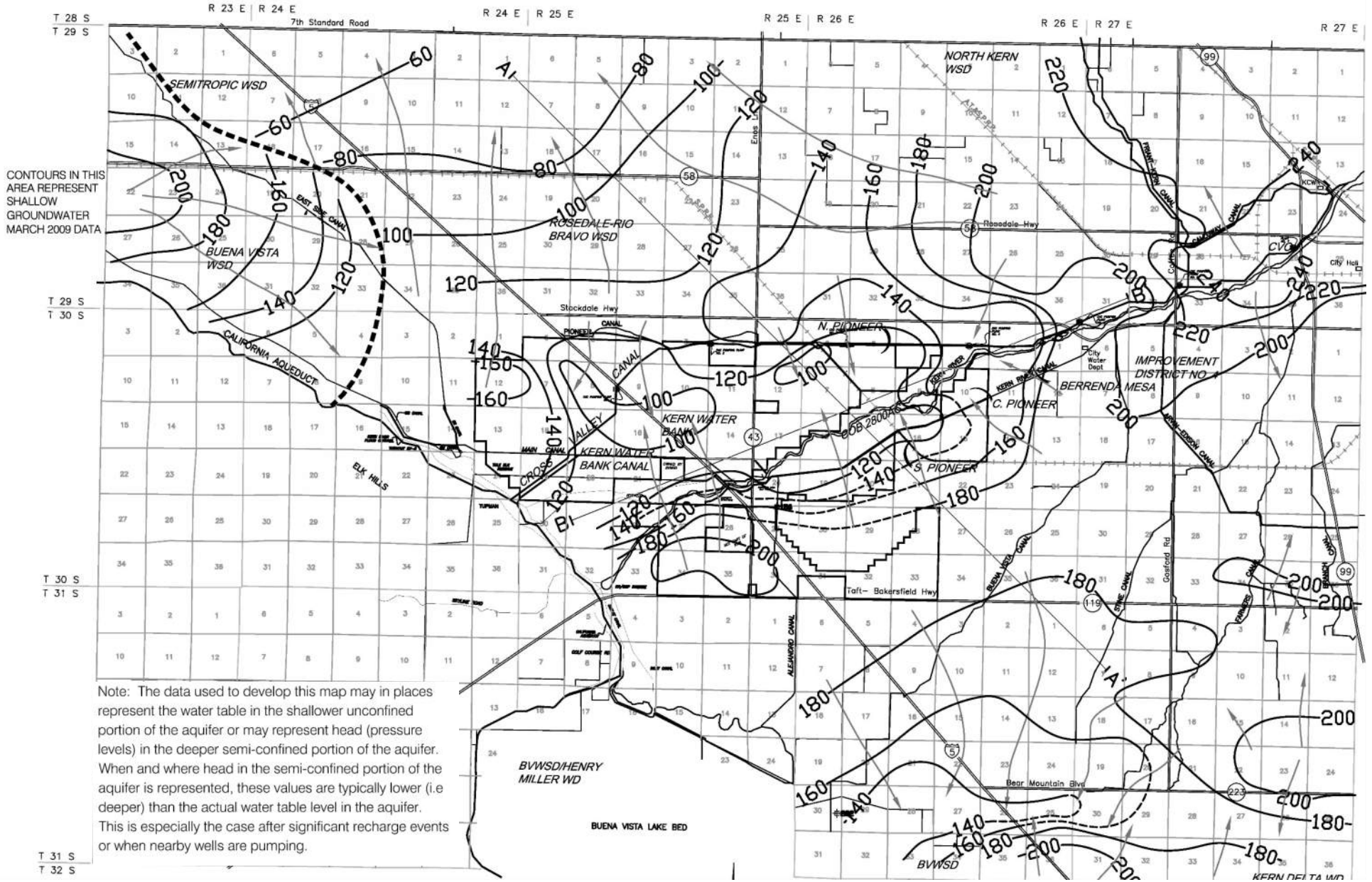
Source: ***"Elevation of Potentiometric Surface Direction of Groundwater Flow Middle Zone Spring 2007",*** **Figure by K.D. Schmidt to the Kern Fan Monitoring Committee, October 2007**

July 2021	**Figure 9-36** **Kern Fan Monitoring Committee** **Middle Zone GW Elevations** **Spring 2007**
TODD GROUNDWATER	



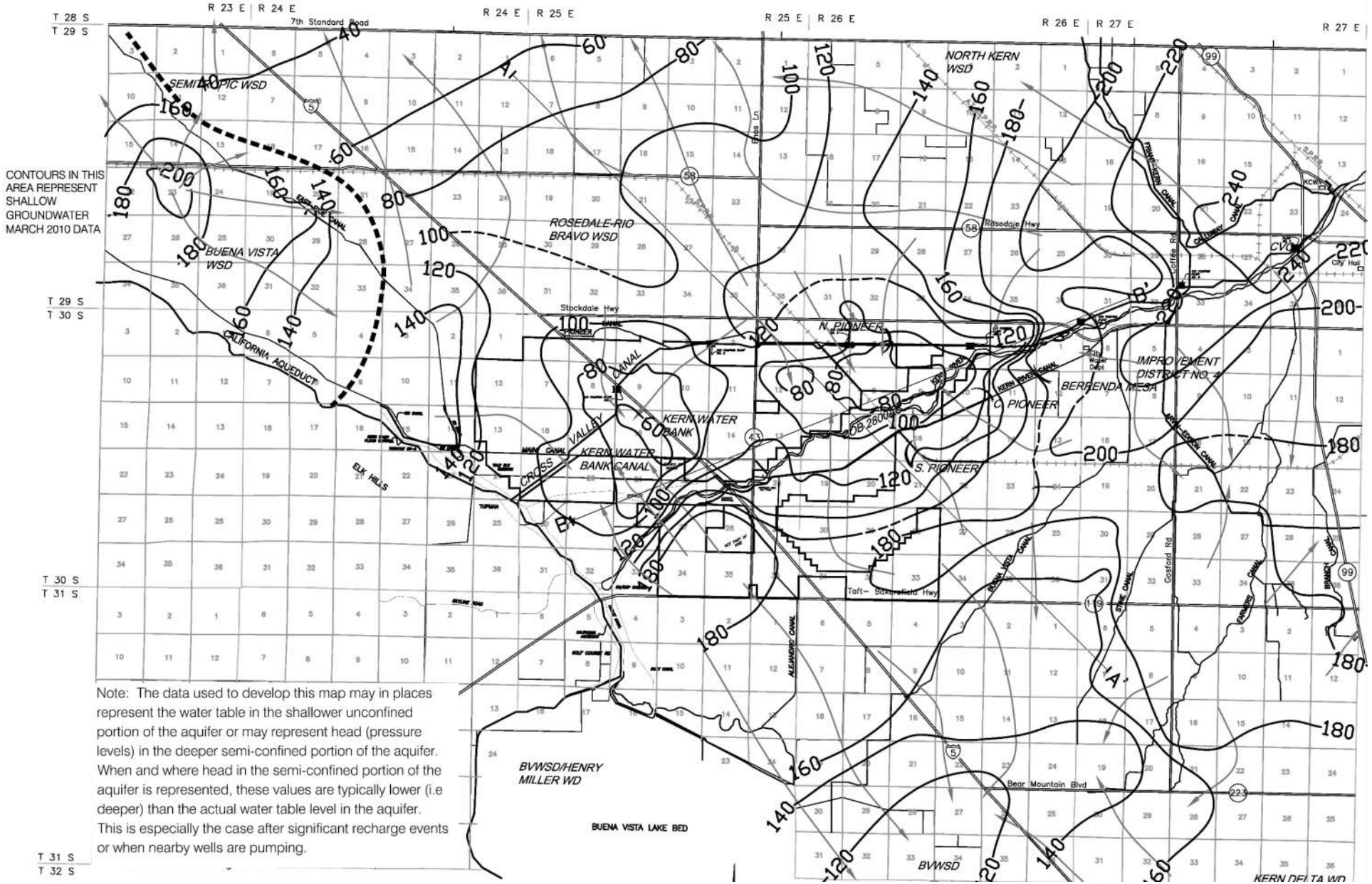
Source: ***"Elevation of Potentiometric Surface Direction of Groundwater Flow Middle Zone Spring 2008",*** **Figure by K.D. Schmidt to the Kern Fan Monitoring Committee, May 21, 2009**

July 2021	**Figure 9-37** **Kern Fan Monitoring Committee** **Middle Zone GW Elevations** **Spring 2008**
TODD GROUNDWATER	



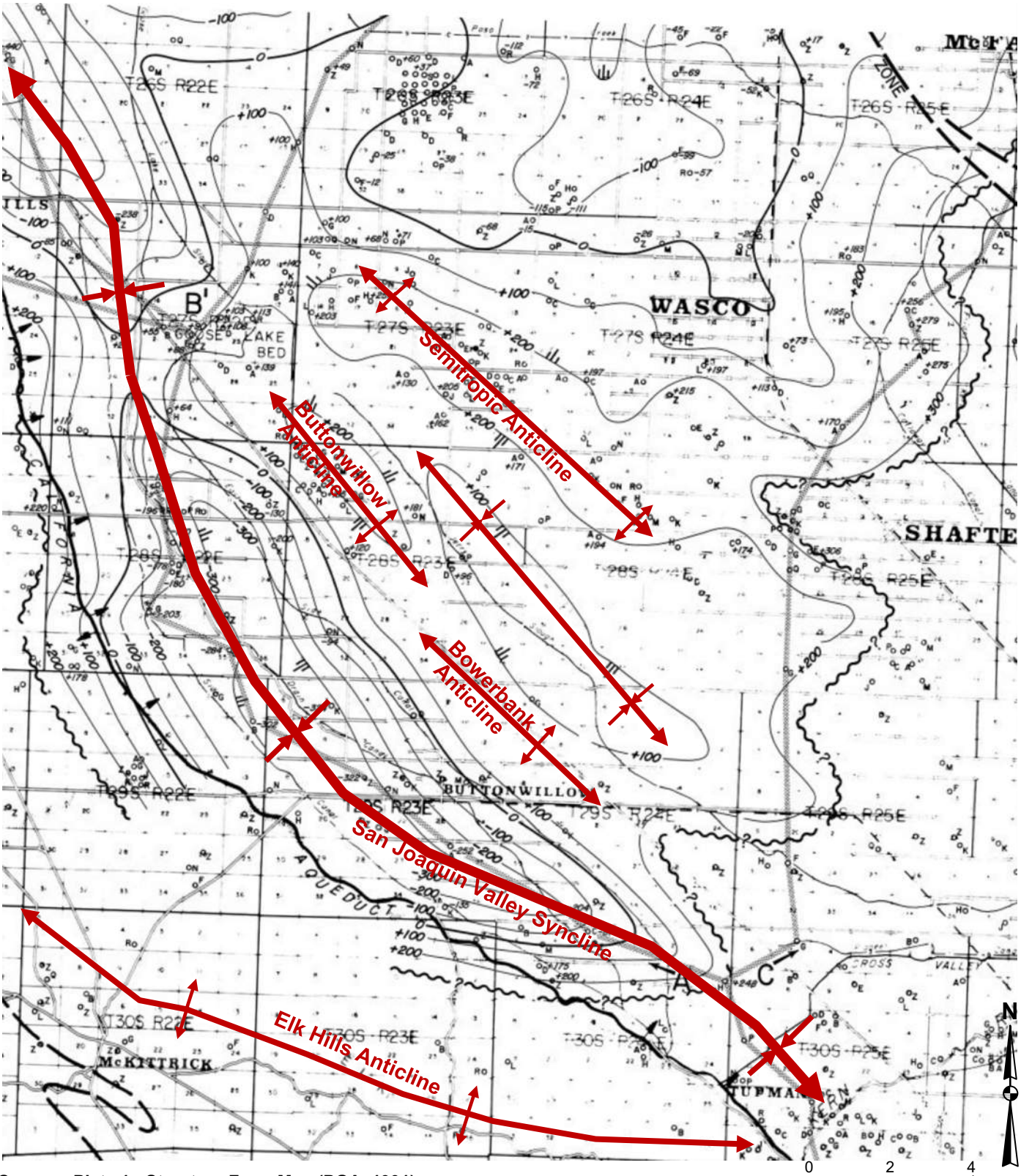
Source: ***"Elevation of Potentiometric Surface Direction of Groundwater Flow Middle Zone Spring 2009",*** **Figure by K.D. Schmidt to the Kern Fan Monitoring Committee, June 27, 2009**

July 2021	**Figure 9-38** **Kern Fan Monitoring Committee** **Middle Zone GW Elevations** **Spring 2009**
TODD GROUNDWATER	



Source: ***"Elevation of Potentiometric Surface Direction of Groundwater Flow Middle Zone Spring 2010",*** **Figure by K.D. Schmidt to the Kern Fan Monitoring Committee, June 17, 2010**

July 2021	**Figure 9-39** **Kern Fan Monitoring Committee** **Middle Zone GW Elevations** **Spring 2010**
TODD GROUNDWATER	



Source: Plate 1 - Structure Form Map (PGA, 1991)

Note: Contour elevations to base of E-Clay in feet

Scale: Miles

July 2021	Figure 9-40 Geologic Structure Map of the Base of the E-Clay or Equivalent
TODD GROUNDWATER	

[This page intentionally left blank.]

9.8 Master Response #8 – Beneficial Use of Recovered Groundwater

Several commenters expressed concern about the potential for beneficial use of groundwater recovered by the Proposed Project. The comments claim the proposed project is unlawful because, without disclosure and evaluation of data showing that the water recharged by the Proposed Project will later be extracted and put to beneficial use, it uses water in a wasteful and unreasonable manner. To support this claim, the comments allege that the Project proposes to recharge high-quality surface water in an area where groundwater is documented to be of much poorer quality. It is also alleged that the DEIR concludes that extraction of water in the Palms Area could not meet water quality standards.

As a point of clarification, the Recovery Project does not propose to recharge water. The Recovery Project proposes to supplement the District recovery facilities by adding up to 14 recovery wells. The DEIR provides the sources and quality of the water recharged under existing projects and analyzes the quality of water to be recovered under this Recovery Project. [DEIR Sec. 3.4.1]. The DEIR also states the beneficial uses for which the recovered water will be used [DEIR Sec 2.2.2]. After analysis, the DEIR concludes that the previously recharged water recovered by the Recovery Project and water recharged in the future will be of sufficient quality to put to beneficial use [DEIR 3-59 – 3-60].

The claim that recharging surface water in the groundwater basin for later recovery and use is, "waste and unreasonable use" is not supported by law or fact, *see* California Water Code §1242. An accepted definition of the term "waste", as applied to the use of water, is said to be: "To use needlessly or without valuable result; to employ prodigally or without any considerable return or effect, and to use without serving a purpose." [Meridian, Limited *v.* City and County of San Francisco (1939) 13 Cal.2d 424, 447]. This Recovery Project seeks to supplement existing facilities to recover and utilize previously stored water. This practice is widely accepted as beneficial, as acknowledged in the KGA's Groundwater Sustainability Plan which states:

> In the Kern Subbasin, conjunctive use plays a vital role for all beneficial users to coordinate the use of surface water and groundwater to improve the overall reliability of water supply. Whether it be water used to irrigate crops or to service communities for drinking water purposes, all users benefit from conjunctive use programs throughout the Subbasin. Conjunctive use programs in the Subbasin have been developed to capture and transport wet year surface water for the purpose of groundwater recharge and offset use of groundwater pumping. In turn, this prepares the basin for dry periods when groundwater may be limited. Projects such as interties, pipelines, and recharge basins have been developed, financed, and implemented by districts within the Kern Subbasin to deliver, bank, and return surface water, as well as replenish aquifers to better prepare for and manage during times of dry periods when beneficial users are more reliant on groundwater. …
>
> The majority of the KGA member agencies partake in groundwater banking and recharge programs. The purpose of these programs is to bring surface water into the Subbasin to recharge groundwater levels and better prepare for and manage water during times of dry periods or in wet periods where water is of excess. Groundwater banking refers to recharging specific amounts of water in a

groundwater basin that can later be withdrawn and used by the entity that deposited the water. [**KGA GSP Sec. 2.1.4.2]**

Notwithstanding the clear benefit of recharging and recovery of surface water, this comment is predicated on the false assumption that the subject Recovery Project proposes to recharge water. The DEIR is clear that the Recovery Project proposes to supplement District recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures [DEIR Sec. 2.3.1 & Fig. 2.2]. Seven of the proposed recovery wells will be located on the existing Palms Project, with the remaining wells located on the nearby Recovery Area [DEIR Fig. 2.2].

The Recovery Project will recover water previously banked by the District under existing projects. The environmental impacts of recharging that water was reviewed at the time those various recharge projects were approved, to the extent required by law. As this Recovery Project does not seek to recharge water, concerns raised about the environmental impacts that may be associated with recharge of surface water are not appropriate or relevant for this Recovery Project and further response is not required. Notwithstanding, the claims that the groundwater under the Palms area is of poor quality is not supported by the data presented in this FEIR. Water quality of groundwater in the Recovery Project area is suitable for beneficial uses in its current condition (**Table 9-2**).

We further note that since the surface water quality is of better quality than the groundwater quality (**Table 9-2**), recharge with the surface water will, over time, result in lowering salinity concentrations in the Project area. Since surface water is typically of better quality than native groundwater, quality typically improves with recharge operations. This is commonly the case at recharge operations throughout Kern County. Elevated constituents in the groundwater such as total dissolved solids and sulfate are expected to decrease in the area over time. Changes to the groundwater quality are beneficial to existing and potential uses and users of the groundwater resource.

Table 9-2. Water Quality of Surface Water Used for Recharge and Groundwater in the Recovery Project Area.

Constituent	Drinking Water Standard	CA Aqueduct	Kern River	DMW-13 Middle (Recharge and Recovery Area) - Average	DMW-13 Middle (Recharge and Recovery Area) - Max	East of East Side Canal (Recovery Area) - Average	East of East Side Canal (Recovery Area) - Max
Boron (ppm)	NL = 1	ND – 0.15	ND – 0.13	0.15 Average	0.24 Max	0.2 Average	0.5 Max
Chloride (ppm)	250 - 500	30 – 47	3 – 4	56 Average	62 Max	75 Average	95 Max
Conductivity (µS/cm)	900 – 1,600	246 – 396	119 – 185	981 Average	1100 Max	891 Average	976 Max
Hardness (ppm)	Very Hard > 181	58 – 82	38 – 54	268 Average	320 Max	179 Average	289 Max
Sodium (ppm)	DWR = 200	23 – 44	9 – 17	108 Average	120 Max	99 Average	123 Max
Sulfate (ppm)	250 - 500	22 – 37	8 – 16	330 Average	370 Max	257 Average	334 Max
TDS (ppm)	500 – 1,000	140 – 238	90 – 113	677 Average	750 Max	589 Average	808 Max

Notes: ppm = parts per million; µS/cm = microSiemens per centimeter; NL= notification level; DWR = California Department of Water Resources; TDS = total dissolved solids.

Further, the claim that the Recovery Project cannot extract water from the Palms Area is also not accurate as half of the proposed recovery wells under the Recovery Project will be located on the Palms Project

Area (existing recharge area) [DEIR Fig. 2.2], and water recovered from the recharge area will be suitable for beneficial use with or without blending with water from other sources.

According to BVWSD's Groundwater Sustainability Plan dated January 2020, Section 2.2.4.7 – Primary Use of the Principal Aquifer System, Buena Vista Groundwater Sustainability Agency is almost entirely irrigated farmland with Community of Buttonwillow being the only municipality. Although a large proportion of agricultural demand is supplied by surface water, the Community of Buttonwillow and individual domestic and industrial users rely solely on groundwater, with agricultural operations recharging surface water diverted from the Kern River and SWP. Groundwater users typically rely on shallow unconfined and semi-confined aquifer zones above the Corcoran Clay.

The Water Quality Control Plan for Tulare Lake Basin (Basin Plan), Third Edition (RWQCB 2018) states beneficial uses for the Kern County basin designates all groundwater to be MUN unless specifically exempted by Regional Board. In addition, all groundwater in the Tulare Lake Basin is considered suitable or potentially suitable for MUN and AGR. According to the Basin Plan, the Recovery Project is located in Hydrologic Units 257 and 258, and designated beneficial uses are MUN, AGR, IND and PRO (and REC-1 in Unit 258). Although the blended water quality analysis evaluated the potential use of groundwater for a PIP into the Aqueduct, if it is not approved by DWR, groundwater in the Recovery Project is also suitable for irrigation. As shown in **Table 3-6** of this FEIR, groundwater underlying the Palms Project area meets all primary drinking water standards; a few secondary drinking water standards fall within the range of the recommended and upper limits. Water quality requirements for a PIP are stricter than requirements for irrigation purposes.

The water quality analysis in Section 3.4 of the DEIR identifies only total dissolved solids, conductivity and sulfate as exceeding secondary MCLs. This general analysis did not find major water quality issues with the continued beneficial use of groundwater from landowner wells in the area.

Water has been pumped from wells located within the Palms Recharge area for many years, and this water has been and continues to be suitable for beneficial use. Given the history of beneficial use of water pumped from within the footprint of the recharge area, there are no grounds for the assertion that water pumped from this area is not suitable for beneficial use.

9.9 Master Response # 9 – Clarification of Recovery Project Description

Several commentors wrongly assumed that the subject project includes construction, operation, and maintenance of recharge ponds, based on the mistaken belief that the subject Recovery Project is part of a previously approved and implemented recharge project known as the "Palms (Recharge) Project." The Recovery Project does not propose to recharge any water. The Recovery Project only supplements the District's recovery facilities by adding nine new recovery wells and refurbishing five replacement wells in addition to related conveyance structures.

It should be noted that the Palms Project is just one of the many existing water recharge facilities within the District [DEIR 2.6]. The Palms Project is one of the identified recharge facilities. Environmental review for the Palms Project was completed in 2016 (Palms Project IS / Mitigated Negative Declaration (SCH # 2015121030)) and construction began in 2016. The Palms Project has been in operation since that time and was utilized to recharge water in 2017 and 2019. Water recharged in the Palms Project can be

recovered by existing facilities. At the time the Palms Project environmental review was completed, the District did not own the eastern parcels in the Recovery Project Area, nor was it reasonably foreseeable that the District would obtain ownership of those parcels several years later. Including review of the subject Recovery Project with the Palms Project environmental review would have been beyond speculative in 2016 and would not have been appropriate under CEQA.

The environmental impacts of recharging water at the Palms Project were reviewed at the time the project was approved, to the extent required by law. As the Recovery Project does not seek to recharge water, concerns raised about the environmental impacts that may be associated with recharge of surface water are not appropriate or relevant for the Recovery Project environmental documentation. CEQA does not require a re-review of an existing project approved and constructed 5 years prior. Under CEQA, project segmentation may be appropriate when future development is unspecified and uncertain, since "no purpose can be served by requiring an EIR to engage in such speculation as to future environmental consequences." Similarly, when two projects, although physically connected, are neither interdependent nor functionally linked to one another, the Lead Agency may evaluate them in separate CEQA documents, and such treatment would not be considered as inappropriate segmenting.

The Palms Project is a distinct and separate project from the Project that is the subject of the DEIR. The Palms Project has 'independent utility', as clearly demonstrated by the fact that it has been constructed and in operation since 2017. To date, the District has recharged approximately 27,166 AF of water in the Palms Project, 14,164 AF in 2017 and 13,002 AF in 2019. Because the Palms Recharge Project is operated independently and has been implemented separately from the Recovery Project, the two projects are not a single project. The fact that both projects will be utilized by the District to conjunctively manage and use water supplies, does not imply that they are one project for purposes of CEQA.

As described in the DEIR, this Project will be used to recover water from various existing recharge facilities, not just the Palms Project [DEIR ES-iii]. This Recovery Project does not seek to construct additional recharge facilities or recharge water. The project description in the DEIR adequately describes all of the elements associated with this Recovery Project. The potential cumulative impacts associated with this Project and existing projects, such as the Palms Project, are discussed and analyzed in the Cumulative Impact section of the DEIR [DEIR Sec. 4-6].

KWBA Comment #1 also misstates that the Project is "adding a third component – recharge *via* BVWSD's Existing canal system." The District has been recharging water in its canal system for later recovery since the inception of the District in 1927. This is not a new component, and this existing activity pre-dates CEQA.

The District has developed other recharge facilities as well, that are also standalone projects. The District recently completed construction of the Corn Camp Recharge Pond and Daley Ranch Recharge Pond. These are examples of recharge facilities that have been developed without specific recovery facilities, as recovery will be performed with grower's private wells.

The following changes have been made to the DEIR so it is abundantly clear that this Recovery Project is not recharging water, but rather supplementing existing District recovery facilities:

ES-3

A high proportion of recharge in the District takes place through seepage in District-owned facilities, including canals, laterals and recharge basins. In January 2016, the District approved construction of the Palms Project in the southern portion of the Buttonwillow Service Area. The existing Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge. Available water supply will continue to be recharged at the Palms Project during wet years. As stated in the Palms Project 2016 Initial Study / Mitigated Negative Declaration (SCH # 2015121030), the District anticipates recharging up to 100,000 acre-feet per year (AFY) through the Palms Project when water supply is available.

This Recovery Project seeks to supplement existing recovery facilities for the recovery of water banked in the District in existing facilities/projects. The District manages recovery so that no more than 90 percent of water banked is recovered. Water recovered by the District will be distributed to District water users or exchanged with other districts or sold to other industrial or municipal users. This Recovery Project may also discharge into the Aqueduct to satisfy existing and future water contracts between the District and other public water agencies.

Sec. 2.3.2

Available water supply will continue to be recharged through seepage in District-owned facilities in wet years. This includes the existing ~~at the~~ Palms Project, where it is anticipated that up to 100,000 AFY can be recharged ~~during wet years~~. ~~The District is anticipated that s recharging up to 100,000 AFY can be recharged through the Palms Project when water supply is available~~. The District will also continue to recharge~~s~~ groundwater through their existing canal system ~~during wet years~~, a District practice for many decades.

As is the current practice, water recovered by the District is distributed to District water users, ~~or~~ exchanged with other districts, or sold to industrial or municipal users. Recovery does not exceed 90 percent of the volume recharged. The Recovery Project will provide additional facilities to continue this practice and will also discharge into the Aqueduct to satisfy existing and future water contracts between the District and other public water agencies.

[This page intentionally left blank.]

10.0 Report Preparers and Reviewers

Buena Vista Water Storage District

Tim Ashlock.....Engineer/Manager

GEI Consultants, Inc.

Ginger Gillin ..... Project Director

Nicholas Tomera..... Project Manager

Christine Russo ..... Environmental Planner

Anne King..... Environmental Planner/Biological Resources

Ryan Snyder..... GIS/Mapping

Jesse Martinez..... Lead Cultural Resources

Matthew Chouest ..... Archaeologist

Madeline Bowen ..... Architectural Historian

David Miller, Ph.D., P.E. .....Agricultural Engineer

Jackie Takeda.....Senior Water Quality Specialist

Stephanie Hearn .....Senior Reviewer, Water Quality

Gigi Gable.....Document Specialist

Other Firm

Michael Maley PE, PG, CHG ……. Senior Hydrogeologist, Todd Groundwater

[This page intentionally left blank.]

11.0 References

References from the Executive Summary

California Department of Fish and Game (CDFG). 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency, Sacramento, CA.

Swainson's Hawk Technical Advisory Committee. 2000. *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*. Available at https://nrm.dfg. ca.gov/FileHandler.ashx?DocumentID=83990&inline. Accessed October 12, 2020.

U.S. Fish and Wildlife Service (USFWS). 2011. Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento Fish and Wildlife Office, Sacramento, CA.

References from Chapter 1.0 Introduction

No references cited.

References from Chapter 2.0 Project Description

No references cited.

References from Chapter 3.0 Environmental Analysis

No references cited.

References from Chapter 3.2 Biological Resources

Beedy, E. C. 2008. Tricolored Blackbird (Agelaius tricolor). In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali, 437–443. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

California Department of Fish and Game (CDFG). 2007. *California Swainson's Hawk Inventory: 2005–2006. Resource Assessment Program, Final Report*. P0485902. Sacramento, CA. Prepared by UC Davis Wildlife Health Center, Davis, CA.

_____. 2012. *Staff Report on Burrowing Owl Mitigation*. State of California Natural Resources Agency, Sacramento, CA.

California Department of Fish and Wildlife (CDFW). 2015. California Department of Fish and Wildlife (Department) Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015. Available at

file:///C:/Users/aking/Downloads/TRBL%20Avoidance%20Measures_Final_2015March20.pdf. Accessed March 31, 2021.

_____. 2020a. Results of electronic database search for sensitive species occurrences. Version 5. Biogeographic Data Branch. Available at https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed August 31, 2020.

_____. 2020b. *California Sensitive Natural Communities*. Available at https://wildlife.ca.gov/Data/ VegCAMP/Natural-Communities/List#sensitive%20natural%20 communities. Accessed October 23, 2020.

California Natural Diversity Database (CNDDB). 2021. https://wildlife.ca.gov/Data/CNDDB

California Native Plant Society (CNPS). 2020. *Inventory of Rare and Endangered Plants*. Online edition, v8-03 0.38. Sacramento, CA. Available at http://www.rareplants.cnps.org. Accessed August 31, 2020.

Davis, J. N., and C. N. Niemla. 2008. Northern Harrier (Circus cyaneus). In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali, 149–155. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

Endangered Species Recovery Program (ESRP). 2020. Tulare Grasshopper Mouse. Available at https://esrp.csustan.edu/speciesprofiles/profile.php?sp=onto. Accessed October 23, 2020.

GEI Consultants, Inc. (GEI). 2019. File data collected during field reviews of Recovery Project area, 2019.

_____. 2020. File data collected during field reviews of Recovery Project area, 2020.

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. 2008. Burrowing Owl (Athene cunicularia). In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali, 218–226. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

Humple, D. 2008. Loggerhead Shrike (Lanius ludovicianus). In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali, 271–277. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

Jaramillo, A. 2008. Yellow-headed Blackbird (Xanthocephalus xanthocephalus). In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California, ed. W. D. Shuford and T. Gardali, 444–450. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

Kern County. 2009. *General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf Accessed: October 2, 2020.

Kern County Planning Department. 2004. Revised Update of the Kern County General Plan and Amendment of the Kern County and Incorporated Cities Integrated Waste Management Plan Siting Element Volume I Recirculated Draft Program Environmental Impact Report. Bakersfield, CA.

_____. 2006. First Public Draft, Kern County Valley Floor Habitat Conservation Plan. Prepared by Garcia and Associates, Lompoc, CA.

Kern Water Bank (KWB). 2019. Kern Water Bank Storage Project within the Kern Groundwater Authority Groundwater Sustainability Plan, January.

McCormick Biological, Inc. 2020. Buena Vista Water Storage District Stockdale Highway Pipelines and Water Wells. Results from Reconnaissance Field Surveys, file report. Russell Sweet, October 27, 2020.

Moore, J. 2000. White-tailed Kite (*Elanus leucurus*). Focal Species Account for the CalPIF Grassland Bird Conservation Plan. Available: http://www.prbo.org/calpif/htmldocs/species/grassland/ wtkiacct.html. Accessed October 23, 2020.

Quinn, J.H. 2008. The ecology of the American badger Taxidea taxus in California: assessing conservation needs on multiple scales. PhD dissertation. University of California, Davis.

Swainson's Hawk Technical Advisory Committee. 2000. *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*. Available at https://nrm.dfg. ca.gov/FileHandler.ashx?DocumentID=83990&inline. Accessed October 12, 2020.

South Valley Biology Consulting, LLC. 2020. *2019 Annual Wildlife Monitoring Report for the Kern Water Bank*. Bakersfield, CA.

_____. 2021 (January 11). Comments on the Draft Environmental Impact Report for the Palms Groundwater Recovery Project - SCH# 2020060315. Prepared by James Jones, Jr.

Sterling Wildlife Biology. 2019. Kern Water Bank Waterbird, Raptor and Upland Bird Survey Report: August 2012 – May 2019. Woodland, CA.

U.S. Fish and Wildlife Service (USFWS). 2010. Tipton kangaroo rat (Dipodomys nitratoides nitratoides) 5-year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA.

_____. 2011. Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento Fish and Wildlife Office, Sacramento, CA.

_____. 2020a. *IPAC Resource List*. Generated at https://ecos.fws.gov/ipac/. Accessed October 23, 2020.

_____. 2020b. Critical Habitat for Threatened and Endangered Species. Available at: https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77. Accessed October 23, 2020.

_____. 2020c. *Species Status Assessment for the Blunt-nosed leopard lizard (*Gambelia sila*)*. Version 1.0. Region 10, Sacramento, CA.

_____. 2020d. Species Status Assessment Report for the Giant Kangaroo Rat (Dipodomys ingens). Version 1.0.

_____. 2020e. Species Status Assessment Report for the San Joaquin kit fox (Vulpes macrotis mutica). Version 1.0.

Williams, D. F. 1986. Mammalian species of special concern in California. California Dept. Fish and Game, Wildl. Manag. Div. Admin. Rep. 86-1, Sacramento, 112 pp.

References from Chapter 3.3 Cultural Resources

Bonte, Harmon S. 1930. Bulletin No. 37: Financial and General Data Pertaining to Irrigation, Reclamation Financing and Refinancing Commission. California Division of Water Resources, Sacramento, CA.

Cook, S.F. 1955. The Aboriginal Population of the San Joaquin Valley, California. *Anthropological Papers* 16(2). University of California Press, Berkeley and Los Angeles, CA.

Fredrickson, David A. 1974. Cultural Diversity in Early Central California: A View from the North Coast Ranges. *The Journal of California Anthropology* 1 (1):41-53.

_____. 1994. Spatial and Cultural Units in Central California Archaeology. In *Toward a New Taxonomic Framework for Central California Archaeology: Essays by James A. Bennyhoff and David A. Fredrickson*, edited by Richard E. Hughes, 25-47. Contributions

of the University of California Archaeological Research Facility, No. 52. Berkeley: University of California Press.

Galloway, Devin and Francis S. Riley. 1999. "San Joaquin Valley, California: Largest Human Alteration of the Earth's Surface. In *Areas Susceptible to Irrigation-Induced Selenium Contamination of Water and Biota in the Western United States*. U.S. Geological Survey Circular 1180, U.S. Department of the Interior, U.S. Geological Survey, Washington, D.C. Available at https://books.google.com/books?id=If4kAQAAIAAJ&pg=RA2-PA23&lpg=RA2-PA23&dq=Devin+Galloway+and+Francis+S.+Riley&source=bl&ots=-Owuz42zFQ&sig=JHB9zYHXt6MjXYJ0km1GCRnBCC0&hl=en&sa=X&ei=4KNlUcD5DeL1iwK5zoHACg&ved=0CEMQ6AEwAw#v=onepage&q=Devin%20Galloway%20and%20Francis%20S.%20Riley&f=false, accessed October 13, 2020.

Gayton, A.H. 1948. Northern Foothill Yokuts and Western Mono. *Anthropological Records* 10(1).

Giefer, Gerald J., ed. 1967. *Sidney T. Harding: A Life in Western Water Development*. Statewide Water Resources Center and Regional Oral History Office, Bancroft Library, University of California Berkeley, Berkeley, CA.

Hoover, Mildred Brooke and Douglas E. Kyle. 1990. *Historic Spots in California*. Stanford University Press, Stanford, CA.

Hundley, Jr., Norris. 1992. *The Great Thirst: Californians and Water, 1770s-1990s*. University of California Press, Berkeley and Los Angeles, CA.

Kern County Centennial Observance Committee. 1966. *Kern County Centennial Almanac*. Kern County Centennial Observance Committee, Bakersfield, CA

Kern County. 2009. *General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf Accessed: October 2, 2020.

Moratto, Michael J. 1984. *California Archaeology*. Academic Press, Inc., San Francisco, CA. National Resource Conservation Service.

Morgan, Wallace M., 1914. *History of Kern County*. California. Historic Record Company, Los Angeles, CA.

Rosenthal, Jeffrey S., Gregory G. White, and Mark Q. Sutton. 2007. The Central Valley: A View from the Catbird's Seat. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, 147-164. New York, NY: Altamira Press.

Wallace, William J. 1978. Southern Valley Yokuts. In Handbook of North American Indians, Vol. 8, edited by Robert F. Heizer, 448-461. Washington, D.C.: Smithsonian Institution.

References from Chapter 3.4 Hydrology and Water Quality

Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985) http://www.fao.org/DOCREP/003/T0234E/T0234E00.htm.

Buena Vista Water Storage District (BVWSD). 2014. Groundwater Management Plan Revised May.

_____. 2016. 2015 Agricultural Water Management Plan. Buttonwillow, CA.

Buena Vista Water Storage District Groundwater Sustainability Agency (BVGSA). 2020. Buena Vista Water Storage District GSA Final Groundwater Sustainability Plan, January.

_____. 2016. 2015 Agricultural Water Management Plan. Buttonwillow, CA.

California Department of Water Resources (DWR). 2016.California's Groundwater, Working Toward Sustainability. Bulletin 118, 2016 Interim Update. https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118

_____. 2019. 2018 Critically Overdrafted Basins Map and List. https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118/Critically-Overdrafted-Basins

_____. 2020. SGMA Basin Prioritization Dashboard. Available: https://gis.water.ca.gov/app/bp-dashboard/final/ Accessed: September 24, 2020.

_____. 2020a. Dam Breach Inundation Map Publisher. https://fmds.water.ca.gov/webgis/?appid=dam_prototype_v2

Central Valley Regional Water Quality Control Board (RWQCB). 1986. Tulare Lake Hydrologic Region Planning Area. https://www.waterboards.ca.gov/rwqcb5/water_issues/basin_plans/tlb_figII_1.pdf Accessed January 29, 2022.

_____. 2018. Water Quality Control Plan for the Tulare Lake Basin Third Edition. Available: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlbp_201805.pdf Accessed: October 8, 2020.

Dale, R.H., French, J.J., and Gordon, C.V., 1966. Ground-Water Geology and Hydrology of the Kern River Alluvial-Fan Area, California, USGS Open-File Report.

Endangered Species Act (ESA). 2017. Kern River Water Allocation Plan Draft Supplemental Environmental Impact Report (SCH# 2011041082), prepared for Kern Delta Water District, August 2017.

Environmental Sciences Associates (ESA). 2010. Groundwater Banking Project Environmental Impact Report. Prepared for West Kern Water District. March 2010.

Faunt, C. ed, 2009. Groundwater Availability of the Central Valley, California, USGS Professional Paper 1766.

Faunt, C.C., R.T. Hanson, and K. Belitz. 2009. Development of a Three-Dimensional Model of Sedimentary Texture in Valley-Fill Deposits of Central Valley, California, USA, Hydrogeology Journal (2010) 18: 625–649.

Federal Emergency Management Agency (FEMA). 2011. FEMA Flood Map Service Center. Available: https://msc.fema.gov/portal/search?%20AddressQuery=231%20silva%20avenue%2C%20marysville#searchresultsanchor Accessed: October 8, 2020.

GEI Consultants, Inc. 2017. Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

Kern County. 2009. *General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf Accessed: October 2, 2020.

Kern County Water Agency (KCWA). 2010-2013. Water Supply Reports.

Kern County Water Agency. (KCWA). 2017, 2019, and 2020. Improvement District No. 4, Report on Water Conditions. https://www.kcwa.com/wp-content/uploads/2021/02/ROWC2020_FINAL.pdf Accessed January 2022.

Leake, S. A. 2011. Capture—Rates and Directions of Groundwater Flow Don't Matter!, Ground Water, 49: 456–458.

Reilly, T.E., O.L. Franke, and G.D. Bennett. 1987. The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6.

Todd Groundwater. 2017. Final Groundwater Impacts Assessment Report Kern River Water Allocation Plan, as Appendix D in Supplemental Environmental Impact Report for Kern River Water Allocation Plan, SCH# 2011041082, July, 1,345 pp.

References from Chapter 3.5 Geological Resources

Buena Vista Groundwater Sustainability Agency (BVGSA). 2020. Final Groundwater Sustainability Plan. Kern County Groundwater Subbasin. Buttonwillow, CA.

California Department of Water Resources (DWR). 2016. Monterey Plus Draft Revised EIR – Kern Water Bank Development and Continued Use and Operation. 2016, page 7.8-11.

California Geologic Survey (CGS). 2002. California Geomorphic Provinces, Note 36. Available: https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-36.pdf Accessed: October 1, 2020.

_____. 2010. Geologic Map of California. California Geologic Data Map Series. https://maps.conservation.ca.gov/geology/

_____. 2020a. Earthquake Zones of Required Investigation. Available: https://maps.conservation.ca.gov/cgs/EQZApp/app/ Accessed: October 1, 2020.

_____. 2020b. Fault Activity Map of California. Available: https://maps.conservation.ca.gov/cgs/fam/ Accessed: October 1, 2020.

_____. 2020c. CGS Information Warehouse: Landslides. Available: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps Accessed: October 1, 2020.

Department of Conservation (DOC). 1964. Geologic Map of California, Bakersfield Sheet. Available: https://www.conservation.ca.gov/cgs/Documents/Publications/Geologic-Atlas-Maps/GAM_002-Map.pdf Accessed: October 2, 2020.

Kern County. 2009. General Plan. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf Accessed: October 2, 2020.

Kern Groundwater Authority Groundwater Sustainability Plan (KGAGSP). 2020. Section 3.2.5 Undesirable Result for Land Subsidence p. 173.

Natural Resources Conservation Service (NRCS). 2020. Custom Soil Resource Report for Kern County, California, Northwestern Part. Available: https://websoilsurvey.sc.egov.usda.gov/WssProduct/4nvqzr1akew50zcuzjmcz3rh/GN_000000/20201002_12562612205_57_Soil_Report.pdf Accessed: October 2, 2020.

Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Paleontological Resources: Standard Guidelines. SVP News Bulletin 163.

_____. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology, p. 1-11

References from Chapter 4.0 Other CEQA Required Sections

Henry Miller Groundwater Sustainability Agency (HMGSA). 2020. Henry Miller Water District Groundwater Sustainability Plan, Kern County Subbasin, January.

Kern County. 2009. *General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf Accessed: October 2, 2020.

Kern Groundwater Authority (KGA). 2020. Kern Groundwater Authority Groundwater Sustainability Plan, January.

Kern River Groundwater Sustainability Agency (KRGSA). 2020. Final Groundwater Sustainability Plan, Kern River Groundwater Sustainability Agency, January.

Maley, M. and C. Brush. 2020. SGMA Water Budget Development using C2VSimFG-Kern in support of the Kern County Subbasin Groundwater Sustainability Plans, included as Appendices 2 and 4 in the Kern County Subbasin Coordination Agreement. Available at: https://sgma.water.ca.gov/portal/gsp/coordagreement/preview/11.

Rosedale-Rio Bravo Water Storage District (RRBWSD). 2019. Groundwater Sustainability Plan chapter for the Rosedale-Rio Bravo Management Area (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December.

West Kern Water District (WKWD). 2019. Chapter Groundwater Sustainability Plan (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December.

References from Chapter 5. Alternatives to the Proposed Project

No references cited.

References from Chapter 6. Mitigation Summary

California Department of Fish and Game (CDFG). 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency, Sacramento, CA.

Swainson's Hawk Technical Advisory Committee. 2000. *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley*. Available at https://nrm.dfg. ca.gov/FileHandler.ashx?DocumentID=83990&inline. Accessed October 12, 2020.

U.S. Fish and Wildlife Service (USFWS). 2011. Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento Fish and Wildlife Office, Sacramento, CA.

References from Chapter 7. Comment Letters Received on Draft EIR

No references cited.

References from Chapter 8. Response to Comments

Buena Vista Water Storage District Groundwater Sustainability Agency (BVGSA). 2020a. Buena Vista Water Storage District GSA Final Groundwater Sustainability Plan, January. Section 5 – Minimum Thresholds, Measurable Objectives, and Interim Milestones.

_____. 2020b. Section 7.4 – Adaptive Management Actions Planned as Part of GSP.

California Department of Fish and Game (CDFG). 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency, Sacramento, CA.

California Department of Fish and Wildlife (CDFW). 2015. California Department of Fish and Wildlife (Department) Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015. Available at file:///C:/Users/aking/Downloads/TRBL%20Avoidance%20Measures_Final_2015March20.pdf. Accessed March 31, 2021.

_____. 2017. Draft Best Management Practices for the Sustainable Management of Groundwater – Sustainable Management Practices, 2017 p. 5.

California Department of Water Resources (DWR). 2016. Monterey Plus Draft Revised EIR – Kern Water Bank Development and Continued Use and Operation. 2016, page 7.8-11.

GEI Consultants, Inc. 2017. Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

GEI Consultants, Inc. (GEI). 2020. Draft Environmental Impact Report for the Palms Groundwater Recovery Project State Clearinghouse Number 2020060315. Prepared for Buena Vista Water Storage District, Buttonwillow, CA.

Kern Groundwater Authority Groundwater Sustainability Plan (KGAGSP). 2020a. Section 3.2.5 Undesirable Result for Land Subsidence p. 173.

_____. 2020b. Section 3.2.5 Undesirable Result for Land Subsidence p. 174.

Kern Water Bank Authority (KWBA). 2019. Groundwater Sustainability Plan. Section 4.2.4 Subsidence, p.37; Section 2.2.2.11 Historic Subsidence Monitoring, p.27; Section 3.2.4 Land Subsidence, p.34.

U.S. Fish and Wildlife Service (USFWS). 2011. Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance. Sacramento Fish and Wildlife Office, Sacramento, CA.

West Kern Water District (WKWD). 2019. Chapter Groundwater Sustainability Plan (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December.

References from Chapter 9. Master Responses to Comments

Bartow, J.A, 1991, The Cenozoic Evolution of the San Joaquin Valley, California, U.S. Geological Survey Professional Paper 1501.

Bear, J. and A. Verruijt. 1987. Modeling Groundwater Flow and Pollution (Theory and Applications of Transport in Porous Media, 2). D. Riedel Publishing Company, Dordrecht, Holland.

Bouwer, H. 1978. Groundwater Hydrology, McGraw-Hill Book, New York, 480.

Buena Vista Water Storage District (BVWSD), 2014, Groundwater Management Plan, report prepared by Provost & Pritchard Consulting Group, Revised May 2014.

Buena Vista Water Storage District Groundwater Sustainability Agency (BVGSA), 2020, Buena Vista Water Storage District GSA Final Groundwater Sustainability Plan, January 2020.

California Department of Water Resources (DWR). 2017. BMP 6 Sustainable Management Practices – Draft. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf

Central Valley Regional Water Quality Control Board (RWQCB). 2018. Water Quality Control Plan for the Tulare Lake Basin Third Edition. Available: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlbp_201805.pdf Accessed: October 8, 2020.

Croft, M.G. 1972. Subsurface Geology of the Later Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California. U.S. Geological Survey Water-Supply Paper 1999-H.

Durbin et al. 2008. Durbin, T., D. Delemos, and A. Rajagopal-Durbin. 2008. Application of Superposition with Nonlinear Head-Dependent Fluxes. Ground water. 46. 251-8. 10.1111/j.1745-6584.2007.00408.x.

Environmental Sciences Associates (ESA). 2010. Groundwater Banking Project Environmental Impact Report. Prepared for West Kern Water District. March 2010.

Environmental Simulations, Inc. (ESI). 2020. Groundwater Vistas. Groundwater Modeling Software. https://www.groundwatermodels.com/ESI_Software.php

Faunt, C. ed, 2009. Groundwater Availability of the Central Valley, California, USGS Professional Paper 1766.

Faunt, C., R.T. Hanson, K. Belitz, W. Schmid, S. Predmore, D. L. Rewis, and K. McPherson, 2009, Groundwater availability of the Central Valley Aquifer, California. USGS Professional Paper 1766. Reston, Va.: United States Department of the Interior, Geological Survey.

Freeze. R. A. and J. A. Cherry. 1979. Groundwater. Prentice-Hall, Englewood Cliffs, New Jersey.

GEI Consultants, Inc. 2017. Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

GEI Consultants, Inc. (GEI). 2020. Draft Environmental Impact Report for the Palms Groundwater Recovery Project State Clearinghouse Number 2020060315. Prepared for Buena Vista Water Storage District, Buttonwillow, CA.

Kenneth D. Schmidt and Associates (Schmidt), 2020, Biennial Groundwater Monitoring Report For The Semitropic Water Storage District Water Banking Project (2017-2018), report by Kenneth D. Schmidt and Associates to Semitropic Water Bank Monitoring Committee, May 2020.

Kern Fan Monitoring Committee (KFMC), 2021, Kern Fan Monitoring Committee Hydrographs, interactive PowerPoint file distributed by Kern County Water Agency, April 2021.

Kern Groundwater Authority (KGA JPA). 2019. Second Amended and Restated Joint Powers Agreement for the Tulare Lake Basin Portions of Kern County, effective July 22, 2019.

Kern Groundwater Authority (KGA), 2020, Groundwater Sustainability Plan, Kern County Subbasin, January 2020.

Kern Water Bank Authority (KWBA), 2019, Kern Water Bank Storage Project Within the Kern Groundwater Authority Groundwater Sustainability Plan, report to DWR, December 13, 2019.

Law, A.M. and W.D. Kelton. 2000. Simulation Modeling and Analysis. McGraw-Hill, Boston.

Leake, S. A. 2011. Capture—Rates and Directions of Groundwater Flow Don't Matter!, Ground Water, 49: 456–458.

Leake, S.A. and D.V. Claar. 1999. Procedures and Computer Programs for Telescopic Mesh Refinement Using MODFLOW. U.S. Geological Survey Open File Report 99-238. Tucson, Arizona.

Morrison. T. 2006. Basic Groundwater Hydrology and Evaluation Procedures. Training Manual. Prepared for the New Mexico Office of the State Engineer.

Pacific Geotechnical Associates, Inc. (PGA). 1991. Study of the Regional Geologic Structure Related to Groundwater Aquifers in the Southern San Joaquin Valley Groundwater Basin, Kern County, California. Prepared for Kern County Water Agency. September

Page, R.W. 1983. Geology of the Tulare Formation and Other Continental Deposits, Kettleman City Area, San Joaquin Valley, California, with a Section on Groundwater Management Considerations and Use of Texture Maps. USGS Water Resources Investigations Report 83-4000.

Page, R.W. 1986. Geology of the Fresh Groundwater Basin of the Central Valley, California with Texture Maps and Cross Sections. Professional Paper 1401-C.

Reilly, T.E., Franke, O.L., and Bennett, G.D., 1984, The Principle of Superposition and Its Application in Ground-water Hydraulics: U.S. Geological Survey Open-File Report 84-459, 43 p

Reilly, T.E., O.L. Franke, and G.D. Bennett, 1987. The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6, 28p., http://pubs.usgs.gov/twri/twri3-b6/pdf/twri_3-B6_a.pdf.

Reilly, T.E., and Harbaugh, A.W., 2004, Guidelines for evaluating ground-water flow models: U.S. Geological Survey Scientific Investigations Report 2004-5038, 30 p.

Rosedale-Rio Bravo Water Storage District (RRBWSD). 2019. Groundwater Sustainability Plan chapter for the Rosedale-Rio Bravo Management Area (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December.

Semitropic Water Storage District Groundwater Sustainability Agency (SWSD GSA), 2020, Semitropic Water Storage District Groundwater Sustainability Agency 2020 Groundwater Sustainability Plan Kern County, CA, January 2020.

Sierra Scientific Services, 2013, The Geology and Groundwater Hydrology of the Buena Vista Water Storage District, Buttonwillow, CA, including Descriptions of Relevant Facilities and Operations.

Takahashi, S. and R.C. Peralta. 1995.Optimal perennial yield planning for complex non-linear aquifers: Methods and examples. Advances in Water Resources 18:49-62.

Todd, D.K., and L. W. Mays. 2004. Groundwater Hydrology, 3rd Edition. Wiley.

Todd Groundwater, 2018, Kern Fan Model Final Report, report to Kern Fan Monitoring Committee, February 2018.

_____.2020. Kern County Subbasin Groundwater Sustainability Plans (GSPs) Second Annual Report Water Year 2020, report to DWR, April 1, 2021.

Wood, P.R. and G. H. Davis, 1959. Geological Survey Water Supply Paper 1457, Ground-water conditions in the Avenal-McKittrick area, Kings and Kern Counties, California. Prepared in coordination with the California Department of Water Resources

Wood, P.R. and R.H. Dale, 1964, Geology and Ground-Water Features of the Edison-Maricopa Area, Kern County, California, USGS Water-Supply Paper 1656

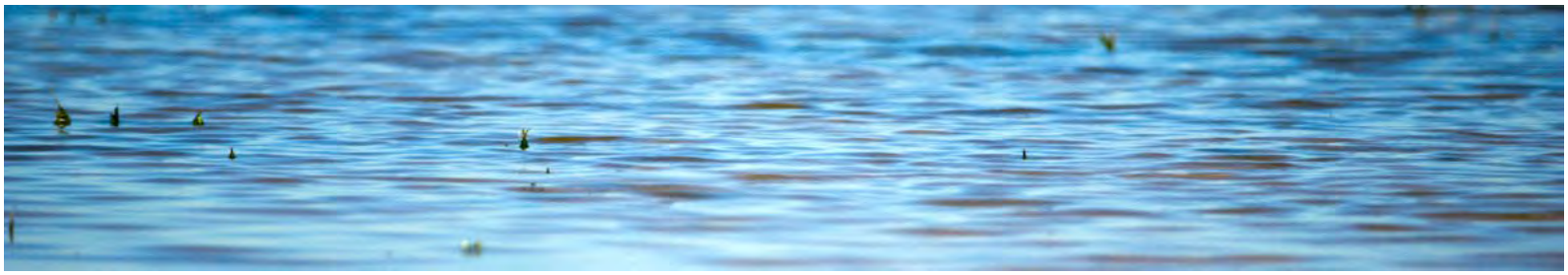
Wood, P.R. and R.H. Dale, 1964, Geology and Ground-Water Features of the Edison-Maricopa Area, Kern County, California, USGS Water-Supply Paper 1656

Wood, P.R. and G. H. Davis, 1959. Geological Survey Water Supply Paper 1457, Ground-water conditions in the Avenal-McKittrick area, Kings and Kern counties, California. Prepared in coordination with the California Department of Water Resources

References from Chapter 10. Report Preparers and Reviewers

No references cited.

Appendix A Notice of Preparation and Initial Study



NOTICE OF PREPARATION AND INITIAL STUDY OF AN ENVIRONMENTAL IMPACT REPORT AND PUBLIC SCOPING MEETING

FOR THE PALMS GROUNDWATER RECOVERY PROJECT

Prepared for:

Buena Vista Water Storage District

June 16, 2020

[This page left intentionally blank]

NOTICE OF PREPARATION AND INITIAL STUDY OF AN ENVIRONMENTAL IMPACT REPORT AND PUBLIC SCOPING MEETING

FOR THE PALMS GROUNDWATER RECOVERY PROJECT

Prepared for:

Buena Vista Water Storage District
525 North Main Street
Buttonwillow, CA 93206

Contact:

Tim Ashlock, Engineer-Manager
661-324-1101

Prepared by:

GEI Consultants
2868 Prospect Park Drive, Suite 400
Rancho Cordova, CA 95670

Contact:

Ginger Gillin
Project Director
503-342-3777

June 16, 2020

Project No. 1610807, Task 1.1008

[This page left intentionally blank]

Table of Contents

1.0 Notice of Preparation 1-1
1.1 NOTICE OF PREPARATION 1-1
1.2 PUBLIC REVIEW AND COMMENT PERIOD 1-1
1.3 PUBLIC SCOPING MEETING 1-1
1.4 PROJECT DESCRIPTION 1-2
1.4.1 Introduction 1-2
1.4.2 Project Facilities and Construction 1-3
1.4.3 Project Operation 1-4
1.4.4 Water Quality 1-5
1.4.5 Memorandum of Understanding 1-5
1.4.6 Project Objectives 1-5
1.4.7 Project Benefits 1-6
1.4.8 Need for Project 1-6
1.5 AGENCY REVIEW AND APPROVALS 1-6
1.6 PROBABLE ENVIRONMENTAL IMPACTS 1-6
Impacts Not Found Significant. 1-7
Other Sections. 1-7

2.0 Initial Study 2-1
2.1 Aesthetics 2-5
2.1.1 Environmental Setting 2-5
2.1.2 Discussion 2-6
2.2 Agriculture and Forestry Resources 2-7
2.2.1 Environmental Setting 2-7
2.2.2 Discussion 2-8
2.3 Air Quality 2-9
2.3.1 Environmental Setting 2-9
2.3.2 Discussion 2-13
2.4 Biological Resources 2-16
2.4.1 Environmental Setting 2-17
2.4.2 Discussion 2-17
2.5 Cultural Resources 2-19
2.5.1 Environmental Setting 2-19
2.5.2 Discussion 2-19
2.6 Energy 2-21
2.6.1 Environmental Setting 2-21
2.6.2 Discussion 2-21
2.7 Geology and Soils 2-22
2.7.1 Environmental Setting 2-23
2.7.2 Discussion 2-24
2.8 Greenhouse Gas Emissions 2-27
2.8.1 Environmental Setting 2-27
2.8.2 Discussion 2-27
2.9 Hazards and Hazardous Materials 2-29
2.9.1 Environmental Setting 2-30

2.9.2 Discussion 2-30
2.10 Hydrology and Water Quality 2-32
2.10.1 Environmental Setting 2-33
2.10.2 Discussion 2-33
2.11 Land Use and Planning 2-35
2.11.1 Environmental Setting 2-35
2.11.2 Discussion 2-35
2.12 Mineral Resources 2-36
2.12.1 Environmental Setting 2-36
2.12.2 Discussion 2-36
2.13 Noise 2-37
2.13.1 Environmental Setting 2-37
2.13.2 Discussion 2-37
2.14 Population and Housing 2-40
2.14.1 Environmental Setting 2-40
2.14.2 Discussion 2-40
2.15 Public Services 2-41
2.15.1 Environmental Setting 2-42
2.15.2 Discussion 2-42
2.16 Recreation 2-43
2.16.1 Environmental Setting 2-43
2.16.2 Discussion 2-43
2.17 Transportation 2-44
2.17.1 Environmental Setting 2-44
2.17.2 Discussion 2-44
2.18 Tribal Cultural Resources 2-46
2.18.1 Environmental Setting 2-46
2.18.2 Discussion 2-46
2.19 Utilities and Service Systems 2-48
2.19.1 Environmental Setting 2-48
2.19.2 Discussion 2-49
2.20 Wildfire 2-50
2.20.1 Environmental Setting 2-50
2.20.2 Discussion 2-50
2.21 Mandatory Findings of Significance 2-52
2.21.1 Discussion 2-52

3.0 References 3-1

4.0 Report Preparers 4-1

List of Tables

Table 2-1. Environmental Resources with Potentially Significant Impacts 2-2
Table 2-2. Federal and California Ambient Air Quality Standards and Attainment Status. 2-10
Table 2-3. Ambient Air Quality Monitoring Data Measured at the Bakersfield-California Avenue Monitoring Station. 2-12
Table 2-4. Small Project Analysis Level by Vehicle Trips. 2-13
Table 2-5. Typical Noise Levels During Construction 2-38

List of Figures

Figure 1-1. Project Location and Site/ 1-3
Figure 2-1. View of the Palms Recovery Project Area. 2-6

This page left intentionally blank]

1.0 Notice of Preparation

1.1 NOTICE OF PREPARATION

Notice is hereby given that the Buena Vista Water Storage District (BVWSD or District) (Lead Agency) will prepare an Environmental Impact Report (EIR) for the proposed Palms Groundwater Recovery Project (Recovery Project). The EIR will address the potential physical and environmental effects of the Recovery Project for each of the environmental topics outlined in the California Environmental Quality Act (CEQA). The District will use the EIR when considering approval of the proposed Recovery Project. Responsible Agencies, which are public agencies other than the District that have a role in approving or implementing the Recovery Project, will also need to consider the EIR when issuing approvals for the implementation of the Recovery Project. The District has prepared this Notice of Preparation (NOP) / Initial Study (IS) to provide Responsible Agencies, Trustee Agencies, and other Interested Parties with a description of the proposed Recovery Project and to identify potential environmental effects pursuant to State CEQA requirements. The NOP/IS for the proposed Recovery Project is available for review on the District's website at http://bvh2o.com/Projects.html. Under CEQA, a Lead Agency (in this case, the District) shall conduct an IS to determine if a project may have a significant effect on the environment (CEQA Guidelines Section 15063[a]). If the Lead Agency determines there is substantial evidence that any aspect of the project may cause a significant effect on the environment, the Lead Agency shall prepare an EIR, or one of the other options listed in CEQA Guidelines Section 15063(b)(1). The District has prepared an IS and made a determination that the Recovery Project may cause a significant effect on the environment, so an EIR will be prepared.

1.2 PUBLIC REVIEW AND COMMENT PERIOD

Further notice is hereby given that the District invites comments on the scope and content of the EIR in response to this NOP/IS. Pursuant to Section 15082 of the State CEQA Guidelines, this NOP/IS will be circulated for a 30-day review period. At a minimum, responses to this NOP/IS should focus on the potentially significant environmental effects that the proposed Recovery Project may have on the physical environment that should be addressed in the EIR, ways in which those effects might be minimized, and potential alternatives to the proposed Recovery Project that should be addressed in the EIR. In your response, include your name, the name of your agency or organization (if applicable), and contact information. Comments on the NOP/IS may be received in writing at the above District mailing address to the attention of Tim Ashlock, or via email to tim@bvh2o.com, by 8:30 a.m. on July 17, 2020. In addition, comments may be provided at the Public Scoping Meeting, noticed below.

1.3 PUBLIC SCOPING MEETING

Further notice is hereby given that the District has scheduled a Public Scoping Meeting at the time and location indicated below. The purpose of the Public Scoping Meeting is to describe the proposed Recovery Project and the environmental review process, and to receive verbal input. The

District will consider all comments, written and oral, in determining the final scope of the evaluation to be included in the EIR.

Public Scoping Meeting:

Thursday, July 2, 2020,
11:00 a.m.

https://zoom.us/j/89798178986
Password: 546152
or
Dial in: 1-669-900-6833
Password: 546152

1.4 PROJECT DESCRIPTION

1.4.1 *Introduction*

The District is located in the southern San Joaquin Valley, approximately 16 miles west of the city of Bakersfield and encompassing the town of Buttonwillow. The District has a gross area of approximately 49,000 acres and lies within a portion of the lower Kern River Watershed characterized by heavy clay soils originating from former swamp and overflow lands.

The District is divided into two distinct service areas. The principal service area, known as the Buttonwillow Service Area, is situated north of the historic Buena Vista Lake. The smaller service area, lying east of the historic Buena Vista Lake, is known as the Maples Service Area.

The District has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Conjunctive management within the District begins with deliveries of surface water from the Kern River and the California Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands. Thus, during years when supplies are above average, surface water is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the District takes place through seepage from facilities constructed by the District including canals, laterals and recharge basins. In January 2016, the District approved construction of the Palms Groundwater Banking Project (Palms Project) in the southern portion of the Buttonwillow Service Area. The Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge (**Figure 1-1**).

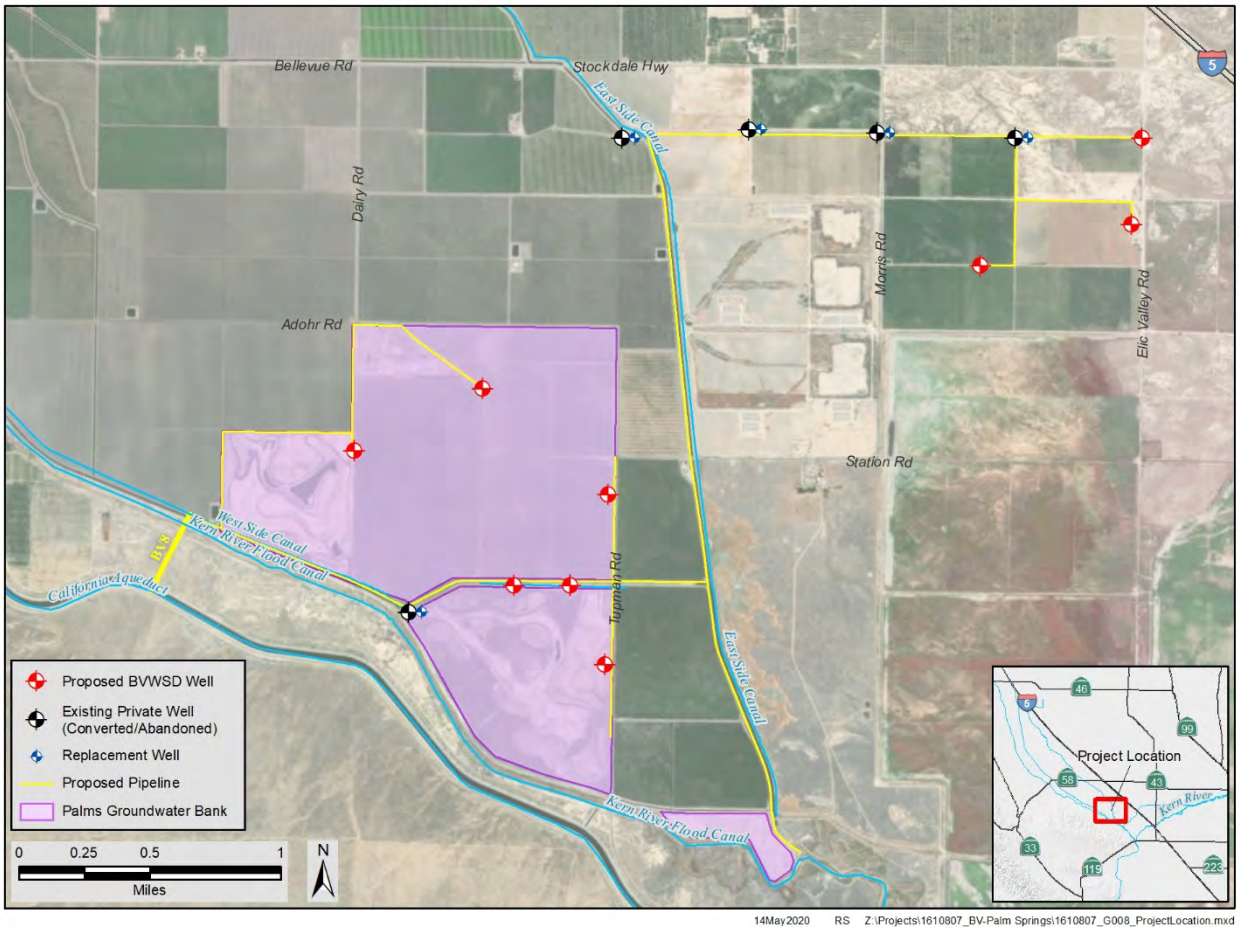


Figure 1-1. Project Location and Site/

An Initial Study/Mitigated Negative Declaration (IS/MND) (SCH # 2015121030) was prepared for the Palms Project in 2015, and the Notice of Determination was filed in January 2016. Initial construction of the recharge portion of the project was completed in 2016. The recharge ponds were subsequently enlarged and today are located within an area of approximately 1,150 acres. To date, the District has recharged approximately 27,166 acre-feet of surplus water in the Palms Project, 14,164 acre-feet in 2017 and 13,002 acre-feet in 2019. High quality water recharged at the Palms Project flows to aquifers that are sources for domestic and municipal wells providing water to residents of Taft, Tupman, and to the disadvantaged community of Buttonwillow, and replenishes groundwater under the Tule Elk Reserve.

The purpose of this Initial Study is to analyze the potential environmental impacts of the Recovery Project.

1.4.2 *Project Facilities and Construction*

In order to extract water banked within the District, including but not limited to water recharged in District canals and the Palms Project, the District would utilize a suite of 14 wells: nine proposed new wells and five replacement wells (**Figure 1-1**).

Conveyance pipes would be installed to connect new and replacement wells for the Recovery Project water delivery system. Construction activities would include excavation and trenching to install the wells, and approximately 11.9 miles of conveyance pipe. The total area of disturbance would be approximately 72 acres. The new and replacement wells would be drilled to a depth of up to 500 feet and include an 18-inch casing. Trench depths would be 5 feet for pipes less than 24 inches and 6 feet for pipes greater than 24 inches in diameter. Trench widths would be 3 feet for pipe sizes less than or equal to 24 inches and 6 feet for pipes greater than 24 inches. Anticipated construction activities would begin in the fall of 2020 and be completed within 11 months. Staging areas for the construction equipment and materials would be adjacent to the Recovery Project area on previously disturbed land. Construction vehicles for the pipeline would consist of a front wheel loader, two excavators, two water trucks, backhoe, and three pickup trucks. Construction equipment for the well construction would consist of a drilling rig, air compressor, backhoe, and pipe trailer.

The water pipelines will connect to the District's existing turnout at the California Aqueduct at BV8. BV8 can be used to either input water to the Aqueduct or to withdraw water from the Aqueduct.

1.4.3 *Project Operation*

Available surplus water supply will continue to be recharged at the Palms during wet years. The District anticipates recharging up to 100,000 acre-feet annually through the Palms Project when surplus water supply is available. The District also recharges groundwater through their existing canal system during wet years, a District practice for many decades.

Water recovered by the District will be distributed to District water users or exchanged with other districts or sold to other industrial or municipal users. This Recovery Project may also discharge into the California Aqueduct to satisfy existing and future water contracts between the District and other Public Water Agencies.

The Recovery Project will be managed so that groundwater elevations will, in the long term, improve from those observed historically. Annual water recovery will be limited to no more than 25,000 acre-feet. Wells will be pumped at a rate of no more than 5 cfs, and the wells selected for recovery will be selected to optimize groundwater recovery and minimize impacts to groundwater levels.

For landowners, there would be an alternative delivery option of groundwater recovery to provide flexibility by allowing private pumping in lieu of surface water deliveries. Landowners would have the option, in addition to surface water delivery, utilize on-farm wells to pump water for irrigation needs or continue to receive surface water deliveries through the District canals and pipelines. No additional District facilities would need to be constructed for this alternative delivery option. Landowners interested in this optional delivery method would be required to sign up for the District program, and participation would be limited by the amount of water available for recovery, no more than 25,000 acre-feet per year.

This alternative delivery option would allow wider participation and flexibility for water users. It is anticipated that water users south of Perral Road in the Buttonwillow Service Area would be eligible to participate in the program. The water pumped from landowner wells would be treated as recovered water, leaving a similar amount of water (SWP, Kern River, or other water) available for a different beneficial use.

1.4.4 *Water Quality*

For the District to use the California Aqueduct (Aqueduct) to convey the recovered groundwater, approval of the Department of Water Resources (DWR) is required. It is DWR policy to assist with the conveyance of water to provide a reliable water supply, and to protect the State Water Project (SWP) water quality within the Aqueduct. In order to facilitate this policy, DWR provides an implementation process to accept Non-SWP Project water into the Aqueduct. To do so, the District is required to submit a Pump-In Proposal (PIP) to DWR which identifies the water sources, planned operation, inflow water quality, and any anticipated impacts to SWP water quality and/or operations. The PIP will also include a water quality monitoring plan in order to continuously demonstrate that the water quality is consistent with that of the Aqueduct water.

In order to ensure that water quality will meet DWR requirements, aquifer isolation zone water quality testing will be conducted. The wells will then be designed to collect water from portions of the aquifer with favorable water quality. This method will likely be used during construction of the first few wells and may be discontinued for wells constructed after the local water quality parameters are better understood.

1.4.5 *Memorandum of Understanding*

On October 26, 1995, the Kern Water Bank Authority and its Member Entities (including 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 (MOU), which provides that "…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…" In subsequent years, a Joint Operating Committee has been formed among these parties, which utilizes multiple groundwater models to assess impacts to groundwater from banking and recovery operations. Therefore, the District will either amend the existing MOU or develop a new MOU, or join the Joint Operating Committee, to address the operation and monitoring of the Recovery Project.

1.4.6 *Project Objectives*

The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies.

- Improve conveyance of previously stored water throughout the District and to neighboring Districts.
- Provide water for urban use in Kern County and possibly elsewhere.

1.4.7 *Project Benefits*

The Recovery Project will provide up to 25,000 acre-feet of banked groundwater to the District's water customers in dry years, while meeting the requirements of the Sustainable Groundwater Management Act.

1.4.8 *Need for Project*

The District has a net irrigated acreage maximum of about 40,000 acres. Currently about half the District lands are planted with permanent crops, as growers migrate away from row crops. The conversion to permanent crops may increase the water demand by 1 acre-foot per acre. In the short term, this conversion typically reduces demand, as a pistachio tree will not reach full demand for water until about the 12th year, with the first year being as low as 0.25 acre-feet per acre. The Recovery Project will allow for the highs and lows of the District's water supply to be managed in a manner that ensures full production of permanent crops regardless of the current years water supply.

With the District's Kern River Water Supply as well as its State Water Project water supply, the District should be able to meet future demands. This Recovery Project will help in meeting those demands, as well as being available to partner with others to help meet their water supply needs.

1.5 AGENCY REVIEW AND APPROVALS

The District is required to apply for approval from the California Department of Water Resources to pump into the California Aqueduct.

1.6 PROBABLE ENVIRONMENTAL IMPACTS

The EIR will address environmental impacts of the Recovery Project's construction and operation activities and will propose mitigation measures to address significant impacts that are identified. The following describes the anticipated environmental issues that will be addressed in the EIR.

- **Biological Resources** – The Recovery Project area contains natural lands with native habitat that may be suitable for special-status species. The EIR will evaluate potential impacts of the Recovery Project on terrestrial special-status animal and plant species, sensitive habitats, mature native trees, and migratory birds that may occur in the Recovery Project area.
- **Cultural Resources** – Based on archival records search, background studies, and on-foot surface reconnaissance cultural resources survey, one prehistoric archaeological site has been recorded in the Recovery Project's vicinity. The EIR will include an evaluation of whether the site will be impacted and provide mitigation, if necessary, to reduce impacts.

Concurrently with release of this NOP, the District will extend invitations to consult with Native American tribes that are traditionally and culturally affiliated with the geographic area of the Recovery Project and that have filed written request to be notified of opportunities to consult. Because the time period for tribes to respond will remain open through the NOP process, it is uncertain at this time whether the Recovery Project could impact tribal cultural resources. The EIR will, therefore, include a discussion of potential impacts to these resources.

- **Hydrology and Water Quality** – Through the use of groundwater modeling and hydrogeologic analyses, the EIR will evaluate changes in local groundwater quality, storage, and levels within the groundwater basin as a whole and their subbasins, as appropriate. The EIR will describe potential impacts of recovery activities and evaluate compliance with the Groundwater Sustainability Plan(s) under the Sustainable Groundwater Management Act.

Impacts Not Found Significant. The EIR will also explain why other effects were determined to not be potentially significant and were not discussed in detail in the EIR. For example, the Recovery Project site is in an agricultural area, would not damage scenic resources, or produce light and glare; therefore, no significant aesthetic impacts are anticipated. The Recovery Project would not result in additional service/utility demands related to police or fire protection, schools, parks and recreation, or wastewater generation. Impacts to air quality, agriculture and forestry resources, geology, hazards and hazardous materials, population and housing, mineral resources, and wildfire are also expected to be less than significant, or less than significant with mitigation incorporated, and therefore will be discussed in this section.

Other Sections. The EIR will include additional topics as required by the CEQA Guidelines including growth inducement, cumulative impacts, and alternatives.

The EIR will also examine a reasonable range of alternatives to the Recovery Project, including the CEQA-mandated No Project Alternative, and other potential alternatives that may be capable of avoiding or substantially reducing any of the significant effects of the Recovery Project.

This page left intentionally blank]

2.0 Initial Study

Project Information

#1. Project title:	Buena Vista Water Storage District Palms Groundwater Recovery Project
#2. Lead agency name and address:	Buena Vista Water Storage District
#3. Contact person and phone number:	Tim Ashlock (661) 324-1101
#4. Project location:	Buena Vista Water Storage District, and an annexed area located to the east of the Buena Vista Water Storage District (*see* Figure 1-1).
#5. Project sponsor's name and address:	Same as lead agency
#6. General plan designation:	Agriculture
#7. Zoning:	Agriculture
#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 sheets if necessary.)	The Recovery Project includes the development of conveyance pipelines and wells to facilitate the recovery of previously stored groundwater.
#9. Surrounding land uses and setting: Briefly describe the project's surroundings:	The Recovery Project is located near the unincorporated community of Buttonwillow, Kern County, in an area dominated by agricultural production. Several other small, unincorporated communities such Lokern and Tupman are located within the vicinity of the Recovery Project. The city of Bakersfield is located approximately 23 miles east of the Recovery Project site.
#10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)	California Water Resources Control Board, and the San Joaquin Valley Air Pollution Control District
#11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code (PRC) Section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?	Yes. Consultation is described in more detail in Cultural Resources and Tribal Cultural Resources.

Note: Conducting consultation early in the California Environmental Quality Act (CEQA) process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (*See* PRC Section 21080.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per PRC Section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. **Please also note** that PRC Section 21082.3(c) contains provisions specific to confidentiality.

Environmental Factors Potentially Affected

Several environmental resources were found to have "potentially significant impacts," and will be discussed further in the subsequent EIR. The environmental factors listed as "Yes" in **Table 2-1** would be potentially affected by the Recovery Project, involving at least one impact that has "Potentially Significant" as indicated by the checklist on the following pages.

Table 2-1. Environmental Resources with Potentially Significant Impacts

Environmental Resources	**Yes or No?**
Aesthetics	No
Agriculture and Forestry Resources	No
Air Quality	No
Biological Resources	**Yes**
Cultural Resources	**Yes**
Energy	No
Geology/Soils	No
Greenhouse Gas Emissions	No
Hazards and Hazardous Materials	No
Hydrology/Water Quality	**Yes**
Land Use/Planning	No
Mineral Resources	No
Noise	No
Population/Housing	No
Public Services	No
Recreation	No
Transportation	No
Tribal Cultural Resources	**Yes**
Utilities/Service Systems	No
Wildfire	No
Mandatory Findings of Significance	**Yes**

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. Operations and maintenance impacts of the proposed project are routine, minimal, and essentially the same as current operations and maintenance of the existing facilities. There is no potential for a significant impact to any resource category from project operations and maintenance of the existing and proposed facilities.

#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 may be significant. If there are one or more “Potentially Significant Impact” entries when the determination is made, an EIR is required. “Beneficial impact” is also identified where appropriate to provide full disclosure of any benefits from implementing the proposed project.

#4. “Less-than-Significant Impact 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 “Earlier Analyses,” as described in (5) below, 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:

#5 -a. Earlier Analysis Used. Identify and state where they are available for review.

#5 -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.

#5 -c. Mitigation Measures. For effects that are a "Less-than-Significant Impact 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:

#9 -a. the significance criteria or threshold, if any, used to evaluate each question; and

#9 -b. the mitigation measure identified, if any, to reduce the impact to less than significance.

Significance thresholds are identified for certain resources, but others are not explicitly identified because there is clearly no impact or the checklist question itself serves as the significance threshold.

2.1 Aesthetics

#1. **AESTHETICS**. Except as provided in PRC Section 21099, **would the project**:

#1 -a. Have a substantial adverse effect on a scenic vista?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#1 -b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#1 -c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#1 -d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.1.1 *Environmental Setting*

The Recovery Project is located west of Interstate 5, near the unincorporated community of Buttonwillow, Kern County. The Recovery Project site is zoned as letter "A" (signifying, exclusive agriculture) (Kern County, 2020). The project area is flat and is comprised of dirt roads, open water canals, and various agricultural crops (*see* **Figure 2-1**). There are no designated scenic vistas within the vicinity of the Recovery Project (Caltrans 2019).

Figure 2-1. View of the Palms Recovery Project Area.

2.1.2 *Discussion*

#1 -a, b, c, and d. Have a substantial adverse effect on a scenic vista, Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway, In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality, or Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

There are no significant view-sheds, scenic vistas, or scenic highways located in the vicinity of the Recovery Project (Caltrans, 2019). The Recovery Project would be constructed in agricultural land and would consist of buried pipelines for conveying recovered water, and new well structures in an area that already contains wells. There would be little change to the visual character of the site and surrounding area. Construction would take approximately 11 months and would require several vehicles and equipment onsite, which is not substantially different that normal agricultural operations. Following the completion of construction activities all construction related equipment would be removed and the site would be restored to pre-construction conditions. The Recovery Project would not change the existing views, nor would it create new sources of light or glare. All construction activities would occur during daylight hours. Therefore, there would be **no impact** to visual resources and this topic will not be evaluated further in the EIR.

2.2 Agriculture and Forestry Resources

#2. AGRICULTURE AND FORESTRY 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, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **Would the project:**

#2 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#2 -b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#2 -c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC Section 12220(g)), timberland (as defined by PRC Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#2 -d. Result in the loss of forest land or conversion of forest land to non-forest use?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#2 -e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.2.1 *Environmental Setting*

The Recovery Project site is designated as exclusive agriculture (Kern County 2020). The Recovery Project consists of Prime Farmland and Grazing land, as delineated by the Farmland

Mapping and Monitoring Program (FMMP) (D.O.C. 2018). The Recovery Project is located on parcels currently under active Williamson Act contracts (Kern County, 2010). However, the land is currently fallow open space, as it is being used for groundwater recharge.

2.2.2 *Discussion*

#2 -a and b. 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? Conflict with existing zoning for agricultural use, or a Williamson Act contract?

The Recovery Project would be implemented on the outer edges of agricultural parcels, along the established dirt roads which are primarily barren. Implementation of the Recovery Project would not convert farmland to non-farmland. The land will continue to be fallow open space, used for groundwater recharge so would not conflict with existing Williamson Act contracts. There would be **no impact** to agricultural land, and this topic will not be evaluated further in the EIR.

#2 -c and d. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by PRC Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))? Result in the loss of forest land or conversion of forest land to non-forest use?

The Recovery Project site is not forest land, timberland, or timberland zoned as Timberland Production, therefore, no loss or conversion of forest land to non-forest land would be necessary. There would be **no impact** to forestland or timberland and this topic will not be evaluated further in the EIR.

#2 -e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

The Recovery Project would not convert farmland to non-agricultural use. The Recovery Project's purpose is to benefit agriculture by providing irrigation water supplies in years with limited surface water supplies. There would be **no impact** to agriculture or forestland and this topic will not be evaluated further in the EIR.

2.3 Air Quality

#3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make the following determinations. **Would the project:**

#3 -a. Conflict with or obstruct implementation of the applicable air quality plan?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? **Yes.**	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#3 -b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? **Yes.**	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#3 -c. Expose sensitive receptors to substantial pollutant concentrations?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? **Yes.**	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#3 -d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.

2.3.1 *Environmental Setting*

The Recovery Project is located in the San Joaquin Valley Air Basin (S.J.V.A.B.) within Kern County. The San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.) is responsible for obtaining and maintaining air quality conditions in the County.

The Federal Clean Air Act and California Clean Air Act required the U.S. Environmental Protection Agency (EPA) and California Air Resource Boards (C.A.R.B.) to establish health-based air quality standards at the federal and state levels. National Ambient Air Quality Standards (N.A.A.Q.S.) and California Ambient Air Quality Standards (C.A.A.Q.S.) were established for the following criteria pollutants: carbon monoxide (C.O.), ozone (O_3), sulfur dioxide (S.O.$_2$), nitrogen dioxide (N.O.$_2$), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead. Areas of the state are designated as attainment,

nonattainment, maintenance, or unclassified for the various pollutant standards according to the Federal Clean Air Act and California Clean Air Act.

An "attainment" designation for an area signifies that pollutant concentrations did not violate the N.A.A.Q.S. or C.A.A.Q.S. for that pollutant in that area. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as identified in the criteria. A "maintenance" designation indicated that the area previously categorized as nonattainment is currently categorized as attainment for the applicable pollutant; though the area must demonstrate continued attainment for a specific number of years before it can be re-designated as an attainment area. An "unclassified" designation signifies that data does not support either an attainment or a nonattainment status. The EPA established N.A.A.Q.S. in 1971 for six air pollution constituents. States have the option to add other pollutants, to require more stringent compliance, or to include different exposure periods. C.A.A.Q.S. and N.A.A.Q.S. are listed in **Table 2-2**.

Table 2-2. Federal and California Ambient Air Quality Standards and Attainment Status.

Pollutant	Averaging Time	California Standards Concentration	Federal Primary Standards Concentration
Ozone (O_3)	8-hour	0.070 parts per million. (137 micrograms per cubic meter).	0.070 parts per million (137 micrograms per cubic meter.) (*See* Note #1.)
	1-hour	0.09 parts per million. (180 micrograms per cubic meter).	(None; *see* Note #2.)
Respirable Particulate Matter (PM_{10})	24-hour	50 micrograms per cubic meter.	150 micrograms per cubic meter.
	Annual Arithmetic Mean	20 micrograms per cubic meter.	(None.)
Fine Particulate Matter ($PM_{2.5}$)	24-hour	(None.)	35 micrograms per cubic meter.
	Annual Average	12 micrograms per cubic meters.	12 micrograms per cubic meter.
Carbon Monoxide	8-hour	9 parts per million. (10 milligrams per cubic meter.)	9 parts per million. (10 milligrams per cubic meter).
	1-hour	20 parts per million. (23 milligrams per cubic meter).	35 parts per million. (40 micrograms per cubic meter).
Nitrogen Dioxide	Annual Average	0.03 parts per million. (57 micrograms per cubic meters.)	0.053 parts per million. (100 micrograms per cubic meters.)
	1-hour	0.18 parts per million. (339 micrograms per cubic meters.)	0.100 parts per million. (188 micrograms per cubic meters.)
Lead	30-day Average	1.5 micrograms per cubic meters.	(None.)
	Rolling 3-Month Average	(None.)	0.15 micrograms per cubic meter.

Pollutant	Averaging Time	California Standards Concentration	Federal Primary Standards Concentration
	Quarterly Average	(None.)	1.5 micrograms per cubic meter.
Sulfur Dioxide	24-hour	0.04 parts per million. (105 micrograms per cubic meter.)	0.14 parts per million (for certain areas)
	3-hour	(None.)	(None.)
	1-hour	0.25 parts per million. (655 micrograms per cubic meter.)	0.075 parts per million. (196 micrograms per cubic meter.)
Sulfates	24-hour	25 micrograms per cubic meter.	No Federal Standard.
Hydrogen Sulfide	1-hour	0.03 parts per million. (42 micrograms per cubic meter.)	No Federal Standard.
Vinyl Chloride	24-hour	0.01 parts per million. (26 micrograms per cubic meter.)	No Federal Standard.

Notes:

#1. On October 1, 2015, the national 8-hour ozone (O_3) primary and secondary standards were lowered from 0.075 to 0.070 ppm.

#2. 1-Hour ozone standard revoked effective June 15, 2005, although some areas have continuing obligations under that standard.

Source: C.A.R.B. 2019, EPA 2016

Under the N.A.A.Q.S., Kern County is designated as nonattainment for 8-hour ozone, and $PM_{2.5}$ (C.A.R.B. 2018). Under C.A.A.Q.S., Kern County is designated nonattainment for 1-hour ozone, 8-hour ozone, $PM_{2.5}$, PM_{10} (C.A.R.B. 2018).

The area's air quality monitoring network provides information on ambient concentrations of air pollutants in the S.J.V.A.B. S.J.V.A.P.C.D. operates several monitoring stations in Kern County, air quality data was obtained from the Bakersfield-California Avenue station. **Table 2-3** compares a 5-year summary of the highest annual criteria air pollutant emissions collected at this station with applicable C.A.A.Q.S., which are more stringent than the corresponding N.A.A.Q.S. Due to the regional nature of these pollutants, O_3, $PM_{2.5}$, and PM_{10} are expected to be fairly representative of the Recovery Project.

As indicated in **Table 2-3**, O_3, $PM_{2.5}$, and PM_{10} standards have been exceeded over the past 5 years.

Table 2-3. Ambient Air Quality Monitoring Data Measured at the Bakersfield-California Avenue Monitoring Station.

Pollutant Standards, 1-Hour Ozone	2014	2015	2016	2017	2018
Maximum 1-hour concentration (ppm)	0.102*	0.104*	0.092*	0.122*	0.107*
Days Exceeding[a] C.A.A.Q.S. 1-hour (>0.09 parts per million)	3	6	0	11	8
Pollutant Standards, 8-Hour Ozone	2014	2015	2016	2017	2018
National maximum 8-hour concentration (parts per million).	0.092*	0.096*	0.085*	0.104*	0.098*
State max. 8-hour concentration (parts per million).	0.093*	0.097*	0.086*	0.104*	0.098*
Days Exceeding[a] N.A.A.Q.S. 8-hour. (>0.075 parts per million.) (*See* note #1.)	20	28	30	47	34
Days Exceeding[a] C.A.A.Q.S. 8-hour. (>0.070 parts per million.) (*See* note #1.)	39	54	63	87	64
Pollutant Standards, Particulate Matter (PM_{10})	2014	2015	2016	2017	2018
National max. 24-hour concentration (micrograms per cubic meter).	430.1*	104.7	90.9	138.0	136.1
State max. 24-hour concentration (micrograms per cubic meter).	419.5*	103.6*	92.2*	143.6*	142.0*
State max. 3-year average concentration (micrograms per cubic meter).	41	44	44	44	43
State annual average concentration (micrograms per cubic meter).	N/A	44.1	40.9	42.6	N/A
Days Exceeding[a] N.A.A.Q.S. 24-hour (>150 micrograms per cubic meter).	N/A	0	0	0	0
Days Exceeding[a] C.A.A.Q.S. 24-hour (>50 micrograms per cubic meter).	N/A	121.4	121.4	98.7	N/A
Pollutant Standards, Particulate Matter ($PM_{2.5}$)	2014	2015	2016	2017	2018
National max. 24-hour concentration (micrograms per cubic meter).	101.9*	107.9*	66.4*	101.8*	98.5*
State max. 24-hour concentration (micrograms per cubic meter).	101.9	111.9	66.4	101.8	98.5
State annual average concentration (micrograms per cubic meter).	18.6*	16.6*	15.9*	15.9*	15.6*
Days Exceeding[a] N.A.A.Q.S. 24-hour (>35 micrograms per cubic meter).	39.3	32.3	25.5	30.2	40.3

2.3.2 *Discussion*

#3 -a and b. Conflict with or obstruct implementation of the applicable air quality plan? Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?

The Recovery Project would generate criteria pollutants from the use of gasoline and diesel-powered vehicles and equipment, and earthmoving activities. Construction of the Recovery Project would require approximately 383 round trips to drop off all required material and equipment to the site. An additional 3,080 truck trips, or 14 trips per day, would be required for workers commuting to the site during construction. A total of 3,463 trips would be required to implement the project.

To streamline the process of assessing significance of criteria pollutant emissions from common construction projects, S.J.V.A.P.C.D has developed a screening tool, the Small Project Analysis Level (SPAL) to assist in determining if constructing a project in the County would exceed the construction significance threshold for criteria pollutants. The tool uses project type and size, and S.J.V.A.P.C.D. pre-quantified emissions to determine a size below which it is reasonable to conclude that a project would not exceed applicable thresholds of significance for criteria pollutants (S.J.V.A.P.C.D., 2017). Construction of a project that does not exceed the screening level are considered to have a less-than-significant impact on air quality (**Table 2-4**). The proposed project would result in a total of 3,463 trips during the entire construction period, which is significantly lower than the SPAL threshold.

Table 2-4. Small Project Analysis Level by Vehicle Trips.

Land Use Category	Project Size
Residential Housing	1,453 trips per day
Commercial	1,673 trips per day
Office	1,628 trips per day
Institutional	1,707 trips per day
Industrial	1,506 trips per day

Source: S.J.A.P.C.D. 2012

However, since the Recovery would disturb more than 1 acre, the District would obtain the following permits: SWRCB N.P.D.E.S. for general construction activity (Order 2009-0009 DWQ as amended by Order 2012-0006-DWQ), and SWPPP. The District would also need to submit a Dust Control Prevention Plan, which is required for non-residential developments that include 5 acres or more of disturbed surface area (S.J.V.A.P.C.D 2004). The Recovery Project would comply with all BMPs outlined in the above-mentioned permits. The Recovery Project would also comply with all S.J.V.A.P.C.D. rules and regulations. S.J.V.A.P.C.D. Regulation VIII implements measures to reduce ambient concentrations of PM_{10} and oxides of nitrogen ($NO_{x)}$. Implementation of the following mitigation measure would ensure that S.J.V.A.P.C.D. practices would be implemented during construction, and this impact would be **less-than-significant with mitigation**. This topic will not be evaluated further in the EIR.

Mitigation Measure AQ-1: District Regulation VIII Fugitive PM_{10} Prohibitions Best Management Practices

All projects are subject to S.J.V.A.P.C.D. rules and regulations in effect at the time of construction. Control of fugitive dust is required by S.J.V.A.P.C.D. Regulation VIII. The District shall implement or require its contractor to implement all of the following measures as identified by S.J.V.A.P.C.D.:

- Apply water to unpaved surfaces and areas
- Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas
- Limit or reduce vehicle speed on unpaved roads and traffic areas
- Maintain areas in a stabilized condition by restricting vehicle access
- Install wind barriers
- During high winds, cease outdoor activities that disturb the soil
- Keep bulk materials sufficiently wet when handling
- Store and hand material in a three-sided structure
- When storing bulk material, apply water to the surface or cover the stage pile with a tarp
- Don't overload haul trucks. Overlanded trucks are likely to spill bulk materials
- Cover haul trucks with a tarp or other suitable cover. Or, wet the top of the load enough to limit visible dust emissions
- Clean the interior of cargo compartments on emptied haul trucks prior to leaving the site
- Prevent track-out by installing a track-out control device
- Clean up track-out at least once a day. If along a busy road or highway, clean up track-out immediately
- Monitor dust-generating actives and implement appropriate measures for maximum dust control

Implementation of the above-mentioned mitigation measure and acquisition of a N.P.D.E.S. construction activity general permit and SWPPP, and submitting a Dust Control Prevention Plan, would reduce significant impacts to a **less-than-significant** level. This topic will not be evaluated further in the EIR.

#3 -c. Expose sensitive receptors to substantial pollutant concentrations?

Some members of the population are especially sensitive to emissions of air pollutants and should be given special consideration during the evaluation of the Recovery Project air quality impacts. These people include children, senior citizens, and persons with pre-existing respiratory or cardiovascular illnesses, and athletes and other who engage in frequent exercise, especially outdoors. Sensitive receptors include schools, residences, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The Recovery Project is located in a predominately agricultural area; however, a residential property resides approximately 300 feet from the Recovery Project site.

During construction, most of the particulate matter (PM), emissions are released in the form of fugitive dust during ground disturbance activities, mostly during the drilling and grading phases. PM emissions are also generated in the form of equipment exhaust and re-entrained road dust from vehicle travel. Impacts from PM emissions would be temporary and would go back to normal after completing the construction phase. Given the short-term emissions, and incorporation of Mitigation Measure AQ-1, impacts would be **less-than-significant with mitigation**. This topic will not be evaluated further in the EIR.

#3 -d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Human response to odors is subjective, and sensitivity to odor varies from person to person. Typically, odors are considered an annoyance rather than a health hazard. However, a person's response to odor can range from psychological (e.g., irrigation, anger, anxiety) to physiological (e.g., circulatory and respiration reaction, nausea, headaches, etc.). During construction, the Recovery Project would generate odor from the use of diesel fuels that could affect the nearby residence, though this impact would be short-term and nonsignificant. During operation, the Recovery Project would consist of the operation of electrically powered pump. No odors would be generated by this use. Potential odor effects would be **less-than-significant** and would not be evaluated further in the EIR.

2.4 Biological Resources

#4. BIOLOGICAL RESOURCES. Would the project:

#4 -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 Wildlife or U.S. Fish and Wildlife Service?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#4 -b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#4 -c. Have a substantial adverse effect on State or Federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#4 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#4 -e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#4 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.4.1 *Environmental Setting*

The Recovery Project site and surrounding areas is almost entirely comprised of agricultural land and associated facilities. Topography is generally flat, with an average elevation of approximately 280 feet above mean sea level. The Tule Elk Reserve borders the eastern side of the Recovery Project.

2.4.2 *Discussion*

#4 -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 Wildlife or the U.S. Fish and Wildlife Service?

The Recovery Project has the potential to have a substantial adverse effect on special-status species located within the vicinity of the site. This impact is likely **potentially significant**. Therefore, impacts to special-status species will be evaluated further in the EIR.

#4 -b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The Recovery Project has the potential to have a substantial adverse effect on riparian habitat or other sensitive natural communities. However, the Recovery Project is located in an agricultural dominant area and as such is unlikely to contain any riparian habitat or other sensitive natural communities. Therefore, this impact is likely **less than significant**, however, potential impacts related to riparian habit or other sensitive natural communities will be evaluated further in the EIR.

#4 -c. Have a substantial adverse effect on state- or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Aquatic habitat within the Recovery Project is limited to irrigation canals that are frequently maintained, generally lack vegetation, and provide very poor aquatic habitat. Therefore, impacts associated with disturbance of small portions of several canals during construction would likely be **less-than-significant**, however, potential impacts to wetlands will be evaluated further in the EIR.

#4 -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 Recovery Project does not contain aquatic habitat that could support fish. The Recovery Project has the potential to interfere substantially with the movement of native resident and wildlife

species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursey sites. This impact is likely **less than significant**, however impacts related to the movement corridors will be evaluated further in the EIR.

#4 -e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The 2004 Kern County General Plan, which is currently being updated, includes several policies and implementation measures designed to protect and conserve threatened and endangered species and oak trees (Kern County 2004a). No oak trees are present onsite, therefore, there is **no impact** and this topic will not be evaluated further in the EIR.

#4 -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?

The Recovery Project is within the area anticipated to be covered by the Kern County Valley Floor Habitat Conservation Plan. A draft of the plan was issued many years ago (Kern County Planning Department 2006), but a final plan has not been released. The majority of the site is within the "White Zone," which is of lower conservation concern and not identified for acquisition of preserve areas, and a small portion of the site is within the "Green Zone,' which is defined as habitat of moderate importance for conservation purposes. The Recovery Project is north of the existing Metropolitan Bakersfield Habitat Conservation Plan area and the plan area for the Bakersfield Habitat Conservation Plan that is currently in development. Therefore, implementing the Recovery Project would not conflict with any provisions, guidelines, goals, or objectives related to biological resources anticipated to be included in a potential final and adopted version of this plan, there would be **no impact**, and this topic will not be evaluated further in the EIR.

2.5 Cultural Resources

#5. CULTURAL RESOURCES. Would the project:

#5 -a. Cause a substantial adverse change in the significance of a historical resource pursuant to CCR Section 15064.5?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#5 -b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CCR Section 15064.5?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#5 -c. Disturb any human remains, including remains interred outside of dedicated cemeteries?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.

2.5.1 *Environmental Setting*

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historic, architectural, archaeological, cultural, or scientific importance. All potential impacts to cultural resources from the implementation of the Recovery Project will be discussed further in the subsequent EIR, and the level of impact may change from what is stated below.

2.5.2 *Discussion*

a and b) Cause a substantial adverse change in the significance of a historical resource pursuant to in CCR Section 15064.5? Cause a substantial adverse change in the significance of an archaeological resource pursuant to CCR Section 15064.5?

The Recovery Project has the potential to have a substantial adverse change in the significance of a historic resource or archaeological resource pursuant to CCR Section 15064.5. This impact is likely **potentially significant.** Potential impacts on historic and archaeological resources will be evaluated further in the EIR.

c) Disturb any human remains, including remains interred outside of dedicated cemeteries?

Although unlikely, the Recovery Project has the potential to disturb human remains, including remains interred outside of dedicated cemeteries, therefore this impact is likely **potentially significant**. Potential impacts on human remains will be evaluated further in the EIR.

2.6 Energy

#6. ENERGY. Would the project:

#6 -a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Have Potentially Significant Impact? No	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.
#6 -b. Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.6.1 *Environmental Setting*

Southern California Edison, and Southern California Gas (Kern County 2004a). In 2018, the total electricity consumption for Kern County was approximately 15,942 million kilowatts per hour (kWh) (California Energy Commission [CEC] 2018). The District would install nine new wells and five replacement wells, which would be configured with new electrical pumps.

2.6.2 *Discussion*

#6 -a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

The proposed project is not likely to result in significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources. The project would involve the use of diesel-fueled vehicles during constructions, however, use of these vehicles would be temporary and nonsignificant. The proposed project involves the installation of 250 horsepower pump motors in all proposed new wells, and replacement wells. The Recovery Project would be limited to the recovery of previously banked water at generally higher groundwater levels which would result in lower energy usage. Energy use will not be wasteful, inefficient, or unnecessary, therefore the impact is **less than significant** and will not be evaluated further in the EIR.

#6 -b. Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

Kern County does not have a local plan for renewable energy or energy efficiency. The proposed project would comply with the state's Climate Commitment to reduce the reliance on non-renewable energy sources by half by 2030 (CEC 2015). There would be **no impact** and this topic will not be evaluated further in the EIR.

2.7 Geology and Soils

#7. GEOLOGY AND SOILS. Would the project:

#7 -a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:					
#7 -a. 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 California Geological Survey Special Publication 42.)	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#7 -a. ii. Strong seismic ground shaking?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#7 -a. iii. Seismic-related ground failure, including liquefaction?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#7 -a. iv. Landslides?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#6 -b. Result in substantial soil erosion or the loss of topsoil?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#7 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.

		Incorporated? No.			
#7 -d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated),), creating substantial direct or indirect risks to life or property?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#7 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#7 -f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? **Yes.**	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.

2.7.1 *Environmental Setting*

The Recovery Project sites are located on the following soil types: Buttonwillow clay drained, and Lokern clay drained (NRCA, 2020). There are several small unnamed Quaternary faults located within 6 miles of the Recovery Project (CGS 2010a). There are no Alquisto-Priolo fault zones located within the vicinity of the site (CGS 2020a).

Inelastic subsidence typically occurs in the clay layers within aquifers and aquitards due to the withdrawal of water in storage within these layers during over-pumping, which induces the permanent rearrangement or collapse of the clay layer structure (BVGSA, 2020). According to DWR (2014), the Kern County Subbasin was rated at a high risk for future subsidence due to 1) a significant number of wells (51%) with water levels at or below historic lows; 2) documented historical subsidence; and 3) documented current subsidence.

The Buena Vista Groundwater Sustainability Agency (BVGSA) covers an agricultural area of Kern County located in the trough of California's southern San Joaquin Valley approximately sixteen miles west of the city of Bakersfield. The boundaries of the BVGSA coincide closely with those of the District. Concerns regarding historical subsidence within the BVGSA have been limited to areas in the northern portion of the District, between Milepost 195 and 215 of the California Aqueduct. Subsidence has not been observed to have affected infrastructure in the Recovery Project area (BVGSA, 2020).

2.7.2 *Discussion*

#7 -a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

#7 -a. 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 California Geological Survey Special Publication 42.)

The Recovery Project is not located within an Alquisto-Priolo Earthquake fault zone (CGS 2020a). Surface fault rupture is most likely to occur on active faults (i.e., faults showing evidence of displacement within the last 11,700 years). Damage from surface fault rupture is generally limited to a linear zone a few yards wide. Since the Recovery Project is not located within the vicinity of an active fault line, there would be **no impact** and this topic will not be evaluated further in the EIR.

#7 -a. ii, iii and iv. Strong seismic ground shaking, Seismic-related ground failure, including liquefaction or landslides?

The Recovery Project facilities, wells and conveyance pipes, would either be buried or extend only a few feet above ground, and would not pose a direct risk to people during seismic activity. If a seismic event should cause a pipeline break or well to collapse, the water would be released underground in a low gradient, agricultural area, posing minimal risk to people or structures. Therefore, there would be no significant impact to people or structures from any seismic-related activity as a result of implementation of the Recovery Project. If additional water treatment facilities are determined to be needed, these facilities would be subject to a separate CEQA process at the time they are proposed. The Recovery Project is not located within a known liquefaction or landslide zone (CGS 2020b). Impacts related to seismic activities, including liquefaction or landslides would be **less-than-significant** and will not be evaluated further in the EIR.

#7 -b, c, and d. Result in substantial soil erosion or the loss of topsoil? 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? Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial direct or indirect risks to life or property?

Soils present at the Recovery Project site consist of, buttonwillow clay drained, and Lokern clay drained, which are considered expansive soils, however, the soils in the project area have been extensively farmed and managed for agricultural purposes (NRCA 2020). The pipelines would be buried within these soils' types. The Recovery Project is not located on unstable soils and implementation of the proposed project would not result in instability or excessive soil erosion.

Because construction activities would disturb an area larger than 1 acre, the District is required by law to obtain coverage under the SWRCB N.P.D.E.S. stormwater permit for general construction

activity, including preparation and submittal of a Notice of Intent (NOI) to discharge with the Central Valley Regional Water Quality Control Board. The District is required to prepare a SWPPP and comply with the conditions of the N.P.D.E.S. general stormwater permit for construction activities. The SWPPP shall describe the construction activities to be conducted, BMPs that would be implemented to prevent soil erosion and contaminated stormwater discharges into waterways, and inspection and monitoring activities that would be conducted.

Topsoil may be stripped and stockpiled for later reuse on the site. With the implementation of a Dust Control Plan or Construction Notification form loss of topsoil would be minimized during construction. Operation of the Recovery Project would not create the potential for soil erosion or loss of topsoil as the area is in a cultivated agricultural field and is topographically flat. Therefore, impacts related to soil erosion, unstable soils, or expansive soils would be **less-than-significant** and these topics will not be evaluated further in the EIR.

Inelastic land subsidence is a major concern in areas of active groundwater extraction due to risks to canal and infrastructure damage, permanent reduction in the groundwater storage capacity of the aquifer, well casing collapse, and increased flood risk in low lying areas.

The BVGSA proposes to monitor subsidence as described in the BVGSA Groundwater Sustainability Plan. In addition, the BVGSA discourages groundwater extraction from beneath the E-clay, in part, because of the potential for extraction from this confined zone to induce subsidence (BVGSA 2020). Recovery wells constructed as part of the Recovery Project will not be constructed below the E-clay. Given that the range of groundwater elevations expected during implementation of the Recovery Project will be within the range of elevations that has been experienced in the past, the risk of subsidence which result in damage to infrastructure is **less-than-significant** and these topics will not be evaluated further in the EIR.

#7 -e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The Recovery Project would not require the use of septic tanks or alternative wastewater disposal systems. Temporary portable restrooms would likely be provided for construction workers. Therefore, there would be **no impact** and this topic will not be evaluated further in the EIR.

#7 -f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The Recovery Project sites are located on marine and non-marine sedimentary rock that consist of alluvium, lake, playa, and terrace deposits, and is from the Pleistocene-Holocene ages (CGS 2010b). Sediments associated with Holocene-age alluvium are too young to contain paleontologically sensitive resources and the likelihood of finding paleontological resources is unlikely. However, since the exact age of the bedrock is unknown and paleontological resources are found almost exclusively in sedimentary rock, there is a chance of discovering unknown

paleontological resources within the Recovery Project site. With implementation of the below mentioned mitigation measure impacts would be **less-than-significant with mitigation**.

Mitigation Measure CR-2: Avoid Potential Effects on Paleontological Resources.

In the event that a paleontological resource is uncovered during Recovery Project implementation, all ground-disturbing work within 165 feet (50 meters) of the discovery shall be halted. A qualified paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts will occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, a qualified paleontologist shall evaluate the resource and determine whether it is "unique" under CEQA, Appendix G, part VII. The determination and associated plan for protection of the resource shall be provided to the District for review and approval. If the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the paleontologist shall consult with the District staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation in place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources and shall be required unless there are other equally effective methods. Other methods may be used but must ensure that the fossils are recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of a qualified paleontologist. All recovered fossils shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology standard guidelines; typically, the Natural History Museum of Los Angeles County and University of California, Berkeley accept paleontological collections at no cost to the donor. Work may commence upon completion of treatment, as approved by the District.

With the incorporation of Mitigation Measure CR-2, potentially significant impacts related to paleontological resources would be reduced to **less-than-significant** and will not be evaluated further in the EIR.

2.8 Greenhouse Gas Emissions

#8. GREENHOUSE GAS EMISSIONS. Would the project:

#8 -a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#8 -b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.8.1 *Environmental Setting*

Kern County has not adopted a local plan for reducing greenhouse gas (GHG) emissions. The S.J.V.A.P.C.D. has adopted the *Guidance for Valley Land-use Agencies Addressing GHG Emissions Impacts for New Projects under CEQA* (S.J.V.A.P.C.D. 2009). The guidance addresses stationary source projects and development projects.

2.8.2 *Discussion*

#8 -a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions would be generated during the construction phase of the Recovery Project. Temporary GHG emissions, primarily for the use of diesel-powered vehicles, would occur during construction. Equipment that would be used during project implementation is described in the project description. Due to the short-term impacts from the construction phases and minimal impacts during operation, impacts related to the generation of greenhouse gas emissions would be **less than significant** and will not be evaluated further in the EIR.

#8 -b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

California has more than 10 Executive Orders directing state agencies to implement programs to reduce GHG emissions to meet 2030 target of 40 percent below 1990 levels (California, 2018). C.A.R.B. is the primary state agency responsible implementing GHG reduction programs. Kern County does not have an adopted local greenhouse gas reduction plan. The S.J.V.A.P.C.D. provides guidance for addressing GHG emissions from stationary source projects and development projects, but not for development of groundwater banking projects. Therefore, there is no conflict

with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG. There would be **no impact** and this topic will not be evaluated further in the EIR.

2.9 Hazards and Hazardous Materials

#9. HAZARDS AND HAZARDOUS MATERIALS. Would the project:

#9 -a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -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 or excessive noise for people residing or working in the project area?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#9 -g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.9.1 *Environmental Setting*

To identify known hazardous materials and contaminated sites, a database search was conducted for all data sources in the Cortese List (enumerated in PRC Section 65962.5), including: the GeoTracker database, a groundwater information management system that is maintained by the State Water Resources Control Board (SWRCB); the Hazardous Waste and Substances Site List (i.e., the EnviroStor database), maintained by the California Department of Toxic Substances Control (DTSC); and EPA's Superfund Site database (DTSC 2020, SWRCB 2020a and 2020b, CalEPA 2016). There were no hazardous materials sites identified within 0.25 mile of the CCSB borrow site. There are also no known naturally occurring asbestos hazards in the vicinity of the CCSB borrow site (DOC 2000).

2.9.2 *Discussion*

#9 -a, b, c, d, f, and g. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? 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? Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? 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? f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

The Recovery Project would be implemented adjacent to active agriculture, farm roads, and canals. The Recovery Project is located away from population centers; involving hazardous materials; and would rely on electric power rather than liquid fuels. The closest school is the Elk Hills Elementary School located approximately 1 mile southeast of the proposed project. The Recovery Project would not expose people to increased risks from wildland fire as the site is comprised entirely of farmland and are not located within a high severity fire zone. The Recovery Project would not affect emergency response plans as facilities would not interfere with traffic routes or response vehicle transport. There would be **no impact** and these topics will not be evaluated further in the EIR.

#9 -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 or excessive noise for people residing or working in the project area?

Kern County has established an Airport Land Use Compatibility Plan which has been incorporated into the General Plan (Kern County 2012). The purpose of the Airport Land Use Compatibility Plan is to establish procedures and criteria by which the Kern County and affected incorporated cities can address compatibility issues when making planning decisions. The Elk Hills – Buttonwillow Airport is located approximately 3 miles west of the Recovery Project. The Recovery Project is not within the Elk Hills – Buttonwillow Airport Influence Area (Kern County 2012). There would be **no impact** and this topic will not be evaluated further in the EIR.

2.10 Hydrology and Water Quality

#10. HYDROLOGY AND WATER QUALITY. Would the project:

#10 -a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:					
#10 -c. i. result in substantial erosion or siltation on- or off-site;	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -c. ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -c. iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -c. iv. impede or redirect flood flows?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.

		Incorporated? No.			
#10 -d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#10 -e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes**.	Have No Impact? No.	Have Beneficial Impact? No.

2.10.1 *Environmental Setting*

The District, established in 1924, is a public agency, which supplies surface water from the Kern River and State Water Project (SWP) via the California Aqueduct and pumps groundwater to agricultural customers, primarily. The District's principal source of surface water is the Kern River. The District has utilized Kern River water under a schedule of long-standing diversion rights. Typically, surface water supplies meet the majority of the Districts water demand, the remaining water demands are meet from privately-owned wells.

2.10.2 *Discussion*

#10 -a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

In order to evaluate the impacts to water quality, water pumped from the proposed wells would need to be tested during and after the construction of the wells. In the event that water quality monitoring finds that the existing groundwater is not the same or better than the water in the California Aqueduct, then blending will be used to meet water quality standards in the Aqueduct. If additional water treatment facilities are determined to be needed, these facilities would be subject to a separate CEQA process at the time it is proposed. This impact is **less-than-significant,** and impact to water quality or waste discharge requirements will not be evaluated further in the EIR.

#10 -b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

The Recovery Project will recover groundwater banked in existing District recharge facilities, including the District canals and the Palms Groundwater Bank. Groundwater modeling will be conducted to evaluate the potential impact of the proposed operational scenario. The results of the

groundwater modeling will be included in the EIR. This impact is **potentially significant** and will be evaluated further in the EIR.

#10 -c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

#10 -i, ii, iii, and iv) Result in substantial erosion or siltation on- or off-site; Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or Impede or redirect flood flows?

The Recovery Project will not alter the existing drainage pattern of the site or the area, therefore there will be **no impact** and this topic will not be evaluated further in the EIR.

#10 -d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The Recovery Project is not located in a flood hazard, tsunami, or seiche zone, therefore there will be **no impact** and this topic will not be evaluated further in the EIR.

#10 -e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The Recovery Project purpose is to enhance groundwater management by increasing the District's ability to recharge groundwater in wet years and return that banked water in dry years. Groundwater levels would decrease when water is groundwater is pumped to meet to local demands or for delivery to agricultural users, however the Recovery Project would be operated to provide a long-term benefit to the basin. Therefore, the impact is **less-than-significant,** and this topic will not be evaluated further in the EIR.

2.11 Land Use and Planning

#11. LAND USE AND PLANNING. Would the project:

#11 -a. Physically divide an established community?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#11 -b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.11.1 *Environmental Setting*

The Recovery Project site is zoned as agriculture (Kern County 2020). The Recovery Project is located in a rural area and are surrounded by various agricultural crops and water conveyance canals.

2.11.2 *Discussion*

#11 -a and b. Physically divide an established the community, and cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The Recovery Project would be developed within existing farm roads, in areas zoned for agriculture (Kern County 1988). The Recovery Project is located outside of existing communities and are consistent with existing zoning. There are no adopted HCPs, NCCPs, other local, regional, or state habitat conservation plans within the site or vicinity, *see* Section 2.11 "Biological Resources". There would be **no impact** and these topics will not be evaluated further in the EIR.

2.12 Mineral Resources

#12. MINERAL RESOURCES. Would the project:

#12 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#12 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.12.1 *Environmental Setting*

The Recovery Project sites are located within a Surface Mining and Reclamation Act of 1975 (S.M.A.R.A.) study area for aggregate materials in the Bakersfield production-consumption region. The Recovery Project is locations are designated as mineral resource zone [MRZ]-3 (areas containing mineral deposits, the significance of which cannot be evaluated from available data) (DOC 2009).

2.12.2 *Discussion*

#12 -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 Recovery Project is located in a S.M.A.R.A. study area and though unlikely, have the potential to contain mineral resources. The Recovery Project would include the construction of nine new wells and approximately 11.9 miles of conveyance pipeline. The pipelines would be installed primarily in or along the edge of existing dirt roads within agricultural fields. The Recovery Project is not located in areas of known significant mineral deposits. Although unlikely, there is potential for the temporary loss of access to a small amount of mineral resources, however, the amount that could be lost would be minimal and would not affect the overall availability of mineral resources in Kern County. Therefore, this impact would be **less-than-significant,** and loss of available mineral resources will not be evaluated further in the EIR.

#12 -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?

The Recovery Project is not located within the vicinity of a locally important mineral resource recovery site. There would be **no impact** and this topic will not be evaluated further in the EIR.

2.13 Noise

#13. NOISE. Would the project:

#13 -a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable standards of other agencies?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#13 -b. Generation of excessive groundborne vibration or groundborne noise levels?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? **Yes.**	Have No Impact? No.	Have Beneficial Impact? No.
#13 -c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.13.1 *Environmental Setting*

The Recovery Project is located in a predominately agricultural area. The closest sensitive receptor is located approximately 300 feet from the Recovery Project. Interstate 5 is located approximately 0.5 mile from the eastern most pipeline segment. The Kern County Code of Ordinances states that construction related noise is limited to the hours of 6:00 a.m. to 9:00 p.m. on weekdays and 8:00 a.m. to 9:00 p.m. on weekends (Kern County 2020).

2.13.2 *Discussion*

#13 -a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable standards of other agencies?

Construction of the Recovery Project would temporarily increase the ambient noise levels within the vicinity of the project site due to the use of heavy machinery during construction activities. Increase ambient noise would occur intermittently during the construction of the well. All work at the Recovery Project sites would be limited to the hours identified in Kern County's Noise Ordinance.

Although construction activities would for the most part occur only during the daytime hours, uncontrolled construction noise could still be considered disruptive to residents adjacent to the Recovery Project. The closest residence is approximately 300 feet from the Recovery Project; however, impacts would be short-term and nonsignificant. Typical composite noise levels for construction activities, and distances of various noise contours from construction sites are presented in **Table 2-5**.

Table 2-5. Typical Noise Levels During Construction.

		Approximate Distance (feet) to Reduce Noise to Given dBA, Leq)[1]		
Construction Activity	Noise Level at 50 feet (dBA), equivalent continuous sound level in decibels [Leq])[2]	60	65	70
Ground Clearing	84	790	450	250
Excavation	89	1,400	800	450
Well drilling (driver)	80	430	235	150
Foundation	78	400	220	130
Erection	85	890	500	280
Finishing (exterior)	89	1,400	800	450

Notes:

1 EPA, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, December 1971; United States Department of Transportation, Federal Highway Administration, Office of Planning, Environment, and Realty, Roadway Construction Noise Model, June 28, 2017.

2 Calculations assume a 6 dBA reduction for each doubling of distance from the noise source.

dBA = A-weighted decibels

Leq = equivalent continuous sound level in decibels

During operations, minimal noise would be generated from the use of existing electric well motors and pumps. Impacts related to noise levels would be **less-than-significant** and will not be evaluated further in the EIR.

#13 -b. Generation of excessive groundborne vibration or groundborne noise levels?

Ground vibration would only be caused during construction activities and would primarily occur during well drilling. Vibrations could be detectable by nearby sensitive receptors. One residence is located approximately 300 feet from the Recovery Project. The closest proposed well is approximately 0.5 east of this residence. Construction activities associated with the installation of the all proposed well would be short-term. No adverse levels of vibration would be generated during project operations. Therefore, impact related to groundborne vibration or noise levels would be **less-than-significant** and will not be analyzed further in the EIR.

#13 -c) For a project located within-the vicinity of a private airstrip or-an airport land use plan or, where such a plan has not been adopted, within 2 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?

Kern County has established an Airport Land Use Compatibility Plan which has been incorporated into the General Plan (Kern County 2012). The Elk Hills – Buttonwillow Airport is located

approximately 3 miles west of the Recovery Project. The Recovery Project is not within the Elk Hills – Buttonwillow Airport Influence Area (Kern County 2012). The Recovery Project would not expose people residing or working in the area to excessive noise levels. There would be **no impact** and this topic will not be analyzed further in the EIR.

2.14 Population and Housing

#14. POPULATION AND HOUSING. Would the project:

#14 -a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#14 -b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.14.1 *Environmental Setting*

The Recovery Project is located in an unincorporated area of Kern County. The population was estimated in 2019 to be 916,464 in Kern County (Department of Finance [DOF] 2019).

2.14.2 *Discussion*

#14 -a and b) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure) or displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The Recovery Project would increase the amount of water available for domestic and municipal wells that provide water to residences located within the District boundaries and the surrounding towns, as well as replenish groundwater under the Tule Elk Reserve. The Recovery Project is located in a primarily agricultural area away from population centers; therefore, the Recovery Project would not be growth inducing. The Recovery Project would not result in the development of new housing, nor would it displace people or housing. The Recovery Project would not require additional employees to operate. There would be **no impact** and these topics will not be evaluated further in the EIR.

2.15 Public Services

#15. PUBLIC SERVICES. Would the project:

#15 -a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the 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:	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
Fire protection?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
Police protection?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
Schools?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
Parks?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
Other public facilities?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.15.1 *Environmental Setting*

The Kern County Sheriff and California Highway Patrol provide law enforcement services for the unincorporated Kern County. The Kern County Fire Department provides fire protection to residents of the unincorporated areas of the County, and the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Tehachapi and Wasco (Kern County 2004b). A mutual agreement between the County and the cities of Bakersfield, Taft, and California City allows for protection and assistance in the jurisdiction of each as needed. The County also has a mutual aid contract with U.S.F.W.S. and a service agreement with the Bureau of Land Management.

2.15.2 *Discussion*

#15 -a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the 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:

The Recovery Project would not require new or altered government facilities, as the Recovery Project would not increase the need for public services from the existing conditions. There would be **no impact** and these topics will not be evaluated further in the EIR.

2.16 Recreation

#16. RECREATION. Would the project:

#16 -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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#16 -b. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.16.1 *Environmental Setting*

The Tule Elk Reserve borders the eastern side of the proposed project. The Tule Elk Reserve protects a small herd of Tule elk that were once in danger of extinction, as well as offering recreational benefits to the public by having picnic areas and interpretive exhibits for public use (DPR 2020).

2.16.2 *Discussion*

#16-a and b. 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 or include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

The Recovery Project is not growth inducing and would not increase the use of existing parks or recreational facilities or require the construction or expansion of recreational facilities. There would be **no impact** and these topics will not be evaluated further in the EIR.

2.17 Transportation

#17. TRANSPORTATION. Would the project:					
#17 -a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#17 -b. Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#17 -c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#17 -d. Result in inadequate emergency access?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.17.1 *Environmental Setting*

The Recovery Project is located near the town of Buttonwillow, Kern County. Access to the site is provided via Interstate 5. There are no transit or on-street bicycle/pedestrian facilities near the Recovery Project site.

2.17.2 *Discussion*

#17 -a, b, c, and d). Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)? Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? Result in inadequate emergency access?

The Recovery Project would not conflict with any program plan, ordinance, or policies. Construction traffic would utilize existing public roads to deliver equipment, supplies, and workers to and from the site. Construction of the Recovery Project would result in a total of 3,463 vehicle trips. The Recovery Project would be implemented in agricultural fields and along dirt roads located on the edge of the agricultural fields. Therefore, the Recovery Project would not require any road closures or result in inadequate emergency access. Since no new roads are being developed, there would be no increase hazards due to a geometric design feature or incompatible uses. Therefore, the impact is **less-than-significant,** and these topics will not be evaluated further in the EIR.

2.18 Tribal Cultural Resources

#18. TRIBAL CULTURAL RESOURCES. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

#18 -a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC Section 5020.1(k), or	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#18 -b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.

2.18.1 *Environmental Setting*

A Tribal Sacred Lands search has not yet been completed for the project. The District sent a letter to the Torres Martinez Desert Cahuilla Indians in accordance with requirements of Assembly Bill 52 (PRC Section 21080.3.1). A request for consultation has not been received. Should a request for consultation be received, a summary report of the consultation process included in the subsequent EIR for review by the District Board of Directors prior to their consideration of the project. All potential impacts to tribal cultural resources from the implementation of the Recovery Project will be discussed further in the subsequent EIR, and the level of impact may change from what is stated below.

2.18.2 *Discussion*

#18 -a and b) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC Section 5020.1(k)? A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In

applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

The Recovery Project has the potential to cause a substantial adverse change in the significance of a tribal cultural resource as defined in PRC sections 21074, 5020.1(k), or pursuant to criteria set forth in section 5024.1(c). Therefore, impacts related to tribal cultural resources are considered **potentially significant** and will be analyzed further in the EIR.

2.19 Utilities and Service Systems

#19. UTILITIES AND SERVICE SYSTEMS. Would the project:

#19 -a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#19 -b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#19 -c. Result in a determination by the wastewater treatment provider that 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?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#19 -d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#19 -e. Comply with Federal, State, and local management and reduction statutes and regulations related to solid waste?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.19.1 *Environmental Setting*

The Recovery Project and vicinity are served by PG&E, Southern California Edison, and Southern California Gas (Kern County 2004a). Sewage disposal is handled by both public and private agencies, and by private individual systems. Several incorporated and unincorporated communities are severed by wastewater treatment plants managed by community service districts. The closest wastewater treatment plant is the Bakersfield wastewater plant. Domestic water is serviced to the public by various water purveyors consisting of public and private water systems. The Kern County Waste Management Department currently owns and operates 7 Class II Landfills, the

closest one being the Taft Landfill located approximately 8.5 miles south of the proposed project. (Kern County 2004b).

2.19.2 *Discussion*

#19 -a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No utility services would need to be constructed or expanded as a result of the Recovery Project. There would be **no impact** and this topic will not be evaluated further in the EIR.

#19 -b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

The Recovery Project would not require a water supply. There would be **no impact** and this topic will not be evaluated further in the EIR.

#19 -c. Result in a determination by the wastewater treatment provider that 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?

See Question "a" above. The Recovery Project would not result in a significant amount of wastewater. There would be **no impact** and this topic will not be analyzed further in the EIR.

#19 -d and e) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? Comply with Federal, State, and local management and reduction statues and regulations related to solid waste?

The Recovery Project would not create substantial amounts of solid waste, and as such would not exceed the capacity of local infrastructure. The Taft Landfill has a remaining capacity of approximately 7,380,708 cubic yards, with a maximum permitted throughput of 800 tons/day. Minimal waste would be generated during construction and no increase in waste production would occur during the operation of the Recovery Project. The project would comply with federal, state, and local management and reduction statues and regulations related to solid waste. There would be **no impact** and these topics will not be evaluated further in the EIR.

2.20 Wildfire

#20. WILDFIRE. If located in or near State responsibility areas or lands classified as very high fire hazard severity zones, **would the project:**

#20 -a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#20 -b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#20 -c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.
#20 -d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	Have Potentially Significant Impact? No.	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? **Yes.**	Have Beneficial Impact? No.

2.20.1 *Environmental Setting*

The Recovery Project is not located in a high severity fire zone (CALFIRE 2007a and 2007b). The Kern County Fire Department provides fire protection for residents of the unincorporated areas of the County and the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Tehachapi and Wasco (Kern County 2004b).

2.20.2 *Discussion*

#20 -a, b, c, and d) Substantially impair an adopted emergency response plan or emergency evacuation plan? Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? Require the installation or maintenance of associated infrastructure (such

as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment? Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The Recovery Project is located in a high severity fire zone; however, implementation of the proposed project would not increase the fire risk. There would not be an increase in the number of users at the site that could impair emergency response or evacuation. Additionally, the short-term, temporary nature of construction and the intermittent nature of material drop-off via large trucks at the site would not pose a risk to emergency response or evacuation during an emergency. The Recovery Project would not require any infrastructure that would exacerbate fire risk or the risk of flooding, slope instability, or drainage changes. There would be **no impact** and these topics will not be evaluated further in the EIR.

2.21 Mandatory Findings of Significance

#21. MANDATORY FINDINGS OF SIGNIFICANCE. Would the project:

#21 -a. 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 an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#21 -b. 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)?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.
#21 -c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	Have Potentially Significant Impact? **Yes.**	Have Less-than-Significant Impact with Mitigation Incorporated? No.	Have Less-than-Significant Impact? No.	Have No Impact? No.	Have Beneficial Impact? No.

2.21.1 *Discussion*

#21 -a. Would 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 an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?

The analysis conducted in this IS concludes that implementation of the Recovery Project could have a potentially significant impact on the environment. This impact would be **potentially significant** and will be evaluated further in the subsequent EIR.

#21 -b. Would 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 Recovery Project has the potential to have cumulative impacts on water quality. To consider cumulative impacts[1] to the environment, past, present, and reasonably foreseeable probable future projects that discharge non-project water into the California Aqueduct would need to be considered and analyzed for potential cumulative impacts to water quality. Impacts to water quality or quantity are considered **potentially significant** and will be discussed further in the subsequent EIR.

#21 -c. Would the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

The Recovery Project would have the potential to cause substantial adverse effects on human beings from potential impacts to water quality or quantity. This impact would be **potentially significant** and will be discussed further in the subsequent EIR.

[1] The CEQA Guidelines, Section 15355 state, "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

This page left intentionally blank]

3.0 References

References for Chapter 2.1, Aesthetics

California Department of Transportation (Caltrans). 2019. *List of eligible and officially designated State Scenic Highways*. August 2019. Available: https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways Accessed: April 17, 2020.

Kern County. 2020. *Kern County GIS*. Available: https://maps.kerncounty.com/H5/index.html?viewer=KCPublicAccessed: April 17, 2020.

References Chapter 2.2, Agriculture and Forestry

Department of Conservation (DOC). 2018. *California Important Farmland Finder*. Available: https://maps.conservation.ca.gov/DLRP/CIFF/ Accessed: April 17, 2020.

_____. 2010. *Kern County Williamson Act Parcels and Non-Renewals, California, 2010*. GIS Layer. Available: https://databasin.org/datasets/b4b2b8e824114b32b1005c74663237fd Accessed: April 17, 2020.

References Chapter 2.3, Air Quality

California Air Resource Board (C.A.R.B.). 2018. *Maps of State and Federal Area Designations*. Available: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations Accessed: March 9, 2020.

_____. 2019. *Ambient Air Quality Standards (CAAQS)*. Dated 5/4/16. Available: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf Accessed: March 9, 2020

_____. 2020. *Air Quality Trend Summaries*. Available: https://www.arb.ca.gov/adam/ Accessed: March 9, 2020.

Environmental Protection Agency (EPA). 2016. *National Ambient Air Quality Standards (NAAQS) Table*. Available: https://www.epa.gov/criteria-air-pollutants/naaqs-table Accessed: March 9, 2020.

San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.) 2004. Rule 8021 Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities (Adopted November 15, 2001; Amended August 19, 2004). Available: https://www.valleyair.org/rules/1ruleslist.htm#reg7 Accessed: April 14, 2020.

S.J.V.A.P.C.D. 2017. *Small Project Analysis Level (SPAL)*. Available: http://www.valleyair.org/transportation/CEQA%20Rules/GAMAQI-SPAL.PDF Accessed: April 6, 2020.

References Chapter 2.4, Biological Resources

Kern County Planning Department. 2006 (December). *First Public Draft, Kern County Valley Floor Habitat Conservation Plan*. Prepared by Garcia and Associates, Lompoc, CA.

References Chapter 2.5, Cultural

No Citations.

References Chapter 2.6, Energy

California Energy Commission (CEC). 2015. *Fact Sheet: California's 2030 Climate Commitment – Renewable Resources for Half of the State's Electricity by 2030.* Available: https://ww3.arb.ca.gov/html/fact_sheets/2030_renewables.pdf. Accessed: March 9, 2020.

_____. 2018. *Electricity Consumption by County*. Available: http://www.ecdms.energy.ca.gov/elecbycounty.aspx Accessed: March 2, 2020

Kern County. 2004a. *Kern County General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP.pdf Accessed: March 2, 2020.

References Chapter 2.7, Geology and Soils

Buena Vista Groundwater Sustainability Agency. (BVGSA). 2020. Final Groundwater Sustainability Plan. Kern County Groundwater Subbasin.

California Geologic Survey (CGS). 2010a. *Fault Activity Map of California (2010)*. Available: https://maps.conservation.ca.gov/cgs/fam/ Accessed: March 4, 2020

_____. 2010b. *Geologic Map of California (2010)*. Available: https://maps.conservation.ca.gov/cgs/fam/ Accessed: March 4, 2020

_____. 2020a. *Earthquake Zones of Required Investigation*. Available: https://maps.conservation.ca.gov/cgs/EQZApp/app/ Accessed: March 4, 2020

_____. 2020b. *CSG Warehouse Information*. Available: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps Accessed: March 4, 2020

DWR, 2014. Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California.

Natural Resources Conservation Service (NRCS). 2020. *U.S. Department of Agriculture Natural Resources Conservation Services, Web Soil Survey*. Available: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx Accessed: March 4, 2020.

References Chapter 2.8, Greenhouse Gas Emissions

San Joaquin Valley Air Pollution Control District (S.J.V.A.P.C.D.). 2009. *Guidance for Valley Land-use Agencies in Addressing GHG Emissions Impacts for New Projects under CEQA*. Available: http://www.valleyair.org/Programs/CCAP/12-17-09/3%20CCAP%20-%20FINAL%20LU%20Guidance%20-%20Dec%2017%202009.pdf Accessed: March 12, 2020.

References Chapter 2.9, Hazards and Hazardous Waste

California Department of Toxic Substances Control. (DTSC) 2020. *Envirostor Hazardous Waste and Substances Site List (Cortese)*. Available: https://www.envirostor.dtsc.ca.gov/public/search?cmd=search&reporttype=CORTESE&site_type=CSITES,OPEN,FUDS,CLOSE&status=ACT,BKLG,COM,COLUR&reporttitle=HAZARDOUS+WASTE+AND+SUBSTANCES+SITE+LIST+(CORTESE). Accessed: April 22, 2020.

California Environmental Protection Agency (CalEPA). 2016. *Sites Identified with Waste Constituents Above Hazardous Waste Levels Outside the Waste Management Unit*. Available: https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/SiteCleanup-CorteseList-CurrentList.pdf. Accessed: April 22, 2020.

California State Water Resources Control Board (SWRCB). 2020a. *GeoTracker Database*. Available: https://geotracker.waterboards.ca.gov/map/?global_id=T0601700073. Accessed: April 22, 2020.

_____. 2020b. *CDO-CAO List*. Available: https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/SiteCleanup-CorteseList-CDOCAOList.xlsx. Accessed: April 22, 2020.

California Department of Conservation (DOC). 2000. *A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos, 2000, Map scale 1:1,100,000, Open-File Report 2000-19*. Available: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf. Accessed: March April 22, 2020.

References Chapter 2.10, Hydrology

No Citations.

References Chapter 2.11, Land Use and Planning

Kern County. 1988. *Zone Maps*. Available: https://kernpublicworks.com/maps/zone-maps/ Accessed: March 2, 2020.

References Chapter 2.12, Mineral Resources

Department of Conservation (DOC). 2009. *Special Report 210*. Available: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps Accessed: March 9, 2020.

References Chapter 2.13, Noise

Kern County. 2012. *Airport Land Use Compatibility Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/ALUCP2012.pdf Accessed: March 13, 2020.

Kern County 2020. *Code of Ordinances, Title 8 Health and Safety*. Available: https://library.municode.com/ca/kern_county/codes/code_of_ordinances Accessed: March 17, 2020.

Environmental Protection Agency (EPA). 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* Available: http://docs.ppsmixeduse.com/ppp/DEIR_References/1971_1201_usepa_noiseconstruction.pdf Accessed: March 17, 2020.

U.S. Department of Transportation, Federal Highway Administration, Office of Planning, Environment, and Realty, Roadway. 2017. *Construction Noise Model*.

References Chapter 2.14, Population and Housing

Department of Finance. 2019. *E-1 Cities, Counties, and State Population Estimates with Annual Percent Change – January 1, 2018 and 2019*. Available: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-1/ Accessed: March 12, 2020

References Chapter 2.15, Public Services

Kern County. 2004b. *Volume I Recirculated Draft Program Environmental Impact Report*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_RPEIR_vol1.pdf Accessed: March 11, 2020.

References Chapter 2.16, Recreation

Department of Parks and Recreation. 2020. Tule Elk State Natural Reserve. Available: https://www.parks.ca.gov/?page_id=584 Accessed: April 21, 2020.

References Chapter 2.17, Transportation

No Citations.

References Chapter 2.18, Tribal Cultural Resources

Native American Heritage Commission (NAHC). 2020. *Sacred Lands Record Search*. Accessed: March 12, 2020

References Chapter 2.19, Utilities

Kern County. 2004a. *General Plan*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP.pdf Accessed: March 2, 2020.

_____. 2004b. *Volume I Recirculated Draft Program Environmental Impact Report*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_RPEIR_vol1.pdf Accessed: March 11, 2020.

References Chapter 2.20, Wildfire

CalFire. 2007a. *Fire Hazard Severity Zones in SRA for Sacramento County*. Available: https://osfm.fire.ca.gov/media/6687/fhszs_map15.pdf Accessed: April 20, 2020.

_____. 2007b. *Very High Fire Hazard Severity Zones in LRA for Sacramento County*. Available: https://osfm.fire.ca.gov/media/6686/fhszl06_1_map15.pdf Accessed: April 20, 2020.

Kern County. 2004b. *Volume I Recirculated Draft Program Environmental Impact Report*. Available: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_RPEIR_vol1.pdf Accessed: April 20, 2020.

This page left intentionally blank]

4.0 Report Preparers

GEI Consultants, Inc.

Ginger Gillin, ...Project Director, Document Review

Nicholas Tomera.....Project Manager, Project Description

Chrissy Russo.....Aesthetics, Agriculture and Forestry, Air Quality, Biological Resources, Cultural Resources, Energy, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Noise, Population and Housing, Public Services, Recreation, Transportation, Tribal Cultural Resources, Utilities and Service Systems, Wildfire, and Mandatory Findings of Significance

Karen Miller.....Geographic Information Systems

Gigi Gable.....Report Editing

This page left intentionally blank]

Appendix B Comments received on the Notice of Preparation and Initial Study

NATIVE AMERICAN HERITAGE COMMISSION

7/1/2020

Governor's Office of Planning & Research

Jun 19 2020

STATE CLEARINGHOUSE

June 16, 2020

Tim Ashlock
Buena Vista Water Storage District
525 North Main Street
Buttonwillow, CA 93206

Re: 2020060315, Palms Groundwater Recovery Project, Kern County

Dear Mr. Ashlock:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project 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. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015. If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). Both SB 18 and AB 52 have tribal consultation requirements. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe. (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez-Lopez
Cultural Resources Analyst

cc: State Clearinghouse

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

July 16, 2020

To: Mr. Tim Ashlock
Engineer-Manager
Buena Vista Water Storage District
Sent via email (tim@bvh2o.com)

Cc: Mr. Greg Hammett
General Manager
West Kern Water District
Sent via email (GHammett@wkwd.org)

RCS Job No. 369-KRN20

From: Anthony Hicke and Richard Slade
Richard C. Slade & Associates LLC (RCS)

Re: Comments Regarding Notice of Preparation (NOP) of an
Environmental Impact Report (EIR) and Initial Study
Palms Groundwater Recovery Project (PGRP), Dated June 16, 2020
Prepared for Buena Vista Water Storage District (BVWSD)
Kern County, California

Introduction

Provided herein are comments related to the referenced NOP for the BVWSD Palms Groundwater Recovery Project (Palms Project). On behalf of the WKWD, RCS reviewed the documentation available from http://bvh2o.com/PALMS-NOP.pdf, and also attended the July 2, 2020 meeting in which the document was presented. RCS provided verbal comments/questions at that meeting related to the proposed project. The purpose of this Memorandum is to help memorialize and clarify those comments, as well as to provide additional questions/comments regarding the project.

Comments

The following comments are provided in no particular order or hierarchy.

- Page 1-4 of NOP – "The Recovery Project will be managed so that groundwater elevations will, in the long term, improve from those observed historically."
    - Recovery wells proposed for the Palms Project surround two sides of the WKWD North Wellfield; specifically, the Palms project wells are located east of and north of the WKWD North Wellfield. Past performance of the WKWD North Wellfield wells has shown that declines in regional water levels affects their ability to produce water and can also affect water quality.

MEMORANDUM

- The NOP documentation appears to focus primarily on basin-wide water level impacts of the Palms Project. Analyses for the EIR should specifically consider pumping water level impacts and water quality impacts to WKWD wells due to their proximity to the proposed project wells.
    - Example - If the Palms project wells are pumping a significant volume of groundwater to the Aqueduct as part of a banking contract, it is presumable that this pumping would occur during a dry rainfall period, when natural aquifer recharge is low. This pumping could occur for an extended period of time. The requested analyses should consider the water drawdown interference induced in the WKWD wells during an extended extraction period by the project wells, and also how those drawdown effects could impact the ability of the WKWD to extract groundwater of acceptable quality from their North Wellfield wells which are necessary to meet the demands of their customers.
    - What protections will there be for the WKWD if they have to deepen pump installations, or even if the WKWD wells lose their ability to pump water at rates necessary for their operations?
    - What protections will there be for WKWD if future water quality changes impact WKWD's ability to extract groundwater of acceptable quality for their operations?

- During construction of the WKWD North wellfield wells, BVWSD expressed concern about constructing wells that were perforated across a clay layer that had been identified in the area. Water quality differed in the aquifers above and below the clay layer, based on the data collected by RCS during the testing of the new water wells and groundwater monitoring wells at the NW Wellfield. Ultimately, WKWD agreed to construct wells so that they were not perforated both above and below the identified clay layer. Page 1-4 of the NOP states the project wells would be constructed to depths "up to 500 ft". RCS assumes the EIR will include the following:
    - Defining which geologic formations from which the proposed BVWSD wells produce water.
    - Considering/defining the correlation/continuity of the aquifers in the region (using geophysical electric logs) into which the proposed Palms Project wells are to be perforated.
    - Identifying whether or not perforations in the project wells are in the same zones as those in the WKWD wells.
- Will the recharge water quality have any effects on the quality of the water produced by WKWD at its North Wellfield?

MEMORANDUM

- The Rosedale Rio Bravo Water Storage District (WSD)/Irvine Ranch Project has a "Phase 2" component that is located just north of the eastern-most BV Palms project wells, which are, in turn, located just north of the WKWD north wellfield.
    - The EIR should consider cumulative effects of the operation of the Rosedale Rio Bravo WSD/Irvine Ranch Project and the Palms Project as part of the Palms Project EIR
- RCS recently emailed pertinent hydrogeologic data derived from the construction of the WKWD North Wellfield monitoring wells to Mr. Tim Ashlock; these data should be considered and/or implemented as appropriate into any modeling work performed for the Palms Groundwater project.
- On pages 1-4 and 1-5, the following is stated:

    "For landowners, there would be an alternative delivery option of groundwater recovery to provide flexibility by allowing private pumping in lieu of surface water deliveries. Landowners would have the option, in addition to surface water delivery, utilize on-farm wells to pump water for irrigation needs or continue to receive surface water deliveries through the District canals and pipelines. No additional District facilities would need to be constructed for this alternative delivery option. Landowners interested in this optional delivery method would be required to sign up for the District program, and participation would be limited by the amount of water available for recovery, no more than 25,000 acre-feet per year.

    "This alternative delivery option would allow wider participation and flexibility for water users. It is anticipated that water users south of Perral Road in the Buttonwillow Service Area would be eligible to participate in the program. The water pumped from landowner wells would be treated as recovered water, leaving a similar amount of water (SWP, Kern River, or other water) available for a different beneficial use."

    - Perral Road is roughly 10 to 15 miles north of the spreading project. Is it reasonable to consider extractions along Perral Road as extracting water spread at the Palms Project? Does the hydrogeology of the region support such an assertion? Under the project as proposed, if 25,000 acre feet (25KAF) of water are spread at the Palms Project, can 25KAF be extracted 10 to 15 miles north of the project by private pumpers and be attributed to the Palms Project spreading?
- From page 1-5:

    "In order to ensure that water quality will meet DWR requirements, aquifer isolation zone water quality testing will be conducted. The wells will then be designed to collect water from portions of the aquifer with favorable water quality. This method will likely be used during construction of the first few wells and may be discontinued for wells constructed after the local water quality parameters are better understood."

MEMORANDUM

- Does the existing data available from prior Palms Project work support the assertion that recharge at ground surface will recharge the aquifers with favorable water quality mentioned in the passage above?

- The EIR should consider possibly phasing the construction of the project wells, and provide specifics on the phasing plan, if possible.
- The EIR should include some historic and more recent groundwater elevation contour maps to show groundwater flow directions in the region during both dry periods and wet periods.
- Figure 1-1 of the NOP shows that a number of the proposed extraction wells for the Palms project are located outside of (east of) the BVWSD boundary and relatively distant from the area of spreading. This also places the WKWD North Wellfield between the Palms Project recharge area and the recovery wells outside of the BVWSD boundary. During prior meetings, it was mentioned by BVWSD that these wells were to help achieve water quality standard necessary for recovery operations when water was pumped back into the aqueduct. The EIR should specifically analyze the effects of these “distant” extraction wells, and the effects of pumping from these distant wells on groundwater levels and water quality in the area, including the effects on WKWD north wellfield operations.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4005
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 17, 2020

Tim Ashlock
General Manager
Buena Vista Water Storage District
Post Office Box 756
Buttonwillow, California 93206
tim@bvh2o.com

Subject: Palms Groundwater Recovery Project (Project)
Notice of Preparation (NOP)
State Clearinghouse No. 2020060315

Dear Mr. Ashlock:

The California Department of Fish and Wildlife (CDFW) received an NOP for an Environmental Impact Report (EIR) from the Buena Vista Water Storage District (BVWSD), as Lead Agency, for the Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), related authorization as provided by the Fish and Game Code will be required.

CDFW has jurisdiction over fully protected species of birds, mammals, amphibians and reptiles, and fish, pursuant to Fish and Game Code sections 3511, 4700, 5050, and 5515. Take of any fully protected species is prohibited and CDFW cannot authorize their incidental take.

PROJECT DESCRIPTION SUMMARY

Proponent: BVWSD is the Project applicant and Lead Agency for the purpose of CEQA.

Objective: The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County by improving the BVWSD's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies.

- Improve conveyance of previously stored water throughout the BVWSD area and to neighboring districts.

- Provide water for urban use in Kern County and possibly elsewhere.

Project Description: The Project is the construction and replacement of a suite of 14 wells, including nine new wells and five replacement wells. Additionally, conveyance pipelines would be installed to connect these wells to the water delivery system. Construction activities would include excavation and trenching to install the wells, and approximately 11.9 miles of conveyance pipe. The total area of disturbance would be approximately 72 acres. The new and replacement wells would be drilled to a depth of up to 500 feet and include an 18-inch casing. Staging areas for the construction equipment and materials would be adjacent to the Project area on previously disturbed land. The water pipelines will be connected to BVWSD's existing turnout at the

California Aqueduct at BV8, which can be used to either input water to, or withdraw water from, the California Aqueduct.

Location: The Project is located in the BVWSD service area, approximately 4 miles south of the unincorporated community of Buttonwillow, Kern County, California, within Sections 2 to 5, 8 to 11, 14, and 15; Township 30 South; Range 24 East; Mount Diablo Base & Meridian.

Timeframe: Construction activities are expected to begin in the fall of 2020 and be completed within 11 months.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist BVWSD in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the CEQA document.

Aerial imagery of the Project boundary and its surroundings within the Project boundary shows nearby riparian corridors, riparian-lined canal corridors, large trees, Valley saltbush and Great Valley mesquite scrub habitat, upland grassland, and agricultural habitats. Tule Elk State Natural Reserve, managed by the California Department of Parks and Recreation, is located adjacent to the Project boundary. Based on a review of the Project description, a review of California Natural Diversity Database (CNDDB) records, and the surrounding habitat, several special-status species could potentially be impacted by Project activities.

Project-related construction activities within the Project boundary including but not limited to construction and operation of additional water banking facilities and introduction of surface water flows for storage could impact the following special-status plant and wildlife species and habitats known to occur in the area: the State threatened and federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*); the State and federally endangered Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*); the State and federally endangered giant kangaroo rat (*Dipodomys ingens*); the State and federally endangered and State fully protected blunt-nosed leopard lizard (*Gambelia sila*); the State threatened Swainson's hawk (*Buteo swainsoni*), Nelson's antelope squirrel (*Ammospermophilus nelsoni*), and tricolored blackbird (*Agelaius tricolor*); the California Rare Plant Rank (CRPR) 1B.1 alkali-sink goldfields (*Lasthenia chrysantha*), oil nest straw (*Stylocline citroleum*), and slough thistle (*Cirsium crassicaule*); the CRPR 1B.2 recurved larkspur (*Delphinium recurvatum*); and the State species of special concern American badger (*Taxidea taxus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), San Joaquin pocket mouse (*Perognathus inornatus*), burrowing owl

(*Athene cunicularia*), Le Conte's thrasher (*Toxistoma lecontei*), western pond turtle (*Emys marmorata*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), California glossy snake (*Arizona elegans occidentalis*), western spadefoot (*Spea hammondi*), and coast horned lizard (*Phrynosoma blainvillii*).

Please note that the CNDDB is populated by and records voluntary submissions of species detections. As a result, species may be present in locations not depicted in the CNDDB but where there is suitable habitat and features capable of supporting species. Therefore, a lack of an occurrence record in the CNDDB is not tantamount to a negative species finding. In order to adequately assess any potential Project related impacts to biological resources, surveys conducted by a qualified wildlife biologist/botanist during the appropriate survey period(s) and using the appropriate protocol survey methodology are warranted in order to determine whether or not any special-status species are present at or near the Project area.

CDFW recommends that the following modifications and/or edits be incorporated into the EIR.

I. Mitigation Measure or Alternative and Related Impact Shortcoming

Would the Project 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 CDFW or the United States Fish and Wildlife Service (USFWS)?

COMMENT 1: San Joaquin Kit Fox (SJKF)

Issue: SJKF occurrences have been documented within the Project boundary (CDFW 2020a). The Project has the potential to temporarily disturb and permanently alter suitable habitat for SJKF and directly impact individuals if present during construction, recharge, and other activities.

SJKF den in a variety of areas such as rights-of-way, agricultural and fallow or ruderal habitat, dry stream channels, and canal levees, and populations can fluctuate over time. SJKF are also capable of occupying urban environments (Cypher and Frost 1999). SJKF may be attracted to Project areas due to the type and level of ground-disturbing activities and the loose, friable soils resulting from intensive ground disturbance. SJKF will forage in fallow and agricultural fields and utilize streams and canals as dispersal corridors. As a result, there is potential for SJKF to occupy all suitable habitat within the Project boundary and surrounding area.

Specific impact: Without appropriate avoidance and minimization measures for SJKF, potential significant impacts associated with construction include habitat loss, den collapse, inadvertent entrapment, reduced reproductive success, reduction in health and vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from land conversion to agricultural, urban, and industrial development is the primary threat to SJKF (Cypher et al. 2013). Western Kern County supports relatively large areas of high suitability habitat and one of the largest remaining populations of SJKF (Cypher et al. 2013). The Project area is within this remaining highly suitable habitat, which is otherwise intensively managed for agriculture. Therefore, subsequent ground-disturbing activities have the potential to significantly impact local SJKF populations.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SJKF associated with subsequent land conversion, ground disturbance and construction, CDFW recommends conducting the following evaluation of project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 1: SJKF Habitat Assessment

For all Project-specific components including construction and land conversion, CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJKF.

Recommended Mitigation Measure 2: SJKF Surveys and Minimization

CDFW recommends assessing presence/absence of SJKF by having qualified biologists conducting surveys of Project areas and a 500-foot buffer of Project areas to detect SJKF and their sign. CDFW also recommends following the USFWS (2011) “Standardized recommendations for protection of the San Joaquin kit fox prior to and during ground disturbance”.

Recommended Mitigation Measure 3: SJKF Take Authorization

SJKF detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire an Incidental Take Permit (ITP) prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081 subdivision (b).

COMMENT 2: Blunt-nosed Leopard Lizard (BNLL)

Issue: BNLL have been documented in suitable habitat within and adjacent to the Project boundary (CDFW 2020a). Suitable BNLL habitat includes areas of grassland and upland scrub that contain requisite habitat elements, such as small mammal burrows. BNLL also use open space patches between suitable habitats, including disturbed sites, unpaved access roadways, and canals.

Specific impact: Without appropriate avoidance and minimization measures for BNLL, potentially significant impacts associated with ground-disturbing activities include habitat loss, burrow collapse, reduced reproductive success, reduced health and vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss resulting from cultivation, agricultural, urban, industrial development, petroleum and mineral extraction, and construction of communication and irrigation infrastructure is the primary threat to BNLL (ESRP 2020a). The range for BNLL now consists of scattered parcels of undeveloped land within the valley floor and the foothills of the Coast Range (USFWS 1998). Some undeveloped areas with suitable BNLL habitat occur within the Project and surrounding area; therefore, ground disturbance and conversion of suitable habitat has the potential to significantly impact local BNLL populations.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to BNLL associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 4: BNLL Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for BNLL.

Recommended Mitigation Measure 5: BNLL Surveys

If suitable habitat is present, then prior to initiating any vegetation- or ground-disturbance activities, CDFW recommends conducting surveys in accordance with the “Approved Survey Methodology for the Blunt-nosed Leopard Lizard” (CDFW 2019). This survey protocol, designed to optimize BNLL detectability, reasonably assures CDFW that ground disturbance will not result in take of this fully protected species.

CDFW advises that BNLL surveys be completed no more than one year prior to initiation of ground disturbance. Please note that protocol-level surveys must be conducted on multiple dates during late spring, summer, and fall of the same calendar year, and that within these time periods, there are specific protocol-level date, temperature, and time parameters that must be adhered to. As a result, protocol-level surveys for BNLL are not synonymous with 30-day "preconstruction surveys" often recommended for other wildlife species. In addition, the BNLL protocol specifies different survey effort requirements based on whether the disturbance results from maintenance activities or if the disturbance results in habitat removal (CDFW 2019).

Recommended Mitigation Measure 6: BNLL Take Avoidance

BNLL detection during protocol-level surveys warrants consultation with CDFW to discuss whether take of BNLL can be avoided during ground-disturbing Project activities.

COMMENT 3: San Joaquin Antelope Squirrel (SJAS)

Issue: SJAS have been documented to occur within areas of suitable habitat within the Project vicinity (CDFW 2020a). Suitable SJAS habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Specific impact: Without appropriate avoidance and minimization measures for SJAS, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to SJAS. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020b). Areas of suitable habitat within the Project represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of SJAS.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SJAS associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 7: SJAS Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJAS.

Recommended Mitigation Measure 8: SJAS Surveys

In areas of suitable habitat, CDFW recommends that a qualified biologist conduct focused daytime visual surveys for SJAS using line transects with 10- to 30-meter spacing of Project areas and a 50-foot buffer around those areas. CDFW further advises that these surveys be conducted between April 1 and September 20, during daytime temperatures between 68° and 86° F (CDFG 1990a), to maximize detectability.

Recommended Mitigation Measure 9: SJAS Avoidance

If suitable habitat is present and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances until the completion of Project activities.

Recommended Mitigation Measure 10: SJAS Take Authorization

SJAS detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire a State ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081 subdivision (b).

COMMENT 4: Tipton Kangaroo Rat (TKR)

Issue: TKR have been documented to occur within areas of suitable habitat within and adjacent to the Project (CDFW 2020a). Suitable TKR habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Specific impact: Without appropriate avoidance and minimization measures for TKR, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to TKR. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020c). Areas of suitable habitat within the Project represent some of the

only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of TKR.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to TKR associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 11: TKR Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for TKR.

Recommended Mitigation Measure 12: TKR Avoidance

If suitable habitat is present, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances of suitable size for TKR use.

Recommended Mitigation Measure 13: TKR Surveys

If burrow avoidance is not feasible, CDFW recommends that focused protocol-level trapping surveys be conducted by a qualified wildlife biologist that is permitted to do so by both CDFW and USFWS, to determine if TKR occurs in the Project area. CDFW advises that these surveys be conducted in accordance with the USFWS (2013) "Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats," well in advance of ground-disturbing activities in order to determine whether impacts to TKR could occur.

Recommended Mitigation Measure 14: TKR Take Authorization

TKR detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire an ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081 subdivision (b).

COMMENT 5: Giant Kangaroo Rat (GKR)

Issue: GKR have been documented within areas of suitable habitat adjacent to the Project area (CDFW 2020a). Suitable GKR habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Specific impact: Without appropriate avoidance and minimization measures for GKR, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural and petroleum development is the primary threat to GKR. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020d). Areas of suitable habitat within the Project vicinity represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of GKR.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to GKR associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 15: GKR Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for GKR.

Recommended Mitigation Measure 16: GKR Surveys

In areas of suitable habitat, CDFW recommends that a qualified biologist conduct focused daytime visual surveys for GKR using line transects with 10- to 30-meter spacing of Project areas and a 50-foot buffer around those areas. Surveys should focus on the identification of their characteristic habitat types and burrow systems (burrow openings 50 to 55 mm in diameter) (CDFW 1990b).

Recommended Mitigation Measure 17: GKR Avoidance

If suitable habitat is present and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances until the completion of Project activities.

Recommended Mitigation Measure 18: GKR Take Authorization

GKR detection or presence of characteristic habitat or burrow systems warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible,

to acquire an ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081 subdivision (b).

COMMENT 6: Swainson's Hawk (SWHA)

Issue: SWHA have been documented within the Project area. Review of recent aerial imagery indicates that trees capable of supporting nesting SWHA occur along nearby waterways and Tule Elk Reserve. Landscape trees may also provide suitable nesting habitat. In addition, grassland and agricultural land in the surrounding area provide suitable foraging habitat for SWHA, increasing the likelihood of SWHA occurrence within the vicinity.

Specific impact: Without appropriate avoidance and minimization measures for SWHA, potential significant impacts associated with Project activities include loss of forging and/or nesting habitat, nest abandonment, reduced reproductive success, and reduced health and vigor of eggs and/or young.

Evidence impact would be significant: Lack of suitable nesting habitat in the San Joaquin Valley limits the local distribution and abundance of SWHA (CDFW 2016). The trees within the Project represent some of the only remaining suitable nesting habitat in the local vicinity. Depending on the timing of construction, activities including noise, vibration, and movement of workers or equipment could affect nests and have the potential to result in nest abandonment, significantly impacting local nesting SWHA. In addition, agricultural cropping patterns can directly influence distribution and abundance of SWHA. For example, SWHA can forage in grasslands, pasture, hay crops, and low growing irrigated crops; however, other agricultural crops such as orchards and vineyards are incompatible with SWHA foraging (Estep 2009, Swolgaard et al. 2008).

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SWHA associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 19: Focused SWHA Surveys

To evaluate potential Project-related impacts, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting SWHA following the entire survey methodology developed by the SWHA Technical Advisory Committee (SWHA TAC 2000) prior to Project initiation. SWHA detection during protocol-level surveys warrants consultation with CDFW to discuss how to implement Project activities and avoid take.

Recommended Mitigation Measure 20: SWHA Avoidance

CDFW recommends that if Project-specific activities will take place during the SWHA nesting season (i.e., March 1 through August 31), and active SWHA nests are present, a minimum ½-mile no-disturbance buffer be delineated and maintained around each nest, regardless if when it was detected by surveys or incidentally, until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, to prevent nest abandonment and other take of SWHA as a result of Project activities.

Recommended Mitigation Measure 21: Tree Removal

CDFW recommends that the removal of known raptor nest trees, even outside of the nesting season, be replaced with an appropriate native tree species planting at a ratio of 3:1 at or near the Project area or in another area that will be protected in perpetuity. This mitigation would offset the local and temporal impacts of nesting habitat loss.

Recommended Mitigation Measure 22: SWHA Take Authorization

If SWHA are detected and a ½-mile no-disturbance nest buffer is not feasible, consultation with CDFW is warranted to determine if the Project can avoid take. If SWHA take cannot be avoided, issuance of an ITP prior to Project activities is warranted to comply with CESA

COMMENT 7: Tricolored Blackbird (TRBL)

Issue: TRBL are known to occur in the Project vicinity (CDFW 2020a, UC Davis 2020). Review of aerial imagery indicates that the Project boundary includes flood-irrigated agricultural land, which is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2017).

Specific impact: Without appropriate avoidance and minimization measures for TRBL, potential significant impacts associated subsequent development include nesting habitat loss, nest and/or colony abandonment, reduced reproductive success, and reduced health and vigor of eggs and/or young.

Evidence impact would be significant: As mentioned above, flood-irrigated agricultural land is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2014). This nesting substrate is present within the Project vicinity. TRBL aggregate and nest colonially, forming colonies of up to 100,000 nests (Meese et al. 2014). Approximately 86% of the

global population is found in the San Joaquin Valley (Kelsey 2008, Weintraub et al. 2016). In addition, TRBL have been forming larger colonies that contain progressively larger proportions of the species' total population (Kelsey 2008). In 2008, for example, 55% of the species' global population nested in only two colonies, which were located in silage fields (Kelsey 2008). Nesting can occur synchronously, with all eggs laid within one week (Orians 1961). For these reasons, depending on timing, disturbance to nesting colonies can cause nest entire colony site abandonment and loss of all unfledged nests, significantly impacting TRBL populations (Meese et al. 2014).

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to TRBL associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 23: TRBL Surveys

CDFW recommends that construction be timed to avoid the typical bird-breeding season of February 1 through September 15. If Project activity that could disrupt nesting must take place during that time, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting TRBL no more than 10 days prior to the start of implementation to evaluate presence/absence of TRBL nesting colonies in proximity to Project activities and to evaluate potential Project-related impacts.

Recommended Mitigation Measure 24: TRBL Colony Avoidance

If an active TRBL nesting colony is found during preconstruction surveys, CDFW recommends implementation of a minimum 300-foot no-disturbance buffer, in accordance with CDFW's "Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015" (CDFW 2015), until the breeding season has ended or until a qualified biologist has determined that nesting has ceased and the young have fledged and are no longer reliant upon the colony or parental care for survival. It is important to note that TRBL colonies can expand over time and for this reason, CDFW recommends that an active colony be reassessed to determine its extent within 10 days prior to Project initiation.

Recommended Mitigation Measure 25: TRBL Take Authorization

In the event that a TRBL nesting colony is detected during surveys, consultation with CDFW is warranted to discuss whether the Project can avoid take; if take avoidance is not feasible, to acquire an ITP, pursuant to Fish and Game Code section 2081 subdivision (b), prior to any Project activities.

COMMENT 8: Special-Status Plants

Issue: Special-status plant species meeting the definition of rare or endangered under CEQA section 15380 are known to occur within the Project and surrounding area. Alkali-sink goldfields, oil nest straw, slough thistle, and recurved larkspur have been documented within the Project area.

Specific impact: Without appropriate avoidance and minimization measures for special-status plants, potential significant impacts associated with subsequent construction include loss of habitat, loss or reduction of productivity, and direct mortality.

Evidence impact would be significant: Alkali-sink goldfields, oil nest straw, slough thistle, recurved larkspur, and many other special-status plant species are threatened by grazing and agricultural, urban, and energy development. Many historical occurrences of these species are presumed extirpated (CNPS 2019). Though new populations have recently been discovered, impacts to existing populations have the potential to significantly impact populations of plant species.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to special-status plants associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 26: Special-Status Plant Surveys

CDFW recommends that individual Project sites be surveyed for special-status plants by a qualified botanist following the “Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities” (CDFG 2018b). This protocol, which is intended to maximize detectability, includes the identification of reference populations to facilitate the likelihood of field investigations occurring during the appropriate floristic period.

Recommended Mitigation Measure 27: Special-Status Plant Avoidance

CDFW recommends that special-status plant species be avoided whenever possible by delineating and observing a no-disturbance buffer of at least 50 feet from the outer edge of the plant population(s) or specific habitat type(s) required by special-status plant species. If buffers cannot be maintained, then consultation with CDFW may be warranted to determine appropriate minimization and mitigation measures for impacts to special-status plant species.

Recommended Mitigation Measure 28: Listed Plant Species Take Authorization

If a State-listed plant species is identified during botanical surveys, consultation with CDFW is warranted to determine if the Project can avoid take. If take cannot be avoided, take authorization is warranted. Take authorization would occur through issuance of an ITP, pursuant to Fish and Game Code section 2081 subdivision (b).

COMMENT 9: Burrowing Owl (BUOW)

Issue: BUOW occur within and in the vicinity of the Project (CDFW 2020a). BUOW inhabit open grassland containing small mammal burrows, a requisite habitat feature used by BUOW for nesting and cover. Habitat both within and surrounding the Project supports grassland habitat. Therefore, there is potential for BUOW to occupy or colonize the Project.

Specific impact: Potentially significant direct impacts associated with subsequent activities and land conversion include habitat loss, burrow collapse, inadvertent entrapment, nest abandonment, reduced reproductive success, reduction in health and vigor of eggs and/or young, and direct mortality of individuals.

Evidence impact is potentially significant: BUOW rely on burrow habitat year-round for their survival and reproduction. Habitat loss and degradation are considered the greatest threats to BUOW in California's Central Valley (Gervais et al. 2008). The Project and surrounding area contain remnant undeveloped land but is otherwise intensively managed for agriculture; therefore, subsequent ground-disturbing activities associated with subsequent constructions have the potential to significantly impact local BUOW populations. In addition, and as described in CDFW's "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), excluding and/or evicting BUOW from their burrows is considered a potentially significant impact under CEQA.

Recommended Potentially Feasible Mitigation Measure(s) (Regarding Environmental Setting and Related Impact)
To evaluate potential impacts to BUOW associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 29: BUOW Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its vicinity contains suitable habitat for BUOW.

Attachment 1

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
RECOMMENDED MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

PROJECT: Palms Groundwater Recovery Project

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Before Disturbing Soil or Vegetation	
Recommended Mitigation Measure 1: SJKF Habitat Assessment	
Recommended Mitigation Measure 2: SJKF Surveys and Minimization	
Recommended Mitigation Measure 3: SJKF Take Authorization	
Recommended Mitigation Measure 4: BNLL Habitat Assessment	
Recommended Mitigation Measure 5: BNLL Surveys	
Recommended Mitigation Measure 7: SJAS Habitat Assessment	
Recommended Mitigation Measure 8: SJAS Surveys	
Recommended Mitigation Measure 10: SJAS Take Authorization	
Recommended Mitigation Measure 11: TKR Habitat Assessment	
Recommended Mitigation Measure 13: TKR Surveys	
Recommended Mitigation Measure 14: TKR Take Authorization	
Recommended Mitigation Measure 15: GKR Habitat Assessment	
Recommended Mitigation Measure 16: GKR Surveys	
Recommended Mitigation Measure 18: GKR Take Authorization	
Recommended Mitigation Measure 19: Focused SWHA Surveys	
Recommended Mitigation Measure 21: Tree Removal	
Recommended Mitigation Measure 22: SWHA Take Authorization	

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Recommended Mitigation Measure 23: TRBL Surveys	
Recommended Mitigation Measure 25: TRBL Take Authorization	
Recommended Mitigation Measure 26: Special-Status Plant Surveys	
Recommended Mitigation Measure 28: Listed Plant Species Take Authorization	
Recommended Mitigation Measure 29: BUOW Habitat Assessment	
Recommended Mitigation Measure 30: BUOW Surveys	
Recommended Mitigation Measure 32: BUOW Passive Relocation and Mitigation	
Recommended Mitigation Measure 33: Habitat Assessment (Other Species of Special Concern)	
Recommended Mitigation Measure 34: Surveys (Other Species of Special Concern)	
Recommended Mitigation Measure 36: Stream and Wetland Mapping	
Recommended Mitigation Measure 37: Stream and Wetland Habitat Mitigation	
During Construction	
Recommended Mitigation Measure 6: BNLL Take Avoidance	
Recommended Mitigation Measure 9: SJAS Avoidance	
Recommended Mitigation Measure 12: TKR Avoidance	
Recommended Mitigation Measure 17: GKR Avoidance	
Recommended Mitigation Measure 20: SWHA Avoidance	
Recommended Mitigation Measure 24: TRBL Colony Avoidance	
Recommended Mitigation Measure 27: Special-Status Plant Avoidance	
Recommended Mitigation Measure 31: BUOW Avoidance	

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Recommended Mitigation Measure 35: Avoidance (Other Species of Special Concern)	

Recommended Mitigation Measure 30: BUOW Surveys

If suitable habitat is present on or in the vicinity of the Project area, CDFW recommends assessing presence or absence of BUOW by having a qualified biologist conduct surveys following the California Burrowing Owl Consortium's "Burrowing Owl Survey Protocol and Mitigation Guidelines" (CBOC 1993) and the "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), which suggest three or more surveillance surveys conducted during daylight with each visit occurring at least three weeks apart during the peak breeding season (i.e., April 15 to July 15), when BUOW are most detectable. In addition, CDFW advises that surveys include a minimum 500-foot buffer area around the Project area.

Recommended Mitigation Measure 31: BUOW Avoidance

CDFW recommends that no-disturbance buffers, as outlined in the "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), be implemented prior to and during any ground-disturbing activities. Specifically, CDFW's Staff Report recommends that impacts to occupied burrows be avoided in accordance with the following table unless a qualified biologist approved by CDFW verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1-Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting sites	Oct 16-Mar 31	50 m	100 m	500 m

* meters (m)

Recommended Mitigation Measure 32: BUOW Passive Relocation and Mitigation

If BUOW are found within these recommended buffers and avoidance is not possible, it is important to note that according to the Staff Report (CDFG 2012), excluding birds from burrows is not a take avoidance, minimization, or mitigation method and is instead considered a potentially significant impact under CEQA. If it is necessary for Project implementation, CDFW recommends that burrow exclusion be conducted by qualified biologists and only during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirmed empty through non-invasive methods, such as surveillance. CDFW recommends replacement of occupied burrows with artificial burrows at a ratio of one burrow

collapsed to one artificial burrow constructed (1:1) to mitigate for evicting BUOW and the loss of burrows. BUOW may attempt to colonize or re-colonize an area that will be impacted; thus, CDFW recommends ongoing surveillance at a rate that is sufficient to detect BUOW if they return.

COMMENT 10: Other State Species of Special Concern

Issue: Tulare grasshopper mouse, San Joaquin pocket mouse, San Joaquin coachwhip, western spadefoot, coast horned lizard, California glossy snake, Le Conte's thrasher, and American badger can inhabit grassland and upland scrub habitats (Shuford and Gardali 2008, Thomson et al. 2016). All the species mentioned above have been documented to occur in the vicinity of the Project, which supports requisite habitat elements for these species (CDFW 2020a).

Specific impact: Without appropriate avoidance and minimization measures for these species, potentially significant impacts associated with ground disturbance include habitat loss, nest/den/burrow abandonment, which may result in reduced health or vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss threatens all of the species mentioned above (Thomson et al. 2016). Habitat within and adjacent to the Project represents some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-and vegetation-disturbing activities associated with development of the Project have the potential to significantly impact local populations of these species.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to special-status species associated with subsequent development, CDFW recommends conducting the following evaluation of project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 33: Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if project areas or their immediate vicinity contain suitable habitat for the species mentioned above.

Recommended Mitigation Measure 34: Surveys

If suitable habitat is present, CDFW recommends that a qualified biologist conduct focused surveys for applicable species and their requisite habitat features to evaluate potential impacts resulting from ground and vegetation disturbance.

Recommended Mitigation Measure 35: Avoidance

Avoidance whenever possible is encouraged via delineation and observance a 50-foot no-disturbance buffer around dens of mammals like the American badger as well as the entrances of burrows that can provide refuge for small mammals, reptiles, and amphibians.

Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS?

COMMENT 11: Wetland and Riparian Habitats

Issue: The Project area is in the immediate vicinity of numerous waterways, riparian and wetland areas. Development within the Project has the potential to involve temporary and permanent impacts to these features.

Specific impact: Project activities have the potential to result in the loss of riparian and wetland vegetation, in addition to the degradation of wetland and riparian areas through grading, fill, and related development.

Evidence impact is potentially significant: The Project vicinity includes stream and wetland features within an agricultural landscape that also maintains undeveloped habitats. Riparian and associated floodplain and wetland areas are valuable for their ecosystem processes such as protecting water quality by filtering pollutants and transforming nutrients; stabilizing stream banks to prevent erosion and sedimentation/siltation; and dissipating flow energy during flood conditions, thereby spreading the volume of surface water, reducing peak flows downstream, and increasing the duration of low flows by slowly releasing stored water into the channel through subsurface flow. Within the San Joaquin Valley, modifications of streams to accommodate human uses has resulted in damming, canalizing, and channelizing of many streams, though some natural stream channels and small wetland or wetted areas remain (Edminster 2002). The Fish and Game Commission policy regarding wetland resources discourages development or conversion of wetlands that results in any net loss of wetland acreage or habitat value. Construction activities within these features also has the potential to impact downstream waters as a result of Project site impacts leading to erosion, scour, and changes in stream morphology.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to wetland and riparian habitats associated with subsequent development, CDFW recommends conducting the following evaluation of project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 36: Stream and Wetland Mapping

CDFW recommends that formal stream mapping and wetland delineation be conducted by a qualified biologist or hydrologist, as warranted, to determine the baseline location, extent, and condition of streams (including any floodplain) and wetlands within and adjacent to the Project area. Please note that while there is overlap, State and Federal definitions of wetlands differ, and complete stream mapping commonly differs from delineations used by the United States (U.S.) Army Corps of Engineers specifically to identify the extent of Waters of the U.S. Therefore, it is advised that the wetland delineation identify both State and Federal wetlands in the Project area as well as the extent of all streams including floodplains, if present, within the Project area. CDFW advises that site map(s) depicting the extent of any activities that may affect wetlands, lakes, or streams be included with any Project site evaluations, to clearly identify areas where stream/riparian and wetland habitats could be impacted from Project activities.

Recommended Mitigation Measure 37: Stream and Wetland Habitat Mitigation

CDFW recommends that the potential direct and indirect impacts to stream/riparian and wetland habitat be analyzed according to each Project activity. Based on those potential impacts, CDFW recommends that the EIR include measures to avoid, minimize, and/or mitigate those impacts. CDFW recommends that impacts to riparian habitat (i.e., biotic and abiotic features) take into account the effects to stream function and hydrology from riparian habitat loss or damage, as well as potential effects from the loss of riparian habitat to special-status species already identified herein. CDFW recommends that any losses to stream and wetland habitats be offset with corresponding riparian and wetland habitat restoration incorporating native vegetation to replace the value to fish and wildlife provided by the habitats lost from Project implementation. If on-site restoration to replace habitats is not feasible, CDFW recommends offsite mitigation by restoring or enhancing in-kind riparian or wetland habitat and providing for the long-term management and protection of the mitigation area, to ensure its persistence.

Editorial Comments and/or Suggestions

Federally Listed Species: CDFW recommends consulting with USFWS regarding potential impacts to federally listed species. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. Consultation with the USFWS in order to comply with FESA is advised well in advance of any Project activities.

Lake and Streambed Alteration: Project activities have the potential to substantially change the bed, bank, and channel of lakes, streams, and associated wetlands onsite and/or substantially extract or divert the flow of any such feature that is subject to CDFW's regulatory authority pursuant Fish and Game Code section 1600 et seq. Fish and Game Code section 1602 requires an entity to notify CDFW prior to commencing any activity that may (a) substantially divert or obstruct the natural flow of any river, stream, or lake; (b) substantially change or use any material from the bed, bank, or channel of any river, stream, or lake (including the removal of riparian vegetation): (c) deposit debris, waste or other materials that could pass into any river, stream, or lake. "Any river, stream, or lake" includes those that are ephemeral or intermittent as well as those that are perennial.

CDFW is required to comply with CEQA in the issuance of a Lake or Streambed Alteration Agreement (LSAA); therefore, if the CEQA document approved for the Project does not adequately describe the Project and its impacts to lakes or streams, a subsequent CEQA analysis may be necessary for LSAA issuance. For information on notification requirements, please refer to CDFW's website (https://wildlife.ca.gov/Conservation/LSA) or contact CDFW staff in the Central Region Lake and Streambed Alteration Program at (559) 243-4593.

Nesting Birds: CDFW has jurisdiction over actions with potential to result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections that protect birds, their eggs and nests include sections 3503 (regarding unlawful take, possession or needless destruction of the nest or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird).

CDFW encourages Project implementation to occur during the bird non-nesting season; however, if Project activities must occur during the breeding season (i.e., February through mid-September), the Project applicant is responsible for ensuring that implementation of the Project does not result in violation of the Migratory Bird Treaty Act or relevant Fish and Game Codes as referenced above.

To evaluate Project-related impacts on nesting birds, CDFW recommends that a qualified wildlife biologist conduct pre-activity surveys for active nests no more than 10 days prior to the start of ground disturbance to maximize the probability that nests that could potentially be impacted by the Project are detected. CDFW also recommends that surveys cover a sufficient area around the work site to identify nests and determine their status. A sufficient area means any area potentially affected by a project. In addition to direct impacts (i.e., nest destruction), noise, vibration, and movement of workers or equipment could also affect nests. Prior to initiation of construction activities, CDFW recommends that a qualified biologist conduct a survey to establish a behavioral baseline of all identified nests. Once construction begins, CDFW

recommends that a qualified biologist continuously monitor nests to detect behavioral changes resulting from the project. If behavioral changes occur, CDFW recommends that the work causing that change cease and CDFW be consulted for additional avoidance and minimization measures.

If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, CDFW recommends a minimum no-disturbance buffer of 250 feet around active nests of non-listed bird species and a 500-foot no-disturbance buffer around active nests of non-listed raptors. These buffers are advised to remain in place until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. Variance from these no-disturbance buffers is possible when there is compelling biological or ecological reason to do so, such as when the construction area would be concealed from a nest site by topography. CDFW recommends that a qualified wildlife biologist advise and support any variance from these buffers and notify CDFW in advance of implementing a variance.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database, which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to the CNDDB. The CNNDB field survey form can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDB_FieldSurveyForm.pdf. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist BVWSD in identifying and mitigating Project impacts on biological resources.

If you have questions regarding these comments, please contact Annette Tenneboe, Senior Environmental Scientist (Specialist), at the address on this letterhead, by phone at (559) 243-4014 extension 231, or by email at Annette.Tenneboe@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Julie Vance
FA83F09FE08945A...

Julie A. Vance
Regional Manager

Attachment 1

ec: Office of Planning and Research
State Clearinghouse
state.clearinghouse.opr.ca.gov

Craig Bailey
Annette Tenneboe
California Department of Fish and Wildlife

REFERENCES

California Burrowing Owl Consortium (CBOC). 1993. Burrowing owl survey protocol and mitigation guidelines. Pages 171-177 *in* Lincer, J. L. and K. Steenhof (editors). 1993. The burrowing owl, its biology and management. Raptor Research Report Number 9.

California Department of Fish and Game (CDFG). 1990a. Approved Survey Methodologies for Sensitive Species. San Joaquin Antelope Squirrel, *Ammospermophilus nelsoni*. California Department of Fish and Game, Region 4.

CDFG. 1990b. Approved Survey Methodologies for Sensitive Species. Giant Kangaroo Rat, *Dipodomys ingens* California Department of Fish and Game, Region 4.

CDFG. 2012. Staff Report on Burrowing Owl Mitigation. California Department of Fish and Game. March 7, 2012.

California Department of Fish and Wildlife (CDFW). 2015. Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015. March 19, 2015.

CDFW. 2016. Status Review on Swainson's Hawk (*Buteo swainsoni*) in California. California Department of Fish and Wildlife. April 11, 2016.

CDFW. 2020a. Biogeographic Information and Observation System (BIOS). https://www.wildlife.ca.gov/Data/BIOS. Accessed July 9, 2020.

CDFW. 2018b. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. California Department of Fish and Wildlife. March 20, 2018.

CDFW. 2019. Approved Survey Methodology for the Blunt-Nosed Leopard Lizard. California Department of Fish and Wildlife, October 2019 (Revised)

California Native Plant Society (CNPS). 2019. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org. July 6, 2020.

Cypher, B. and N. Frost. 1999. Condition of San Joaquin kit foxes in urban and exurban habitats. Journal of Wildlife Management 63: 930-938.

Cypher, B.L., S.E. Phillips, and P.A. Kelly. 2013. Quantity and distribution of suitable habitat for endangered San Joaquin kit foxes: conservation implications. Canid Biology & Conservation 16(7): 25-31. http://www.canids.org/CBC/16/San_Joaquin_kit_fox_habitat_suitability.pdf

Edminster, R.J. 2002. Streams of the San Joaquin. Second Edition. Quercus Publications, Los Banos, California.

Endangered Species Recovery Program (ESRP). 2020a. Blunt-nosed leopard lizard. http://esrp.csustan.edu/speciesprofiles/profile.php?sp=gasi . Accessed July 10, 2020.

ESRP. 2020b. San Joaquin antelope squirrel. http://esrp.csustan.edu/speciesprofiles/profile.php?sp=amne . Accessed July 10, 2020.

ESRP. 2020c. Tipton kangaroo rat. https://esrp.csustan.edu/speciesprofiles/profile.php?sp=dinin. Accessed July 10, 2020.

ESRP. 2020d. Giant kangaroo rat. https://esrp.csustan.edu/speciesprofiles/profile.php?sp=diin. Accessed July 9, 2020.

Estep, J. 2009. The influence of vegetation structure on Swainson's hawk (*Buteo swainsoni*) foraging habitat suitability in Yolo County, California. Prepared for the Yolo Natural Heritage Program, Woodland, CA.

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. 2008. Burrowing Owl (*Athene cunicularia*) *In* California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California (W. D. Shuford and T. Gardali, editors). Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Kelsey, R. 2008. Results of the tricolored blackbird 2008 census. Report submitted to U.S. Fish and Wildlife Service, Portland, OR, USA.

Meese, R. J., E. C. Beedy, and W. J. Hamilton, III. 2014. Tricolored blackbird (*Agelaius tricolor*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna-org.bnaproxy.birds.cornell.edu/Species-Account/bna/species/tribla. Accessed December 15, 2017.

Meese, R. J. 2017. Results of the 2017 Tricolored Blackbird Statewide Survey. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report 2017-04, Sacramento, CA. 27 pp. + appendices.

Orians, G. H. 1961. The ecology of blackbird (*Agelaius*) social systems. Ecological Monographs 31(3): 285–312.

Shuford, W. D. and T. Gardali (editors). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Published by Western Field Ornithologists and California Department of Fish and Game.

SWHA TAC. 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the Central Valley of California. Swainson's Hawk Technical Advisory Committee. May 31, 2000.

Swolgaard, C. A, K. A. Reeves, and D. A. Bell. 2008. Foraging by Swainson's Hawks in a Vineyard-Dominated Landscape. Journal of Raptor Research 42(3), 188-196. https://doi.org/10.3356/JRR-07-15.1

Thomson, R. C., A. N. Wright, and H. B. Shaffer. 2016. California Amphibian and Reptile Species of Special Concern. California Department of Fish and Wildlife and University of California Press: 84-92.

University of California, Davis (UC Davis). 2020. Tricolored blackbird portal. https://tricolor.ice.ucdavis.edu/. Accessed May 1, 2020.

United States Fish and Wildlife Service (USFWS). 1998. Blunt-nosed leopard lizard *In* Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

USFWS. 2011. Standard Recommendations for the Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance. United States Fish and Wildlife Service. January 2011.

USFWS. 2013. Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats. United States Fish and Wildlife Service. March 2013.

Weintraub, K., T. L. George, and S. J. Dinsmore. 2016. Nest survival of tricolored blackbirds in California's Central Valley. The Condor 118(4): 850–861.

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

July 16, 2020

Mr. Tim Ashlock
Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, California 93206

SCH# 2020060315, Notice of Preparation and Initial Study for the Palms Groundwater Recovery Project EIR

Dear Mr. Ashlock:

The California Department of Water Resources (DWR) State Water Project Analysis Office (SWPAO) and Division of Operations and Maintenance (O&M) have reviewed the Buena Vista Water Storage District's Notice of Preparation and Initial Study for the proposed Palms Groundwater Recovery Project (Recovery Project) and have the following comments. DWR is providing these comments pursuant to DWR's regulatory responsibilities under Cal. Code Regs. Tit. 23, § 600 et seq. and Cal. Code Regs. Tit. 14, § 15096.

Project Description

The Buena Vista Water Storage District (BVWSD) has a conjunctive management which includes groundwater recharge and groundwater water banking. The Recovery Project would extract water banked within the District, including but not limited to water recharged in District canals and the Palms Groundwater Banking Project (Palms Project). The extracted water would be distributed to BVWSD water users, exchanged with other water districts or sold to industrial or municipal users. The Recovery Project may discharge water into the California Aqueduct.

The Recovery Project would construct nine new wells, replace five existing wells and construct conveyance pipes. The new and replacement wells would be drilled to a depth of up to 500-feet and include an 18-inch casing. Approximately 11.9 miles of conveyance pipe would be installed to connect the new and replacement wells to the BVWSD's existing turnout at the California Aqueduct at BV8.

Specific Comments

1.4.2 Project Facilities and Construction

Section 1.4.2 states, "[t]he water pipelines will connect to the District's existing turnout at the California Aqueduct at BV8. BV8 can be used to either input water to the Aqueduct or to withdraw water from the Aqueduct."

According to DWR records, the BV-8 turnout is not currently a turn-in, therefore it is not able to input water. The EIR needs to provide supporting evidence that the current BV-8 turnout is a turn-in/turnout. If the Recovery Project needs to modify BV-8 to a turn-in/turnout, that action needs to be added to the Project Facilities and Construction section. In addition, BVWSD will need permission from DWR to make any such modifications.

1.5 AGENCY REVIEW AND APPROVALS

The Recovery Project may require multiple approvals from DWR. If a modification at turnout at the California Aqueduct at BV8, BVWSD will need permission from DWR to make the modification. In addition, as the NOP/IS indicates, DWR approval is required to pump into the California Aqueduct. This is accomplished through a turnout agreement which must be executed prior to connecting the proposed wells to the SWP.

2.7 Geology and Soils and 2.71 Environmental Setting

The NOP/IS states that subsidence which impacts infrastructure in the Recovery Project area has not been observed. The Recovery Project is within Basin 5-022 and the Buena Vista Groundwater Sustainability Agency (BVGSA) jurisdiction. The Sustainable Groundwater Management Act (SGMA) classifies Basin 5-022 as critically over drafted.

The NOP/IS subsidence analysis focuses on the extraction wells, explaining that because the BVGSA discourages groundwater extraction from beneath E-clay, recovery wells constructed as part of the Recovery Project will not be constructed below the E-clay. The analysis concludes, "[g]iven that the range of groundwater elevations expected during implementation of the Recovery Project will be within the range of elevations that has been experienced in the past, the risk of subsidence which result in damage to infrastructure is less-than-significant and these topics will not be evaluated further in the EIR."

DWR finds the subsidence evaluation in the NOP/IS inadequate for our responsible agency purposes. DWR requests the EIR include a Geology and Soils section which includes the reports and analysis which are the basis for the conclusion that, due to the project design feature where recovery wells would not be constructed below the E-clay, the risk of subsidence in Basin 5-022 is less than significant.

Please provide DWR with a copy of any subsequent project environmental or other documentation when it becomes available for public review by sending the document to:

Pedro Villalobos, Chief
State Water Project Analysis Office
Department of Water Resources
1416 Ninth Street, Suite 1620
Sacramento, California 95814

and

Donald Walker, Chief
Project Management
Operations and Maintenance Division
Department of Water Resources
1416 Ninth Street, Room 641-3
Sacramento, California 95814

Thank you for the opportunity to comment on the project. If you have any questions, please contact Pedro Villalobos at (916) 653-4313 or Pedro.Villalobos@water.ca.gov.

Sincerely,

nancy finch

Nancy Finch
Senior Attorney
Office of the Chief Counsel
Department of Water Resources
1416 Ninth Street, Room 1118
Sacramento, California 95814
Phone (916) 653-6840
Fax (916) 653-0952
Nancy.Finch@water.ca.gov

bcc: Lincoln King
Terri Ely
Shannon McDaniel
Scott Williams
Tamee Yokota
Casey Pancaro

July 16, 2020

50 - Environmental

Mr. Tim Ashlock
Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206

Re: Notice of Preparation for an Environmental Impact Report for the Palms Groundwater Recovery Project

Dear Mr. Ashlock:

The Kern County Water Agency (Agency) would like to thank you for the opportunity to review and comment on the Notice of Preparation for an Environmental Impact Report (EIR) for the Palms Groundwater Recovery Project (Project).

The Agency was created by the California State Legislature in 1961 to contract with the California Department of Water Resources (DWR) for State Water Project (SWP) water. The Agency has contracts with water districts throughout Kern County to deliver SWP water. The Agency also manages and/or is a participant in multiple groundwater banking projects, including the Kern Water Bank, Pioneer Property and Berrenda Mesa banking projects. Therefore, the Agency is uniquely qualified to provide comments on the Project.

The Agency is generally supportive of projects that seek to improve the water supply and reliability of Kern County water users. However, the proposed Project has the potential to significantly impact other water users within Kern County.

Comment 1: Use of turnout BV-8 as a turn-in will require new agreements between the Agency, Buena Vista Water Storage District and DWR.

Buena Vista Water Storage District's (Buena Vista) existing turnout BV-8 may only withdraw water from the California Aqueduct (Aqueduct). Any use of BV-8 as a turn-in to pump water into the Aqueduct will require new agreements between the Agency, Buena Vista and DWR.

Comment 2: The EIR should include an impact analysis for all proposed recovery wells.

In the Notice of Preparation, Buena Vista relies upon the Buena Vista Groundwater Sustainability Agency's Groundwater Sustainability Plan (GSP) to conclude that the

(661) 634-1400

Mailing Address
P.O. Box 58
Bakersfield, CA 93302-0058

Street Address
3200 Rio Mirada Drive
Bakersfield, CA 93308

Project recovery wells will have a less-than-significant impact and require no further analysis (p. 2-25). The GSP does not specifically address monitoring impacts for the Project and is too general to rely upon for subsidence monitoring along the Aqueduct. Therefore, the EIR should include an impact analysis for the Project's proposed recovery wells.

If you have any questions, please contact Monica Tennant of my staff at (661) 634-1419.

Sincerely,

Holly Melton
Water Resources Manager

KERN WATER BANK AUTHORITY

July 15, 2020

Tim Ashlock, General Manager
Buena Vista Water Storage District
P.O. Box 756
Buttonwillow, CA 93206
(661) 324-1101
tim@bvh20.com

Subject: Notice of Preparation and Initial Study of an Environmental Impact Report and Public Scoping Meeting for the Palms Groundwater Recovery Project

Dear Mr. Ashlock:

The Kern Water Bank Authority (KWBA) appreciates the opportunity to provide comments on the Notice of Preparation and Initial Study of an Environmental Impact Report and Public Scoping Meeting (NOP/IS) for the Palms Groundwater Recovery Project (Project). The project description states, in part, that: "In order to extract water banked within the District, including but not limited to water recharged in District canals and the Palms Project, the District would utilize a suite of 14 wells: nine proposed new wells and five replacement wells..." The new and replacement wells would be drilled to a depth of up to 500 feet. Conveyance pipes would be installed to connect new and replacement wells for the Project water delivery system to the District's existing turnout at the California Aqueduct at BV8. The maximum amount of water to be recovered per year is 25,000 acre-feet.

Pursuant to California Environmental Quality Act Guidelines section 15082, the NOP must provide "sufficient information describing the project and the potential environmental effects to enable the responsible agencies to make a meaningful response" including "[p]robable environmental effects of the project." Some of the information that will be necessary for the KWBA to evaluate the Project includes:

- Additional discussion and analysis of the Project's operations. The Project description lacks important details regarding the scope and impact of the proposed recharge and recovery operations. For example, the description states that water extracted pursuant to the Project is not limited to water recharged in the Palms project but instead it may include water recharged in District canals and at other unknown locations. The EIR must specify operationally where and when all water intended for extraction pursuant to the Project was recharged, banked, and the hydrologic connectivity between those points and recovery under the Project. This information must be provided in conjunction with prior CEQA analyses associated with those recharge activities, and must provide a

complete analysis of the impacts from recovering water that was not recharged in the vicinity of the Project's recovery wells.

- An analysis of the Project's proposed complete recovery operations including reliance upon recovery of water outside the District needed to blend with the poor-quality water recovered within the District. In recent discussions regarding the Project, District personnel have indicated Buena Vista has purchased land outside the District to recover better quality groundwater to blend with poorer quality groundwater within the District so that water quality standards for delivering water to the California Aqueduct could be met. However, the Project does not include recharging any water in the vicinity of the out-of-District wells. The EIR should provide an analysis of this proposed unbalanced recovery arrangement with respect to groundwater levels, groundwater quality, and SGMA sustainability goals, especially with respect to the out-of-District lands.
- Proposed Project operations will include an "alternative delivery option" wherein District landowners would pump groundwater for irrigation needs and forego District surface water deliveries. The pumped groundwater would be "treated as recovered water, leaving a similar amount of water (SWP, Kern River, or other water) available for a different beneficial use." The EIR should provide analysis regarding the hydrologic connectivity between landowners deemed eligible for this alternative delivery option—which Buena Vista has determined include landowners up to 12 miles away from the Project (Perral Road)—and the Project's stored water supply. The EIR should further provide clear examples of how water under this delivery arrangement would be accounted, including how Buena Vista's rights to surface water are impacted by such reductions in surface water deliveries.
- An analysis of the cumulative groundwater impacts of all existing and reasonably foreseeable probable future projects. This should consider the cumulative impacts of Buena Vista's groundwater recharge, storage, recovery and sales programs, including information and analysis regarding the ability of Buena Vista to meet both the demands of the district's landowners as well as all banking and sales obligations. This analysis should evaluate a worst-case scenario wherein Buena Vista is required to meet all current and expected obligations during a multi-year drought, including evaluation of groundwater level changes resulting from cumulative pumping, Project pumping, and landowner groundwater pumping. The analysis should also include the adjoining banking programs.
- Information on the Project's proposed plans to monitor groundwater levels and quality, including the sampling of recovery well quality, the installation and monitoring of dedicated monitoring wells for both groundwater levels and quality, and the development of a monitoring plan.
- Detailed historic information on groundwater levels and quality throughout the District and in the Project area to substantiate any analyses provided in the EIR.
- An analysis of the cumulative effects the Project may have on existing groundwater recovery and pump-in programs especially with respect to water quality and deliveries to the California Aqueduct.

- Information regarding the Project's total cumulative annual recovery limits, as the NOP/IS indicates that no more than 25,000 acre-feet will be recovery while also suggesting that another 25,000 acre-feet will be recovered under the "alternative delivery option" by which landowners in certain portions of the District merely pump groundwater from their own wells.
- Information regarding the undefined term "the District's Kern River Water Supply," including the specific quantity of water relied upon by the District under this alleged right, the basis of the right, and any and all limitations of this right.
- Information regarding the likely sources of surface water to be recharged at the Project, and analysis of the impacts of utilization of those surface water sources, including long term water-supply considerations. The NOP/IS provides that up to 100,000 acre-feet of water will be recharged by related Project facilities, and that up to 25,000 acre-feet will be recovered for use by District landowners for sale to municipal and industrial water users out of the region. Detailed information on water sources for the Project including information regarding the underlying water right(s) or contract(s) relied upon is required, particularly with respect to water that may be sold or otherwise provided to others. The NOP/IS's refusal to specifically identify useful information water resources necessarily relied upon by and for the Project is insufficient under *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412.
- A detailed analysis of the conveyance facilities anticipated to be used for the project, including offsite facilities, especially with respect to existing agreements and/or rights of way and the impacts any anticipated deliveries may have on other projects.
- A draft MOU for the operation of the project.

Finally, and perhaps most importantly, the Department of Water Resources developed mitigation measures to reduce or otherwise mitigate impacts, including cumulative effects, from the Kern Water Bank and other water banking programs on the Kern Fan to less than significant (see attached). KWBA would expect the Project to consider, adopt and implement substantially similar measures for the Project.

Thank you for the opportunity to provide input for your proposed EIR. Please call if you have any questions.

Sincerely,
Kern Water Bank Authority,

Jonathan D. Parker,
General Manager

cc: KWBA Board of Directors

Mitigation Measures for KWBA Resolution

7.1-2 *KWBA will establish a program that meets the following requirements in accordance with the Long-Term Project Recovery Operations Plan regarding Kern Water Bank Project (2016 KWB Long-Term Operations Plan, Attachment A):*

A. *Monitor and Report Groundwater Conditions to KWBA's Board of Directors and the Public*

1) *KWBA will monitor groundwater levels monthly, except during periods of no recovery when monitoring will occur at least quarterly. KWBA may rely on monitoring conducted by the Kern Fan Monitoring Committee to meet these requirements.*

2) *KWBA will report current groundwater levels to its Board of Directors at each monthly regular meeting, and will make the reports available to the public on its website (http://www.kwb.org/).*

3) *KWBA will regularly update its Groundwater Model (Model) to actual conditions and use the Model to project future groundwater conditions. KWBA will endeavor to use the best practicable science and latest information available in all modeling and technical matters. KWBA will report the results of its modeling to its Board of Directors and will make the results available to the public on its website (http://www.kwb.org/). Recovery of banked groundwater in any calendar year beyond March 15 of that year shall not commence (or continue) until the Model has been run for projected KWB operations and the results have been reported to* KWBA's Board of Directors and made available to the public*. Model data for a preceding year becomes available at different times in the following year. Modeling at the beginning of any given year will necessitate estimating certain model input data for the preceding year (e.g., Kern River losses). These estimates will be replaced with actual data at regular intervals when the model is updated.*

B. *Implement Proactive Measures (in addition to A above)*

1) *KWBA will use its Model as a tool to evaluate potential groundwater impacts resulting from its project operations. The Model will be periodically run and updated as projected recovery plans become known or changed and the Model will assume such conditions as described in A.3.*

2) *The Model will be used to:*

a) *Forecast groundwater levels.*

b) *Forecast and predict the contribution of KWB Operations to groundwater level declines in the area.*

c) *Determine water level conditions with "Without KWB Operations" for purposes of evaluating the potential impact of "With KWB Operations". The "Without KWB Operations" is the water level that would have been at any particular well location absent "KWB Operations."*

d) *Identify, based upon an analysis of "Without KWB Operations" versus "With KWB Operations," if a* ***negative potential impact ("NPI")*** *has or is likely to occur for which the measures described at D, E, and F may be operative.* ***NPI*** *is determined according to C.1 below.*

e) *Forecast any localized areas for special attention and/or additional monitoring where groundwater levels will decline 30 or more feet below the "Without KWB Operations" groundwater level.*

f) *Identify wells at risk of potential impacts during recovery operations.*

3) *KWBA will provide notification on its website if the Model shows that an* ***NPI*** *has or is likely to occur, including steps that potentially affected landowners must follow if the landowner desires to make a claim to KWBA regarding potential well impacts due to KWBA's recovery operations.*

C. ***Implement Triggers and Actions***

The actions described in sections D, E, and F will be implemented in consultation with affected landowners/well owners that make a claim to KWBA regarding well impacts relating to KWBA's recovery operations and groundwater level declines, subject to the following:

1) *The trigger for mitigation shall be based upon an analysis and comparison of Model generated "Without KWB Operations" versus "With KWB Operations." When "With KWB Operations" are 30 feet deeper than the "Without KWB Operations" at an operative well, and the well has (or is expected to) experience mechanical failure or other operational problems due to declining water levels, a* ***negative potential impact ("NPI")*** *is triggered. If KWBA enters into a joint operations agreement with other water banks in the area, the depth at which a* ***NPI*** *is triggered shall provide an equivalent measure of potential impact as described in the 2016 KWB Long-Term*

2) *For a well owner to be eligible for mitigation as provided below, the affected landowner shall submit a claim to KWBA, in accordance with the Government Claims Act, which shall, at a minimum, provide information concerning the condition of the well and casing and pumping equipment of the well, and other information that is relevant to the landowner's claim. Upon receipt of a claim, KWBA shall use the Model (or the results of modeling as reported to the Board and the public) to determine whether an* ***NPI*** *exists at the landowner's well and respond with the appropriate action described below.*

3) *KWBA will provide mitigation and/or compensation for the KWB Operations' contribution to the adverse impact. Mitigation and/or compensation is not required for a well owner's lack of well maintenance, normal wear and tear, depreciation, failure of well equipment, well casing degradation, etc., or other reasons not relating to KWB Operations.*

D. ***Implement Action for Agricultural Wells When Well Adjustment Is Needed and Available***

1) *Trigger: When the Model predicts* ***NPI*** *for an operational agricultural well outside the current operating range of the pump but within the potential operating range of the well.*

2) *KWBA actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

   a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline due to KWB operations. If needed:*

      - *Obtain right-of-entry permit and well data release from well owner.*

      - *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

   b) *Compare pump setting information with Model projected pumping water levels throughout the year to determine pump submergence levels and evaluate the necessity and feasibility of lowering the well pump to meet the landowner's needs to provide the least-cost short and long-term solution.*

c) *Develop a cost estimate to complete the necessary work.*

d) *Develop and submit a report to the landowner informing the landowner of the findings and proposed actions, including denying the claim because groundwater declines are not due to KWB operations.*

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the* ***NPI****, using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless D.3 occurs, once agreement is reached between KWBA and the landowner pursuant to D.2.b and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

E. ***Implement Action for Agricultural Wells When Well Adjustment Is Unavailable***

1) *Trigger: When the Model predicts* ***NPI*** *for an operational agricultural well outside the current and potential operating range of the well.*

2) *KWBA actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline due to KWB operations. If needed:*

- *Obtain right-of-entry permit and well data release from well owner.*
- *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

b) *Identify water of an equivalent water quantity and quality suitable for agricultural uses for the affected landowner from an alternate source at no greater cost to the affected landowner or, with the consent of the affected landowner, identify acceptable mitigation (for example, drill and equip a new well) to provide the least-cost short- and long-term solution, including an estimate to complete the necessary work.*

Develop and submit a report to the landowner informing the landowner of the findings and resulting proposed actions, including denying the claim because groundwater declines are not due to KWB operations.

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the* ***NPI*** *using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless E.3 occurs, once an agreement is reached between KWBA and the landowner to provide mitigation pursuant to E.2.b and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

F. ***Implement Action for Domestic Wells***

1) *Trigger: When the Model predicts* ***NPI*** *for a domestic well that is outside the current operating range of the pump but within the potential operating range of the well production.*

2) *KWBA's actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

   a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline. If needed:*

      - *Obtain right-of-entry permit and well data release from well owner.*
      - *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

   b) *Identify availability and cost of a permanent connection to the nearest water service provider.*

   c) *Identify acceptable mitigation (for example, lower the domestic submersible pump bowl setting sufficient to restore and maintain service or drill and equip a new well that complies with applicable county well standards) to provide the least-cost short- and long-term solution, including an estimate to complete the necessary work.*

d) Develop and submit a report to the landowner informing the landowner of the findings and resulting proposed actions, including denying the claim because groundwater declines are not due to KWB operations.

e) If necessary for emergency health and safety concerns, provide interim in-home water supplies within 14 days after receipt of the claim until a permanent mitigation action is implemented or the claim has been denied because groundwater declines are not due to KWB operations.

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the* ***NPI*** *using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless F.3 occurs, once an agreement is reached for KWBA to provide mitigation pursuant to F.2.c above and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

7.1-7 *KWBA will implement the following measures in accordance with the KCWA and KWBA CVC Agreement (Attachment B):*

a) *KWBA will monitor water levels frequency, evaluating groundwater conditions on a weekly/monthly basis.*

b) *KWBA will coordinate water operations with KCWA*.

c) *KWBA will manage recharge operations to help ensure that groundwater gradient is away from the CVC during shallow groundwater conditions. Should groundwater conditions develop that might induce piping behind the CVC's liner, KWBA will minimize recharge adjacent to the CVC either by reducing inflow to adjacent ponds or increasing the setbacks of adjacent ponds.*

7.2-2 *KWBA will implement the following measures:*

b) *Hazardous waste sites would be subject to the county public health department and/or the CVRWQCB oversight with the responsible parties. KWBA will cooperate with the regulatory agency(s) during the process and provide pertinent groundwater elevations and water quality data the regulatory agencies may request.*

c) *On an annual basis, KWBA shall report the status of shallow groundwater level monitoring activities and water quality analysis in areas of contamination to the Kern Fan Monitoring Committee.*

d) *KWBA will continue to monitor and evaluate the nature and extent of any current and future contamination and remediation within KWB Lands as follows:*

i. *For all evaluation and monitoring activities performed by third parties on KWB Lands, KWBA shall obtain reports and sampling data as soon as they become available. Monitoring and evaluation shall continue until verification by third party documentation, regulatory correspondence, and/or laboratory analysis is obtained that indicates soil or groundwater contamination has been remedied and no longer provides a threat to groundwater quality.*

ii. *On an annual basis, KWBA shall report the status of contamination for each issue and provide water quality data monitoring activities, where available, to the Kern Fan Monitoring Committee. Any newly discovered contamination shall be reported to the Kern Fan Monitoring Committee immediately.*

7.2-3 *KWBA will implement the following measures:*

a) *Prior to construction, identify all plugged and abandoned wells through agency contacts. This includes identification of abandoned wells through the DOGGR website, field verification of an abandoned well prior to construction, notifying DOGGR of intent to construct a recharge pond adjacent to or over an abandoned well.*

b) *Modify excavation and grading activities to ensure the near surface seals and wellhead remain undamaged.*

c) *If the top of an abandoned well or wellhead is damaged during pond construction, appropriate authorities (i.e., DOGGR, CVRWQCB, and/or Kern County Environmental Health) will be notified as to the nature and extent of the damage along with plans to repair the damage, as needed and in accordance with existing regulations.*

7.4-3 *KWBA will implement the following terms required of KWBA as specified in the 1997 Monterey IS and Addendum, in this 2016 KWBA Resolution, and KWB HCP/NCCP, including Appendix A (Kern Water Bank Operations Manual), Appendix C (Kern Water Bank Vegetation Management Plan, and Appendix D (Kern Water Bank Waterbird Management Plan):*

a) *Biological Monitor*

A qualified biologist shall monitor all ground disturbing activities during construction in the Sensitive Habitat Sector and will oversee measures undertaken to reduce the take of listed species.

b) *Construction Practices*

i. *Delineation of Disturbance Areas – During construction, KWBA shall clearly delineate disturbance area boundaries by stakes, flagging, or by reference to terrain features, as provided in the KWB HCP/NCCP ~~directed by CDFG and USFWS~~ to minimize degradation or loss of adjacent wildlife habitats during operation.*

ii. *Signage – During construction, KWBA shall post signs and/or place fencing around construction sites to restrict access of vehicles and equipment unrelated to site operations.*

iii. *Resource Agency Notification – At least 20 working days prior to initiating ground disturbance for project facilities in designated salvage/relocation areas, KWBA shall notify the Fresno Field Office of CDFWG ~~G~~ and the Sacramento Field Office of USFWS of its intention to begin construction activities at a specific location and on a specific date. The agencies will have ten working days to notify the KWBA of their intention to salvage or relocate listed species in the construction area. If KWBA is notified, it shall wait an additional five days to allow the salvage/relocation to take place.*

iv. *Salvage and Relocation – KWBA shall allow time and access to USFWS and/or CDFWG ~~G~~, or their designees, to relocated listed species, at the Resource Agencies' expense, from construction areas prior to disturbance of areas that have been identified by the Resource Agencies as having known populations of the listed species they wish to salvage or relocate.*

v. *Construction Site Review – All construction pipes, culverts, or similar structures with a diameter of three inches or greater that are stored at a construction site on the Kern Water Bank for one or more overnight periods shall be thoroughly inspected for trapped kit foxes and other animals before the subject pipe is subsequently buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight shall be capped. If during construction a kit fox or other animal is discovered inside a pipe, that section of pipe shall not be moved or, if necessary, shall be moved only once to remove it from the path of construction activity until the animal has escaped.*

vi. *Employee Orientation – An employee orientation program for construction crews, and others who will work on-site during construction, shall be conducted and shall consist of a brief consultation in which persons knowledgeable in endangered species biology and legislative protection explain endangered species concerns. The education program shall include a discussion of the biology of the listed species, the habitat needs of these species, their status under FESA and CESA, and measures being taken for the protection of these species and their habitats as a part of the project. The orientation program shall be conducted on an as needed basis prior to any new employees commencing work*

on the Kern Water Bank. Every two years or at the beginning of construction for the Supply/Recovery canal, a refresher course will be conducted for employees previously trained. A fact sheet conveying this information shall also be prepared for distribution to all employees. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be filed at KWBA's office and shall be accessible by CDW<u>F</u>~~G~~ and USFWS.

vii. *Standards for Construction of Canals – Concrete-lined canals will have a side slope of 1.5 to 1 or less and the sides will have a concrete finish which will assist in the escape of animals. If canals are determined by CDF<u>W</u>~~G~~ or USFWS to be substantial impediments to kit fox movement, plank or pipe crossings will be provided across concrete canals in areas identified as having high kit fox activity.*

c) *On-Going Practices*

i. *Equipment Storage - All equipment storage and parking during site development and operation shall be confined to the construction site or to previously disturbed off site areas that are not habitat for listed species.*

ii. *Traffic Control - KWBA's project representative shall establish and issue traffic restraints and signs to minimize temporary disturbances. All construction related vehicle traffic shall be restricted to established roads, construction areas, storage areas, and staging and parking areas. Project related vehicles shall observe a 25 MPH speed limit in all project areas except on county roads and state and federal highways.*

iii. *Food Control - All food-related trash items such as wrappers, cans, bottles, and food scraps generated both during construction and during subsequent facility operation shall be disposed of in closed containers and shall be regularly removed from the site. Food items may attract kit foxes onto a project site, consequently exposing such animals to increased risk of injury or mortality.*

iv. *Dog Control - To prevent harassment or mortality of kit foxes or destruction of kit fox dens or predation on this species; no domestic dogs or cats, other than hunting dogs, shall be permitted on-site.*

v. *Pesticide Use - Use of rodenticides and herbicides on the site shall be permitted in accordance with the Vegetation Management Plan, which incorporates by reference the Interim Measures for Use of Rodenticides in Kern County, and which will incorporate by reference any other applicable laws, rules, and regulations regarding the use of pesticides as they take effect.*

d) *Project Representatives*

KWBA shall designate a specific individual as a contact representative between KWBA, USFWS, and CDF<u>W</u>~~G~~ to oversee compliance with protection measures detailed herein. KWBA shall provide written notification of the contact representative to CDF<u>W</u>~~G~~ and USFWS within 30 days of issuance of the Permits and the Management Authorizations. Written notification shall also be provided by KWBA to CDF<u>W</u>~~G~~ and USFWS in the event that the designee is changed.

e) *Notification Regarding Dead, Injured or Entrapped Listed Animals*

Any employee or agent of KWBA who kills or injures a San Joaquin kit fox, blunt nosed leopard lizard, Tipton kangaroo rat, San Joaquin antelope squirrel, or other listed species listed as a threatened or endangered animal under FESA or CESA, or who finds any such animal either dead, injured, or entrapped on the Kern Water Bank shall report the incident immediately to KWBA's representative who shall, in turn, report the incident or finding to USFWS and CDF<u>W</u>~~G~~. In the event that such observations are of entrapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape unimpeded. In the event that such, observations are of injured or dead animals, KWBA shall immediately notify USFWS and CDF<u>W</u>~~G~~ by telephone or other expedient means. KWBA shall then provide formal notification to USFWS and CDF<u>W</u>~~G~~, in writing, within three working days of the finding of any such animal(s). Written notification shall include the date, time, location, and circumstances of the incident.

The USFWS contact for this information shall be the Assistant Field Supervisor for Endangered Species, Sacramento Field Office. The CDF<u>W</u>~~G~~ contact shall be the Environmental Services Supervisor at the San Joaquin Valley-Southern Sierra Region Headquarters.

USFWS or CDF<u>W</u>~~G~~ will be notified if any other animal, which is otherwise a listed species, is found dead or injured.

f) *Construction of Supply/Recovery Canal*

Within 60 days prior to the construction of the supply/recovery canal within the zone marked within the Map of the Kern Water Bank, KWBA shall conduct a limited survey within the area of the Kern Water Bank, which <u>will be</u> affected by that construction, with the sole goal of identifying potential San Joaquin kit fox dens. KWBA shall contact USFWS and CDF<u>W</u>~~G~~ pursuant to the salvage procedures set forth above if any kit fox dens are found.

g) *Take Avoidance Protocol for Fully Protected Species*

<u>Although a population of blunt nosed leopard lizards was relocated to the Kern Water Bank, there is no known present occurrence of them</u>. Existing data on the blunt nosed leopard lizard at the Kern Water Bank indicates that populations, <u>if they exist</u>, occur within habitat set asides (either sensitive, compatible, or conservation bank habitat), thus the likelihood of take from project construction, operation, and maintenance is negligible. However, in the future adaptive management measures may expand to areas of suitable habitat.

Three other species, which may be found on the Kern Water Bank, are also state designated fully protected species: American peregrine falcon, Greater sandhill crane, and White-tailed kite. The likelihood of the take of any of these species from project construction, operation, and maintenance is negligible due to their mobility and preferred habitats. ~~However, to avoid any take of these species, the same take avoidance protocol as set out for the blunt nosed leopard lizard shall apply to each of these three species.~~

KWBA will comply with the terms of the NCCP Approval and Take Authorization as it relates to ~~Until such time that the KWBA obtains appropriate authorization for take of the~~ state-designated fully protected species ~~blunt-nosed leopard lizard by the Fish and Game Commission, t~~ The following take avoidance protocol shall apply in any areas that contain suitable habitat for fully protected species not covered by authorization for take of state-designated fully protected species identified in this subsection (g) ~~of the blunt-nosed leopard lizard~~:

i. *A qualified biologist shall survey any areas proposed for project related disturbance that contain suitable habitat for fully protected species ~~the blunt-nosed leopard lizard~~ to determine the likelihood of presence. ~~Suitable habitat consists of valley and foothill grasslands, saltbush scrubland, iodine bush grassland, and alkali flats.~~*

ii. *If these fully protected species ~~blunt nosed leopard lizards~~ are found to occur in areas proposed for project facilities construction or maintenance, ~~consideration of~~ avoidance should take place. ~~first. If avoidance is not practicable, then the blunt nosed leopard lizard will be trapped and relocated prior to disturbance at KWBA's expense in accordance with the applicable annual management plan. This work must be done by or under the direction of USFWS staff by persons with appropriate experience and with their own take for scientific purposes permits. This procedure will avoid any violation of state law~~.*

The use of a biological monitor, and special construction activities and on- going practices will result in a heightened awareness and education regarding sensitive biological resources, which will reduce the potential for impacts on special-status species. In addition, the use of a project representative as a liaison between the KWBA and the resource agencies will expedite notification regarding any take of a listed animal. ~~While take of a fully protected species is not anticipated, this mitigation outlines avoidance protocol to further reduce the likelihood of said take.~~ Together these mitigation measures and the beneficial net increase of habitat for special- status species through implementation of the HCP/NCCP will reduce any potential impact to a less-than-significant level.

7.11-1 *KWBA will implement the following measures:*

c) *Provide a comprehensive Worker Environmental Awareness Program (WEAP) that will include all training requirements identified in Best Management Practices, Worker Site Specific Health and Safety Plan, and mitigation measures, including training for all field personnel (e.g., KWBA employees, agents, and contractors).*

The WEAP shall include protocols and training for responding to and handling of hazardous materials and hazardous waste management, and emergency preparedness, release reporting, and response requirements. KWBA will ensure that all construction workers at risk of inhaling dust shall be provided masks with filters designed to trap spores of the size of Valley Fever fungus.

7.11-4 *KWBA will implement the following measures:*

c) *KWBA shall implement the following measures before and during ground-disturbing activities to reduce health hazards associated with potential exposure to hazardous substances.*

i. *If stained or odorous soil is discovered during project-related construction activities, KWBA shall retain a qualified environmental professional to conduct a Phase II Environmental Site Assessment and/or other appropriate testing. Recommendations in the Phase II Environmental Site Assessment to address any contamination that is found shall be implemented before continuing with ground-disturbing activities in these areas.*

ii. *As required by law, notify the appropriate federal, state, and local agencies if evidence of previously undiscovered soil or groundwater contamination (e.g., stained soil, odorous groundwater) or if unknown or previously undiscovered underground storage tanks are encountered during construction activities.*

7.13-1a *KWBA will implement the following measures to minimize potential adverse impacts on cultural resources:*

a) *Prior to ground disturbance for new pond or well construction and associated facilities, an analysis to identify the potential presence of archaeological resources on the project site shall be conducted. The analysis shall include, at a minimum, a records check and literature survey from the appropriate California Historical Resources Information System (CHRIS) center and a Phase I Cultural Resources Investigation by an archaeologist meeting the Secretary of the Interior's Standards. If resources are known to exist on a project site, the analysis shall include an assessment of the resource and shall include measures for the in-situ protection, or the recovery, preservation, study, and curation of the resource, as appropriate. The analysis and the measures developed shall be consistent with the practices and intent described in Section 21083.2 et seq. of the Public Resources Code, as well as Sections 15064.5 et seq. and 15126.4(b) of the California Code of Regulations, and shall be consistent with current professional archaeological standards. The archaeologist shall prepare a report of the results of any study prepared, following accepted professional practice. Copies of the report shall be submitted to the KWBA and to the appropriate CHRIS information center. KWBA shall also consult, as appropriate, with the Native American Heritage Commission and appropriate Native American tribal representatives to address Native American cultural values with respect to archaeological contexts and places of traditional use or importance.*

b) *As a condition of all contracts for new pond or well construction and associated facilities and prior to ground-disturbing activities, all earth-moving and excavation contractor employees shall attend an orientation session informing them of the potential for inadvertently discovered cultural resources and/or human remains and protection measures to be followed to prevent destruction of any and all cultural resources discovered on site. The applicant's designated project construction manager, a qualified archaeologist, and a qualified cultural resource manager/monitor from a local California Native American tribe shall conduct the orientation (unless the local tribe opts not to participate). The orientation will include information regarding the potential for objects to occur on site, a summary of applicable environmental law, procedures to follow if potential cultural resources are found, and the measures to be taken if cultural resources and/or human remains are unearthed as part of the project.*

c) *Construction areas for new ponds and wells and associated facilities shall be staked prior to earthmoving by a qualified archaeologist in consultation with the contractor to indicate the construction area, construction staging area, and buffer. No earthmoving, parking, or materials storage will be allowed outside the staked areas. Prior to construction, the archaeologist shall survey the area to identify any surface artifacts within the staked area. An archaeologist and qualified cultural resource manager/monitor from a local California Native American tribe (unless the local tribe opts not to participate) shall be present during any grubbing or topsoil grading within the staked area. If previously unknown buried cultural resources, such as flaked or ground stone, historic debris, building foundations, or nonhuman bone (unless determined to be from present day grazing operations), are discovered during ground-disturbing activities, work will stop in that area and within an appropriate buffer area, as determined by the archaeologist. The archaeologist shall assess the significance of the affected cultural resources and, if necessary, develop feasible and appropriate treatment measures in consultation with the project staff, such as avoidance, capping with geotextile and fill, or Phase III data recovery consistent with applicable standards adopted pursuant to the National Historic Preservation Act.*

d) *In the event of the discovery of a burial, human bone, or suspected human bone, all excavation or grading in the vicinity of the find shall halt immediately, the area of the find shall be protected, and KWBA immediately shall notify the County Coroner of the find and comply with the provisions of PRC Section 5097 with respect to Native American involvement, burial treatment, and re-burial, if necessary.*

7.13-1b *KWBA will implement the following measures to minimize potential adverse impact on previously unknown potentially unique, scientifically important paleontological resources:*

a) *Before the start of any well-drilling activities, KWBA shall retain a qualified paleontologist or other qualified individual to train all personnel involved with earthmoving and/or well drilling activities regarding the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction, and proper notification procedures should fossils be encountered (this training can take place at the same time as the orientation required by 7.13-1a).*

b) *In the event that paleontological resources are discovered, KWBA will notify a qualified paleontologist. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in CEQA Guidelines Section 15064.5. If fossil or fossil bearing deposits are discovered during construction, excavations within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by a qualified paleontologist. The paleontologist will notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. If KWBA determines that avoidance is not feasible, the paleontologist will prepare an excavation plan for mitigating the effect of the project on the qualities that make the resource important. The plan will be submitted to KWBA for review and approval prior to implementation. The analysis and measures developed shall be consistent with the Conformable Impact Mitigation Guidelines developed by the Society of Vertebrate Paleontology and current professional paleontological standards.*

12-1 *KWBA will implement the following measures:*

a) ***Pump Efficiency Monitoring**: KWBA will conduct pump efficiency monitoring to ensure that all KWB pumps are monitored and evaluated at regular intervals during recovery periods.*

i. *Daily Pump Efficiency Monitoring: Pumps shall be monitored daily for their total water volume pumped (acre-feet [AF]) and electricity consumption (kilowatt-hours [kWh]), which will be used to calculate a daily energy efficiency value (i.e., kWh/AF).*

ii. *Pump Efficiency Software: Metro or an equivalent water system management program will be used to provide up-to-date and streamlined methods to analyze KWB's individual pump and total system efficiency.*

b) ***Pump Rehabilitation, Retrofits, and Replacement**: KWBA shall use data from the Pump Efficiency Monitoring component to strategically and actively rehabilitate, retrofit, and/or replace pumps as needed during recovery periods.*

i. *Pump Prioritization and Testing: Pump rehabilitation, retrofit, and replacement shall be prioritized by accounting for the relative efficiency of each pump with respect to the total pump system and water volume pumped through each pump. Data obtained from the Pump Efficiency Monitoring component shall be used to prioritize which pumps will be rehabilitated, retrofitted, and/or replaced. In addition efficiency testing by external entities if available (e.g., pump company, Pacific Gas & Electric Company [PG&E]) or other similar analysis will also be used for the prioritization process.*

ii. *Schedule: KWBA shall rehabilitate, retrofit, and/or replace pumps/wells at the earliest possible time without substantially disturbing ongoing O&M activities, but at a minimum will rehabilitate, retrofit, and/or replace at least an annual average of 5 pumps per year during a prolonged recovery period such as occurred between 2013 and 2016.*

c) ***Reporting****: KWBA will maintain a quarterly and annual reporting program that will be publicly available online. Annual reports will cover calendar years and be posted online by March 30 to cover the previous year. Quarterly reports will be posted online within 30 days of the end of each calendar quarter. The annual and quarterly reports will include, but are not limited to, the following components:*

   i. *KWB O&M Totals: Total quarterly electricity consumption for recovery pumping activities along with total acre-feet recovered shall be provided online. A running total of the annual electricity consumption and acre-feet recovered by quarter shall also be provided.*

   ii. *Pump Efficiency: A summary of the pump efficiency (kWh/acre-feet) for each of KWB's pumps will be provided quarterly. Similar to the KWB O&M Totals, a running annual average efficiency for each pump shall be provided. These data shall be used to identify the 5 pumps per year that will be rehabilitated, retrofitted, or replaced. If a pump/well is adjusted for depth, notes shall be made within the reports to explain these changes in pump efficiency.*

   iii. *Electricity Efficiency Actions: Each report should include actions taken in the previous quarter to rehabilitate, retrofit, and/or replace pumps. Any other energy efficiency measures taken will be reported. When information is available from PG&E's Advanced Pumping Efficiency Program or other similar programs, annual electricity savings from these actions shall be included in the quarterly and annual reports to clearly show the electricity savings associated with rehabilitation, retrofit, and/or replacement actions. If annual energy savings cannot be determined through pre- and post-pump improvement testing, KWBA shall report the empirical annual energy savings (kWh/year) from these improvements in its annual reports.*

   iv. *Identifying Next Steps: Each annual report will include the list of 5 or more pumps planned to be evaluated for potential rehabilitation, retrofit, or replacement during that year. If all five of the least efficient pumps are not scheduled for rehabilitation, retrofit, and/or replacement in the coming year, the annual report shall explain what KWB operation requires the pump to remain in service that year.*

d) ***Pump Compliance:*** *KWBA will only purchase new pumps that comply with United States Department of Energy pump efficiency regulations (10 CFR Part 429 and 431) when those regulations become effective in the marketplace in 2020.*

e) ***Future Increases in Technology and Emissions Standards:*** *KWBA shall actively consider replacing older pumps with new pumps with increased efficiency technology. All future requirements for pumps at the federal, state, and/or local level shall be complied with.*

Appendix C Sensitive Species List

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (East Elk Hills (3511934) OR West Elk Hills (3511935) OR Lokern (3511945) OR Buttonwillow (3511944) OR Tupman (3511933) OR Taft (3511924) OR Mouth of Kern (3511923) OR Rio Bravo (3511943) OR Fellows (3511925))
 AND Taxonomic Group IS (Ferns OR Gymnosperms OR Monocots OR Dicots OR Lichens OR Bryophytes)

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Astragalus hornii var. hornii Horn's milk-vetch	PDFAB0F421	None	None	GUT1	S1	1B.1
Atriplex cordulata var. cordulata heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
Atriplex cordulata var. erecticaulis Earlimart orache	PDCHE042V0	None	None	G3T1	S1	1B.2
Atriplex coronata var. vallicola Lost Hills crownscale	PDCHE04371	None	None	G4T3	S3	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G2	S2	1B.1
Atriplex subtilis subtle orache	PDCHE042T0	None	None	G1	S1	1B.2
Caulanthus californicus California jewelflower	PDBRA31010	Endangered	Endangered	G1	S1	1B.1
Cirsium crassicaule slough thistle	PDAST2E0U0	None	None	G1	S1	1B.1
Delphinium recurvatum recurved larkspur	PDRAN0B1J0	None	None	G2?	S2?	1B.2
Eremalche parryi ssp. kernensis Kern mallow	PDMAL0C031	Endangered	None	G3G4T3	S3	1B.2
Eriastrum hooveri Hoover's eriastrum	PDPLM03070	Delisted	None	G3	S3	4.2
Eriogonum temblorense Temblor buckwheat	PDPGN085P0	None	None	G2	S2	1B.2
Eschscholzia lemmonii ssp. kernensis Tejon poppy	PDPAP0A071	None	None	G5T2	S2	1B.1
Lasthenia chrysantha alkali-sink goldfields	PDAST5L030	None	None	G2	S2	1B.1
Lasthenia glabrata ssp. coulteri Coulter's goldfields	PDAST5L0A1	None	None	G4T2	S2	1B.1
Madia radiata showy golden madia	PDAST650E0	None	None	G3	S3	1B.1
Monolopia congdonii San Joaquin woollythreads	PDASTA8010	Endangered	None	G2	S2	1B.2
Puccinellia simplex California alkali grass	PMPOA53110	None	None	G3	S2	1B.2
Stylocline citroleum oil neststraw	PDAST8Y070	None	None	G3	S3	1B.1

Record Count: 19

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (East Elk Hills (3511934) OR West Elk Hills (3511935) OR Lokern (3511945) OR Buttonwillow (3511944) OR Tupman (3511933) OR Taft (3511924) OR Mouth of Kern (3511923) OR Rio Bravo (3511943) OR Fellows (3511925))
 AND Taxonomic Group IS (Fish OR Amphibians OR Reptiles OR Birds OR Mammals OR Mollusks OR Arachnids OR Crustaceans OR Insects)

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
Ammospermophilus nelsoni Nelson's antelope squirrel	AMAFB04040	None	Threatened	G2	S2S3	
Anniella alexanderae Temblor legless lizard	ARACC01030	None	None	G1	S1	SSC
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Bombus crotchii Crotch bumble bee	IIHYM24480	None	Candidate Endangered	G3G4	S1S2	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened	None	G3T3	S2S3	SSC
Charadrius montanus mountain plover	ABNNB03100	None	None	G3	S2S3	SSC
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Dendrocygna bicolor fulvous whistling-duck	ABNJB01010	None	None	G5	S1	SSC
Dipodomys ingens giant kangaroo rat	AMAFD03080	Endangered	Endangered	G1G2	S1S2	
Dipodomys nitratoides brevinasus short-nosed kangaroo rat	AMAFD03153	None	None	G3T1T2	S1S2	SSC
Dipodomys nitratoides nitratoides Tipton kangaroo rat	AMAFD03152	Endangered	Endangered	G3T1T2	S1S2	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	FP

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Lanius ludovicianus loggerhead shrike	ABPBR01030	None	None	G4	S4	SSC
Lytta hoppingi Hopping's blister beetle	IICOL4C010	None	None	G1G2	S1S2	
Masticophis flagellum ruddocki San Joaquin coachwhip	ARADB21021	None	None	G5T2T3	S2?	SSC
Onychomys torridus tularensis Tulare grasshopper mouse	AMAFF06021	None	None	G5T1T2	S1S2	SSC
Perognathus inornatus San Joaquin pocket mouse	AMAFD01060	None	None	G2G3	S2S3	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Plegadis chihi white-faced ibis	ABNGE02020	None	None	G5	S3S4	WL
Protodufourea zavortinki Zavortink's protodufourea bee	IIHYM77020	None	None	G1	S1	
Sorex ornatus relictus Buena Vista Lake ornate shrew	AMABA01102	Endangered	None	G5T1	S1	SSC
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thamnophis gigas giant gartersnake	ARADB36150	Threatened	Threatened	G2	S2	
Toxostoma lecontei Le Conte's thrasher	ABPBK06100	None	None	G4	S3	SSC
Vireo bellii pusillus least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2	S2	
Xanthocephalus xanthocephalus yellow-headed blackbird	ABPBXB3010	None	None	G5	S3	SSC

Record Count: 34

CNPS California Native Plant Society

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

24 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3511945, 3511944, 3511943, 3511935, 3511934, 3511933, 3511925 3511924 and 3511923;

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Allium howellii var. howellii	Howell's onion	Alliaceae	perennial bulbiferous herb	Mar-Apr	4.3	S3	G3G4T3
Amsinckia furcata	forked fiddleneck	Boraginaceae	annual herb	Feb-May	4.2	S4	G4
Astragalus hornii var. hornii	Horn's milk-vetch	Fabaceae	annual herb	May-Oct	1B.1	S1	G4G5T1T2
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex cordulata var. erecticaulis	Earlimart orache	Chenopodiaceae	annual herb	Aug-Sep(Nov)	1B.2	S1	G3T1
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	Mar-Oct	4.2	S3	G4T3
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	annual herb	Apr-Sep	1B.2	S2	G4T2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Atriplex subtilis	subtle orache	Chenopodiaceae	annual herb	Jun,Aug,Sep(Oct)	1B.2	S1	G1
Azolla microphylla	Mexican mosquito fern	Azollaceae	annual / perennial herb	Aug	4.2	S4	G5
Caulanthus californicus	California jewelflower	Brassicaceae	annual herb	Feb-May	1B.1	S1	G1
Cirsium crassicaule	slough thistle	Asteraceae	annual / perennial herb	May-Aug	1B.1	S1	G1
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Eremalche parryi ssp. kernensis	Kern mallow	Malvaceae	annual herb	Jan,Mar,Apr,May(Feb)	1B.2	S3	G3G4T3
Eriastrum hooveri	Hoover's eriastrum	Polemoniaceae	annual herb	(Feb)Mar-Jul	4.2	S3	G3
Eriogonum gossypinum	cottony buckwheat	Polygonaceae	annual herb	Mar-Sep	4.2	S3S4	G3G4

Eriogonum temblorense	Temblor buckwheat	Polygonaceae	annual herb	(Apr)May-Sep	1B.2	S2	G2
Eschscholzia lemmonii ssp. kernensis	Tejon poppy	Papaveraceae	annual herb	(Feb)Mar-May	1B.1	S2	G5T2
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2
Madia radiata	showy golden madia	Asteraceae	annual herb	Mar-May	1B.1	S3	G3
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	annual herb	(Jan)Feb-May	1B.2	S2	G2
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Stylocline citroleum	oil neststraw	Asteraceae	annual herb	Mar-Apr	1B.1	S3	G3
Trichostema ovatum	San Joaquin bluecurls	Lamiaceae	annual herb	Jul-Oct	4.2	S3	G3

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 31 August 2020].

Search the Inventory
Simple Search
Advanced Search
Glossary

Information
About the Inventory
About the Rare Plant Program
CNPS Home Page
About CNPS
Join CNPS

Contributors
The Calflora Database
The California Lichen Society
California Natural Diversity Database
The Jepson Flora Project
The Consortium of California Herbaria
CalPhotos

Questions and Comments
rareplants@cnps.org

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Project information

NAME

The Palms Recovery Phase

LOCATION

Kern County, California

DESCRIPTION

This project includes construction of facilities to extract and convey water stored at the Palms Groundwater Bank in western Kern County.

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600

(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Buena Vista Lake Ornate Shrew Sorex ornatus relictus — Endangered
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/1610

Giant Kangaroo Rat Dipodomys ingens — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6051

San Joaquin Kit Fox Vulpes macrotis mutica — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2873

Tipton Kangaroo Rat Dipodomys nitratoides nitratoides — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/7247

Reptiles

NAME	STATUS

Blunt-nosed Leopard Lizard Gambelia silus — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/625

Giant Garter Snake Thamnophis gigas — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4482

Amphibians

NAME	STATUS

California Red-legged Frog Rana draytonii — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2891

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/321

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Kern Mallow Eremalche kernensis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1731	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Buena Vista Lake Ornate Shrew Sorex ornatus relictus https://ecos.fws.gov/ecp/species/1610#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Burrowing Owl Athene cunicularia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
Common Yellowthroat Geothlypis trichas sinuosa This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Le Conte's Thrasher toxostoma lecontei — Breeds Feb 15 to Jun 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8969

Long-billed Curlew Numenius americanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

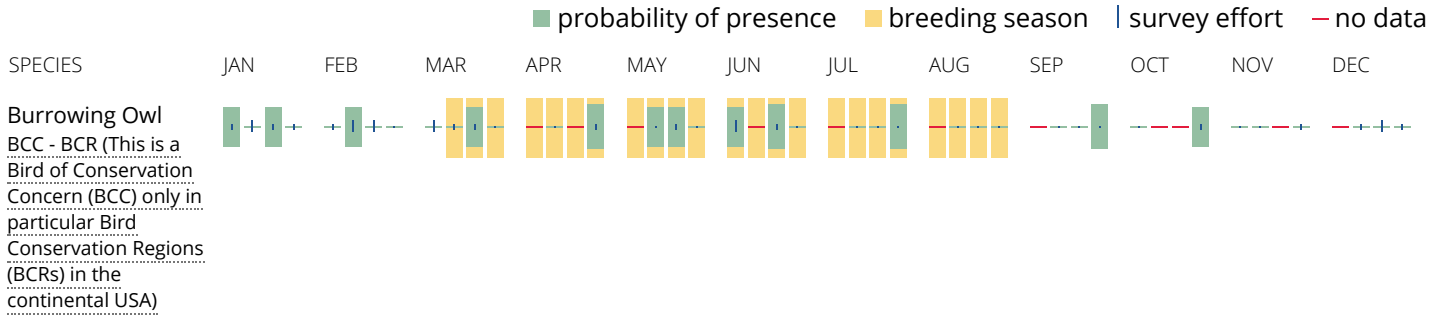
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

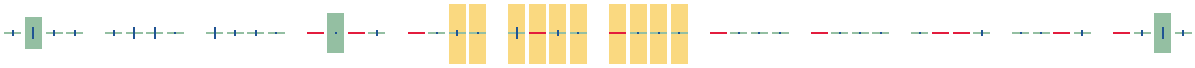
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

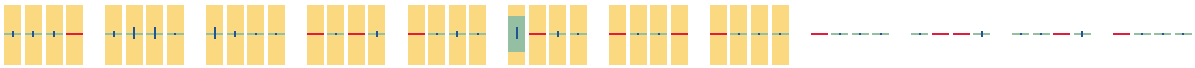
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

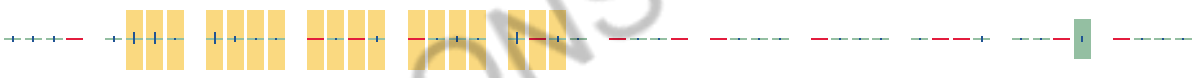


Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

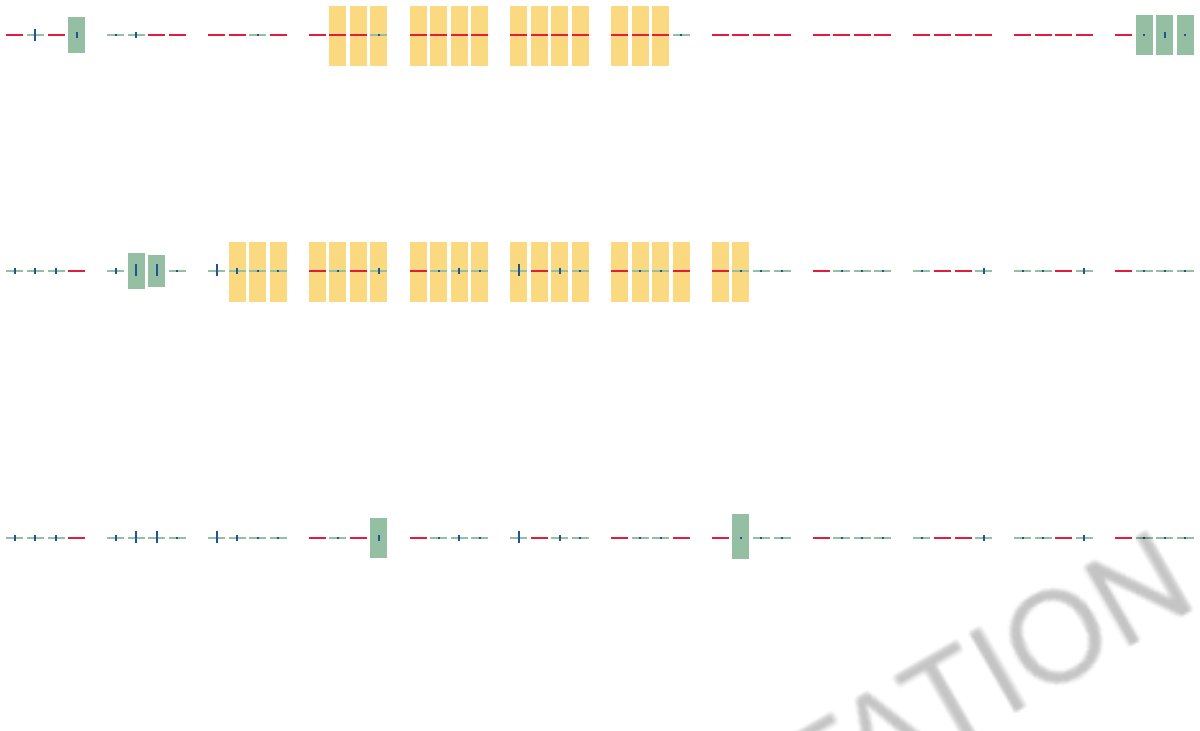
Le Conte's Thrasher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Long-billed Curlew
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal

bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1A
- PEM1Ah

FRESHWATER FORESTED/SHRUB WETLAND

- PSSC

FRESHWATER POND

- PUSC
- PUBFx
- PUBF
- PUSCx

RIVERINE

- R2UBHx
- R4SBCx
- R4SBC
- R5UBFx
- R5UBF

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix D Groundwater Modeling Report

November 24, 2020

MEMORANDUM

To: Tim Ashlock, Buena Vista Water Storage District

From: Michael Maley, PE, PG, CHg

Re: Groundwater Modeling of the Proposed Buena Vista Water Storage District Palms Groundwater Recovery Project

1. INTRODUCTION

This report provides a summary of groundwater modeling conducted in support of the Buena Vista Water Storage District's (BVWSD or District) Palms Groundwater Recovery Project (Recovery Project). The model results presented in this report represent the status of the modeling work that has been done to date for evaluating potential project alternatives and in support of California Environmental Quality Act (CEQA) compliance requirements.

2. BACKGROUND

2.1 Buena Vista Water Storage District

BVWSD is located in Kern County, approximately sixteen miles west of the City of Bakersfield in the trough of California's southern San Joaquin Valley (**Figure 1**). Land use within BVWSD is primarily agricultural. As with neighboring districts, there has been a shift in recent years from row crops to permanent crops. For example, between 2008 and 2015 the percentage of land planted in permanent crops grew from 9 percent to 42 percent, a conversion which increases winter water demands and reduces the ability of growers to reduce demand in droughts (BVWSD 2014, 2016; BVGSA, 2020).

BVWSD controls an average entitlement of approximately 150,000 acre-feet per year (AFY) of surface water from the Kern River, based on the Miller-Haggin Agreement of 1888. In 1973, BVWSD contracted with the Kern County Water Agency (KCWA) for an additional surface water supply from the State Water Project (SWP) delivered via the California Aqueduct. The contract provided for an annual firm supply of 21,300 AFY and a surplus supply of 3,750 AFY. The water conveyance systems in and around BVWSD consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals and drains that deliver surface water to, and collect runoff from, the lands within BVWSD. BVWSD provides water to two services areas, the larger is the Buttonwillow Service Area (BSA) to the northwest and the smaller Maples Service Area (MSA) to the southeast (**Figure 1**).

BVWSD receives surface water from the Kern River, the California Aqueduct and the Friant-Kern Canal. Kern River and Friant-Kern Canal flows are delivered via the Kern River channel, and

BVWSD's Main, Outlet, and Alejandro canals (BVWSD 2014, 2016; BVGSA, 2020). Altogether, there are approximately 240 miles of pipelines, lined and unlined canals and drainage ditches within BVWSD with seepage from the unlined canals recharging groundwater. BVWSD operates all of the water conveyance and control facilities within its service area and maintains flow records for each reach of District canal.

2.2 Palms Groundwater Banking Project Overview

The District has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Using this conjunctive management policy, water available during years of above average surface water flow is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply. A high proportion of recharge in the District takes place through seepage from facilities constructed by the District including canals, laterals and recharge basins.

In January 2016, the District approved construction of the Palms Groundwater Banking Project (Palms Project) in the southern portion of the Buttonwillow Service Area. The Palms Project is a groundwater replenishment and water banking project that covers approximately 1,150 acres and includes features needed to apply surface water for groundwater recharge (**Figure 2**). An Initial Study/Mitigated Negative Declaration (SCH # 2015121030) was prepared for the Palms Project in 2015, and the Notice of Determination was filed in January 2016. Initial construction of the recharge portion of the project was completed in 2016. The recharge ponds were subsequently enlarged and today are located within an area of approximately 1,150 acres. To date, the District has recharged approximately 27,166 acre-feet of surplus water in the Palms Project (14,164 acre-feet in 2017 and 13,002 acre-feet in 2019).

2.3 Palms Groundwater Recovery Project Description

The current analysis is for the Recovery Project that will provide up to 25,000 acre-feet (AF) of banked groundwater to the District's water customers in dry years, while meeting the requirements of the Sustainable Groundwater Management Act. The overall purpose of the Recovery Project is to enhance groundwater management by increasing the District's ability to recharge groundwater in wet years and return that banked water in dry years. Additionally, enhanced groundwater management would benefit agriculture by providing irrigation water supplies in years with limited surface water supplies. The Recovery Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County (County) by improving the District's ability to meet demands during periods when supply of surface water is limited with previously banked water supplies
- Improve conveyance of previously stored water throughout the District and to neighboring Districts
- Provide water for urban use in County and possibly elsewhere
- Recover banked groundwater of suitable water quality that can be blended, as needed, to meet water quality standards for pump-in to the California Aqueduct (Aqueduct)

There are two areas of pumping. One is located adjacent to the Palms Recharge Ponds and the second area is an annexed area to the northeast where BVWSD has purchased property for the Recovery Project (**Figure 2**).

The Recovery Project will be managed so that groundwater elevations will, in the long term, improve from those observed historically. Available surplus water supply will continue to be recharged at the Palms Project during wet years. The District anticipates recharging up to 100,000 AFY when surplus water supply is available through the Palms Project and their existing canal system during wet years, a District practice for many decades. Annual water recovery by the Recovery Project will be limited to no more than 25,000 AFY. Wells will be pumped at a rate of no more than 5 cubic feet per second (2,250 gallons per minute), and the wells selected for recovery will be selected to optimize groundwater recovery and minimize impacts to groundwater levels.

2.4 Nearby Groundwater Banking Operations

Several prominent groundwater banking facilities are located near the Recovery Project. These include facilities operated by the following:

- Kern Water Bank
- Rosedale-Rio Bravo Water Storage District, and
- West Kern Water District.

The Kern Water Bank is located to the east of the Recovery Project (**Figures 3** and **4**). To operate the facility, the Kern Water Bank has constructed significant infrastructure that includes approximately 7,000 acres of recharge ponds, 85 recovery wells, 36 miles of pipeline, and a 6-mile long canal. The recharge ponds can recharge up to 72,000 acre-feet per month. The ponds are shallow - only a few feet deep - and were constructed by building a low levee on the downslope sides of each pond. The recovery wells average about 750-feet deep and produce as much as 5,000 gallons per minute of water. They are distributed throughout the water bank and spaced 1/3 of a mile or more apart (KWB 2020).

Rosedale-Rio Bravo Water Storage District (RRBWSD) operates groundwater recharge projects located to the northeast of the Recovery Project and north of the Kern Water Bank (**Figure 3**). The recharge facilities consist of recharge basins, improved unlined channels and natural channels. The facilities generally follow the alignment of the Goose Lake Slough. RRBWSD has constructed a network of groundwater recharge basins and channels cover approximately 1,180 acres as of the end of 2017 (RRBWSD 2013, 2019). Nearly all of RRBWSD's surface water supplies are recharged into the groundwater aquifer. Extractions are primarily by private wells (RRBWSD 2013, 2019).

The West Kern Water District (WKWD) is a retail agency that provides water directly to residential, commercial and industrial customers over a large service area located south and west of the Recovery Project (**Figure 3**). In 2015 WKWD served 6,712 active connections; however, about 80 percent of water is delivered to industrial customers, primarily oil exploration companies and power plants (WKWD 2016, 2019).

WKWD has a contract with the KCWA to deliver water from the SWP. WKWD's SWP supply is delivered to BVWSD in exchange for BVWSD's water from the Kern River. The Kern River water is physically recharged in WKWD's South Ponds, located near the Kern River, just west of Enos Lane. West Kern does have an annual option to "buy back" exchanged SWP water for their own

use; up to 6,500 AF annually out of their potential 25,000 AF. A total of Recovered groundwater is extracted for use inside WKWD and to support exchange programs with other local water districts (WKWD 2016, 2019). A total of 5 percent of recharged water is considered a non-recoverable loss to benefit the Subbasin, leaving 95 percent of this water available for recovery and use in and outside of WKWD.

WKWD also has North Ponds, just east of BVWSD East Side canal, adjacent and north of Station Road. WKWD acquires a water supply from various sources to recharge in the North Ponds to bank in order to recover in a similar destination to the South Ponds. The banked supply water is wheeled through BVWSD's canal system. In the North Ponds, a total of 6 percent of recharged water is considered a non-recoverable loss to benefit the Subbasin, leaving 94 percent of this water available for recovery and use in and outside of WKWD

The North Project Management Area is shown in **Figure 4** and has recharge ponds that recharge into the shallow aquifer in that region. The South Project Management Area has recharge ponds that recharge into the unconfined aquifer in that region. WKWD's south wellfield consists of eight wells and the north wellfield consists of five wells.

3. REGIONAL SETTING

3.1 Physical Setting

BVWSD lies within the lower Kern River watershed, where historic runoff created heavy clay soils from former swamp and overflow lands along the northern fringe of Buena Vista Lake (**Figures 1** and **3**). BVWSD is made up largely of reclaimed swamp lands located in and along the pre-development course of the lower Kern River. After exiting the Southern Sierra Nevada mountains near Bakersfield, the Kern River flows south and then southwest across the southern San Joaquin Valley, through the topographic axis of the valley toward its ultimate terminus at a drainage basin which was once Tulare Lake (BVWSD 2014, 2016; BVGSA, 2020).

The Recovery Project is located in the southern portion of the BSA, which is a 26-mile long, three- to five-mile wide strip of land that lies west of the Kern River alluvial fan between the Elk Hills and Buttonwillow Ridge (BVWSD 2014, 2016; BVGSA, 2020). The pre-development course of the lower Kern River followed the valley's topographic axis from the Buena Vista Lakebed northward toward the Tulare Lakebed. Because of the asymmetry of the San Joaquin Valley's topography, the axial trough where the BSA lies borders the western edge of the valley. Land surface elevations in the BVWSD range from 290 feet above sea level in the south to 235 feet above sea level in the north (**Figure 1**).

Most precipitation occurs in the winter with little occurring during the summer months of June through August. By contrast, rates of evaporation and transpiration are low in the cooler, wetter months and peak during the hot, dry summer growing season. Average annual precipitation is 5.64 inches and the average reference evapotranspiration rate is 57.06 inches (Western Regional Climate Center 2016).

3.2 Geology

BVWSD overlies the Kern County Subbasin (DWR Basin No. 5-022.14) which comprises the entire southern end of the San Joaquin Valley Groundwater Basin. The subbasin covers about 3,040 square miles and is bounded on the east, south and west by the topographic slope break

between the valley fill and the surrounding dissected foothills (**Figure 1**). To the north, the basin is delineated by the boundary between Kern, Kings, and Tulare counties, a political boundary which does not define a change in geological or flow conditions.

BVWSD lies near the western margin of the Kern Subbasin and occupies the overflow lands west of the Kern River alluvial fan within the Buttonwillow Syncline, lying between the Elk Hills and Buttonwillow Ridge (Dale et al, 1966). Land surface elevations in BVWSD range from 290 feet above msl in the south to 235 feet above msl in the north. The groundwater gradient, which is generally flat along a north-south alignment north of 7th Standard Road, steepens south of this boundary with a gradient of 5 to 6 feet per mile (BVGSA, 2020).

The water conveyance systems in and around the district consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals that delivers surface water to the lands within the BVWSD (**Figure 3**).

The BSA is made up largely of reclaimed swamp lands. The aquifer beneath the BSA consists of a sequence of interbedded, laterally discontinuous, sandy and silty sediments (BVWSD 2014, 2016; BVGSA, 2020). Down to a depth of about 200 feet, silty sediments tend to predominate, but from 200 to 600 feet, sandy and silty sediments occur in approximately equal proportions (**Figure 5**). The Corcoran Clay, or another stratigraphically-equivalent clay, has been mapped or inferred to exist under the BSA and MSA. The clay layer lies from 450 to 600 feet below the ground surface under the central portion of the BSA but rises to about 100 feet below the surface under the south end and 250 feet below the surface under the north end (Sierra Scientific 2013).

3.3 Groundwater Conditions

Water level measurements were obtained from the California Department of Water Resources (DWR) state-wide water level database, and from BVWSD who has measured groundwater levels in nearby wells between two and four times a year since about 1993. Hydrographs grouped by geographic location, to the north, east, and in close proximity to the Recovery Project, are shown on **Figure 6**.

The upper graph on **Figure 6** presents groundwater level trends in areas north and west of the Recovery Project. Overall, the groundwater levels show a relatively stable to slightly declining trend from 1970 to 2000. Following 2000, groundwater levels have declined by upwards of 100 feet through 2017. It should be noted that this period represents a period of unusually dry climatic conditions culminating in a statewide historic drought period from 2012 through 2016. The drought-related reductions in local and imported water supplies available to Kern County caused an increased demand on groundwater.

The middle and lower graphs on **Figure 6** show that groundwater level data for wells in close proximity and to the east of the Recovery Project are generally similar. Overall, the groundwater levels show a decreasing trend from 1960 to 1993. However, the initiation of the Kern Water Bank around 1993 and increased banking by BVWSD, WKWD and other nearby agencies shows a significant increase in groundwater levels from 1993 to 2000. As noted above, the unusually dry climatic conditions from 2000 to 2016 produced a general declining trend in groundwater levels. However, significant increases are noted in 2005 and 2011 as a result of increased groundwater banking during these wet years due to the increased availability of local and imported surface water supplies.

The groundwater flow directions can be interpreted from groundwater elevation contours. **Figure 7** shows regional groundwater level contours for 2015 for BVWSD (GEI 2017: BVWSD 2016). The groundwater gradient, which is generally flat along a north-south alignment north of 7th Standard Road, steepens south of this boundary with a gradient of 5 to 6 feet per mile extending almost the entire distance to the southeast end of the GSA. The groundwater elevations near the Recovery Project are lower than areas to the northwest of the project, and this indicates that water generally flows in a southeasterly direction. Local groundwater flow direction near the Recovery Project appears to be in an easterly direction. **Figure 7** shows that groundwater elevations in the vicinity of the Recovery Project where groundwater levels range from 160 feet above msl to the west to 110 feet above msl in the southeast corner of the BSA.

Figure 8 shows the depth to groundwater map for BVWSD (GEI 2017: BVWSD 2016). In the vicinity of the Recovery Project, depth to groundwater ranged from over 180 feet in the southeast to about 130 feet to the northwest. This provides an indication of the potentially available capacity for aquifer storage at the Recovery Project site.

3.4 Groundwater Use

While most of the groundwater pumping within BVWSD is attributable to on-farm pumping from approximately 200 privately-owned wells, BVWSD maintains and operates seven production wells within BVWSD with an eighth well lying outside BVWSD's boundaries along the Alejandro Canal near the Kern River Channel. The majority of irrigation wells in BVWSD are completed to depths between 200 and 600 feet with perforated intervals around 150 feet to the bottom, in a 21-inch (minimum) diameter bore hole. Pumping lifts vary with hydrology and location; however, the average lift has been approximately 100 feet in recent years (BVWSD 2014, 2016; BVGSA, 2020).

BVWSD has established a "*Landowner Well Use Program*", which is a voluntary program to assist BVWSD in satisfying water demands during dry years by making unused well capacity available in return for reimbursement to participating well owners for energy charges in addition to capital replacement and maintenance costs. As noted earlier, this program is part of BVWSD's drought response effort (BVWSD 2014, 2016; BVGSA, 2020).

3.5 Regional Water Quality

Groundwater quality in the region is variable and depends on the quality of the recharge water, the chemical changes that occur as surface water percolates into the aquifer, and chemical changes that occur within the aquifer (Dale et al. 1966). Groundwater in the southern San Joaquin Valley can be divided into three groups based on geography: east side, west side, and axial trough (Dale et al. 1966).

East side groundwater quality is of the bicarbonate type with low total dissolved solids (TDS). This groundwater is characteristic of the surface waters which drain the granitic Sierra Nevada Range to the east of the basin (Dale et al. 1966). Groundwater quality in the east side reflects the quality of the Kern River, the primary source of recharge.

West side groundwater quality is of the sulfate or chloride type with higher TDS concentrations than the east side. This groundwater quality is characteristic of the surface waters that drain the Miocene-Pliocene marine sediments of the Temblor Range to the west of the basin (Dale et al. 1966; Sierra Scientific Services 2013). This water quality is found in a strip along the west

side of basin. There is less surface runoff from the west than from the east, therefore groundwater quality of the sulfate type is less prevalent than of the bicarbonate type (Sierra Scientific Services 2013).

Groundwater quality in the axial trough is a mixture of east side and west side groundwater, as well as surface water that percolates to the aquifer. Groundwater is of sodium type but varies in concentration and chemical character. Axial trough groundwater typically has higher TDS concentrations than water in the east side. The boundary between the axial trough and west side groundwater may be the West Side Canal, which forms the western border of the Recovery Project boundary (Dale et al. 1966).

4. SUPERPOSITION GROUNDWATER MODEL

4.1 Approach

The Superposition Model has been used since 2016 as part of the ongoing evaluations for the Recovery Project (GEI, 2017). During this time, the Superposition Model was used as a screening model to evaluate various alternatives for the recovery of banked groundwater up to a rate of 25,000 AFY for use by BVWSD. The following text summarizes the setup and application of the Superposition Model for the Recovery Project. Additional details on the approach, setup and validation of the Superposition Model are presented in **Attachments A**, **B** and **C**.

A superposition modeling approach was selected as the most suitable method to support the groundwater impacts analysis. As detailed in the following section, this superposition approach enables the Project-related changes to be calculated throughout the basin and superimposed upon the groundwater system so that the accumulated effects of the Project over time can be determined.

4.2 Superposition Model

The modeling used to simulate the Recovery Project is based on the principle of superposition. The principle of superposition, as applied to a groundwater system, means that the result of multiple stresses on an aquifer system is equal to the sum of the results of the individual stresses. Additional information about applying the principle of superposition to numerical groundwater models is provided in **Attachment A**.

Superposition allows the groundwater impacts analysis to assess the effects of the Project on the groundwater system in isolation from other acting stresses (e.g., pumping, recharge, etc.) without having to obtain data of non-project related stresses to simulate the Project. Using a superposition model, calculation of groundwater impacts is inherently precise because flow quantities other than Project related components are set to zero (Leake 2011).

When the Principle of Superposition is used in groundwater modeling, the model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. Therefore, the model results provide the relative change in groundwater levels due to the Recovery Project; in other words, a superposition model directly calculates the groundwater level impacts from the Recovery Project. By applying the Principle of Superposition, the relative change in groundwater levels can be added (superimposed) to measured or simulated groundwater elevations to determine a predicted groundwater elevation associated with Project impacts. This means that calculated changes in groundwater levels can

then be added to other groundwater level distributions to determine the combined effects on the groundwater system (Reilly et al. 1987).

4.3 Groundwater Model Setup

For the groundwater modeling analysis, a regional groundwater Superposition Model will be used to simulate the changes in groundwater levels from proposed recovery operations. The Superposition Model used for the BVWSD Recovery Project was previously developed and used for the Supplemental Environmental Impact Report (SEIR) for the Kern River Water Allocation Plan for Kern Delta Water District (KDWD). The Draft SEIR was completed in 2017 (ESA 2017) and the groundwater modeling was described in the Groundwater Impacts Assessment Report (Todd Groundwater 2017) which was an appendix to the SEIR.

Following the general methodology for applying superposition methods to groundwater modeling (Reilly et al. 1987), the Kern County Superposition Model was developed from the existing, previously calibrated, USGS Central Valley Hydrologic Model (CVHM) (Faunt 2009). CVHM is a three-dimensional (3D) computer model developed by the USGS to simulate surface water and groundwater flow across the entire Central Valley (Faunt 2009). The geologic framework and aquifer properties of CVHM are based on a comprehensive geologic analysis (USGS Sediment Texture Analysis) that provides a regionally consistent evaluation of aquifer properties based on the analysis of local well logs (Faunt, Hanson and Belitz 2009). Additional details on the setup and modifications of the Superposition Model are presented in **Attachment B**.

4.4 Superposition Model Validation

Although the underlying CVHM Base Model was calibrated by the USGS to data obtained throughout the Central Valley – presumably using reasonable care in developing the geologic framework and determining aquifer properties – it is appropriate to demonstrate that the use of the Kern County Superposition Model built from the CVHM for the specific objectives of this impact analysis reasonably reproduces historical groundwater level changes.

Developing an appropriate validation scenario can be challenging in a heavily operated groundwater basin because validation requires simulating a set of historical groundwater stresses that show a clear cause and effect relationship. Since the Superposition Model results provide the change in groundwater levels, there is no base case to remove the effects from other background stresses. To achieve this, validation scenarios were developed to test the ability of the Superposition Model to evaluate regional groundwater impacts by simulating a historical period during which field data were obtained that measured changes that occurred under similar hydrologic conditions. Additional details on the setup and results of the Validation Scenarios are presented in **Attachment C**.

An initial validation scenario compared an analytical model simulation based on pumping tests at the WKWD North Wellfield which is located adjacent to the Recovery Project (**Figure 4**). In July 2020, WKWD provided detailed data on aquifer testing, groundwater pumping and measured water levels for the North Wellfield, including October 2012 through December 2014 pumping data from the five WKWD groundwater production wells. This period was the beginning of a significant drought period and groundwater pumping associated with the nearby groundwater banks was also occurring. Consequently, the measured groundwater elevations at the WKWD North Wellfield wells would be affected by this pumping and could be used as a

comparison to modeled groundwater recovery pumping. Based on this comparison, modifications were made to the hydraulic conductivity in the Superposition Model for the BVWSD area as described in both **Attachments B** and **C.**

A previous validation scenario had been constructed to evaluate groundwater level changes resulting from recharge operations at the Kern Water Bank from 1993 to 1998 (Todd Groundwater 2017). This period represents the initial recharge operations at the Kern Water Bank and other nearby recharge facilities prior to significant recovery activities. This scenario evaluated the capability of the Superposition Model to simulate the effects of major changes in groundwater levels as a result of managed aquifer recharge. The previous scenario was rerun using the modified hydraulic conductivities from the WKWD validation scenarios. Based on the model validation, the Superposition Model provides a useful planning tool to evaluate potential groundwater changes resulting from the Palms Project.

Since the pumping and recharge conditions imposed for the validation scenario meet or exceed those proposed for the both the Palms and Recovery Projects, the validation scenario results provide a means to determine the relative percentage of uncertainty that is appropriate for the Palms Project. The validation scenarios indicate a relative level of uncertainty of approximately 15 percent (**Attachment C**). This would apply to the overall model results with the acknowledgement that uncertainties for a specific location may have a larger or smaller percentage.

The groundwater modeling performed for this report is intended as an initial screening-level analysis to evaluate the overall feasibility of using BVWSD's ponds with higher discharge volumes. To accommodate uncertainty in the conceptual model, the Recovery Project scenario uses reasonable, but conservative, assumptions based on the available site data so as not to overestimate the capacity of the shallow aquifer. The model validation demonstrates the capability of the Superposition Model, as it is configured for this study, to reasonably simulate the change in groundwater levels and trends based on the comparison to measured data.

5. RECOVERY PROJECT SCENARIO

The Superposition Model was used to evaluate a number of potential alternatives for the Recovery Project. The Recovery Project Scenario, described below, provides an assessment of the recovery operations of 14 wells to pump the recharged groundwater for use by BVWSD.

5.1 Approach

Two operational scenarios were run to assess changes in groundwater conditions from the combined Palm and Recovery Projects. The original project description (Scenario A) included an assumption of 100 percent recovery of the recharged water as a worst-case scenario with respect to groundwater level impacts. The Reduced Recovery Alternative (Scenario B), the Recovery Project would recover 90 percent of the recharged water, with the remaining 10 percent of the Palms Project recharge remaining in the groundwater basin as a *leave-behind*. The two different Recovery Project operation scenarios were setup as follows:

- *Scenario A* simulates the combined Palms and Recovery Project operations using an assumption of 100 percent recovery of the Palms Project recharged water as a worst-case scenario with respect to groundwater level impacts. The simulated recovery

pumping occurs at a rate of 25,000 AFY over a six-month period over four consecutive years (**Figure 9**).

- *Scenario B* simulates the combined Palms and Recovery Project operations using an assumption of 90 percent recovery of the Palms Project recharged water as a most-likely case scenario with respect to groundwater level impacts. The simulated recovery pumping occurs at a rate of 25,000 AFY over a six-month period over three consecutive years. During the fourth year, the simulated recovery pumping occurs at a rate of 15,000 AFY (**Figure 9**). The same pumping rate occurs during the first 3 months, reduced pumping occurs in the fourth month, and no pumping during final two months of the fourth-year extraction period.

The relatively straightforward operational strategy used for this scenario helps to evaluate a direct cause-and-effect relationship that applies a maximum recharge and recovery operational condition where 100,000 AF of recharge occurs in a single year and recovery occurs at the Recovery Project maximum rate of 25,000 AFY over a period of four consecutive years. No additional recharge is included in the Project scenario.

5.2 Recovery Project Scenario Setup

The objective of this scenario is to simulate a relatively straightforward operational strategy that assumes a high volume of recharge (100,000 AF) occurring in a single-year followed by four consecutive years of pumping at the Project-specified maximum pumping of the combined wellfield of 25,000 AFY. Historical, BVWSD typically has smaller recharge volumes and smaller groundwater recovery pumping that occurs over a longer period of time. Also, it is not unusual for recharge and recovery to occur during the same year.

The Recovery Project scenario presented in this report represents the most recent configuration of recovery wells based on technical and logistical concerns. The recovery project consists of two areas of pumping and will include facilities needed for recovery and treatment of stored groundwater. One area is located adjacent to the Palms Project and the second area is an annexed area to the northeast where BVWSD has purchased property for the Recovery Project (**Figure 2**). The Recovery Project scenario consists of four operational stages that are outlined below:

- Year 1 – Recharge of 100,000 AF of water at Palms Project recharge sites operated by BVWSD distributed over an eight-month period in a manner consistent with past high-volume recharge events by BVWSD.
- Year 2 – No recharge or recovery to allow for some dissipation of the mound (conservative assumption on groundwater impacts).
- Years 3 through 6 – Recovery pumping of 25,000 AFY from 14 Project wells shown on **Figure 2**. A uniform pumping rate is applied to each well with the pumping spread over a six-month period consistent with past BVWSD pumping operations.
- Years 7 through 11 - No recharge or recovery to evaluate long-term recovery from operations.

Because this is a superposition model, only the combined Palms and Recovery Project operations were simulated. The 14 proposed groundwater pumping locations were located as

shown on **Figure 2**. No other pumping is included in the scenario. The simulation was run over the 11-year simulation period using one-month stress periods.

5.3 Evaluation of Scenario Results

The Superposition Model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. Therefore, the model results provide the relative change in groundwater levels due to the combined Palms and Recovery Projects; in other words, a superposition model directly calculates the groundwater level impacts resulting from the combined Palms and Recovery Projects. Model results are presented using a variety of maps and graphs to provide for a comprehensive analysis of Project-related impacts on groundwater resources. Techniques used to present the results of the groundwater impacts analysis are summarized briefly below:

- *Groundwater Level Change Maps* – contour maps that show the simulated change in groundwater levels in the vicinity of the Recovery Project. This analysis provides a direct assessment of the spatial distribution of groundwater level impacts of the combined Palms and Recovery Projects.
- *Change Hydrographs* – hydrographs that show the change in groundwater levels over time for representative locations in the vicinity of the combined Palms and Recovery Projects to provide a direct assessment of the magnitude of impacts of the Palms Project operations on groundwater levels over time.
- *Superposition Hydrographs* – simulated groundwater elevation changes are superimposed onto hydrographs (based on measured groundwater elevation data) to evaluate -related impacts due to the combined Palms and Recovery Projects relative to historical groundwater elevation data. This analysis evaluates the scale of the impacts of the Palms Project compared to the historical variation in groundwater levels from monitoring wells in the vicinity. The superposition hydrographs are compared to historical data for Scenario B.

Collectively, these maps and graphs, along with additional model results, illustrate how the Project will impact groundwater in the vicinity of the Recovery Project. The results of the groundwater impacts analysis using the Superposition Model is summarized below.

5.4 Palms Project Scenario Groundwater Change Maps

A series of groundwater level change maps are provided that show the simulated change in groundwater levels at key intervals during the simulated operations of the combined Palms and Recovery Projects. These illustrate the spatial distribution of groundwater level change resulting from the proposed Recovery Project operations and are discussed below.

Figure 10 shows the distribution of the change in groundwater levels representing the maximum mounding at the end of the Year 1 recharge event. Both Scenarios A and B use the same recharge setup, so **Figure 10** is the same for both Scenarios A and B. The maximum increase of groundwater levels of up to 100 feet occur in the center of the Palms Project, and mounding of 10 to 50 feet covers a large area of Palms Project area. Lesser amounts of mounding extend into WKWD and the western areas of the Kern Water Bank.

Figure 11 shows the distribution of the residual mound prior to the initiation of recovery pumping in Year 3. This map is the same for both Scenarios A and B. This represents the buildup of groundwater levels as groundwater flows away from the recharge area to the surrounding areas over the 20 months between the end of recharge and the beginning of the recovery.

Figure 12 shows the distribution of the cumulative groundwater level change for the simulation after the first year of recovery pumping in Year 3 of the simulation. This map is the same for both Scenarios A and B. Drawdown shown on **Figure 12** is the result of the first year of Recovery Project pumping in Simulation Year 3 imposed on the residual mound from the Palms Project (**Figure 11**). Therefore, the change in groundwater levels relative to the beginning of the scenario as shown on **Figure 12** show the maximum cumulative groundwater level change of less than 10 feet occurs near the recovery wells. Adjacent areas in WKWD, RRBWSD and Kern Water Bank still have elevated groundwater levels of 0 to 4 feet resulting the Palms Project recharge.

Figure 13 shows the distribution of the cumulative groundwater level change for Scenario A after the fourth year of recovery pumping in Year 6 of the simulation. The contours show the maximum cumulative groundwater level change relative to the start of the simulation of 20 to 35 feet occurs near the recovery wells. The cumulative groundwater level declines of 2 to 10 feet cover the area of Recovery Project and extend further into western areas in RRBWSD and across the western half of the Kern Water Bank primarily west of Interstate 5. An area of the residual mound remains to the north in BVWSD.

Figure 14 shows the distribution of the cumulative groundwater level change for Scenario B, which assumes 90 percent recovery of the Palms Project recharge. The contours show the maximum cumulative groundwater level change of 20 to 30 feet occur near the recovery wells. Because groundwater pumping is reduced the fourth year of recovery of Scenario B, the cumulative groundwater level declines are 0 to 2 feet less than those in Scenario A (**Figure 13**).

5.5 Recovery Project Scenario Groundwater Change Hydrographs

The Superposition Model was used to simulate a series of hydrographs for the Recovery Project Scenario. These change hydrographs show the change in groundwater levels over time for representative locations in the vicinity of the Recovery Project. This analysis provides a direct assessment of the magnitude of impacts of the Recovery Project on groundwater levels over time.

Figure 15 shows the locations of the simulated Recovery Project wells used for the Palms Scenario including interim reference names. There are two areas of pumping. One is located within the Palms Project site and the second area is an annexed area to the northeast where BVWSD has purchased property for the Recovery Project.

Figure 16 shows the simulated change in groundwater levels at the Recovery Project wells for Scenario A. The upper graph on **Figure 16** provides the hydrographs for the seven wells located within the Palms Project site. Here the mounding from the recharge reaches a maximum of about 100 feet at the end of the recharge period and a residual mound of 15 feet remains at the beginning of the first pumping period. Drawdowns over the pumping periods are generally on the order of about 20 feet for all of the wells. The cumulative groundwater level declines range from 15 to 25 feet at the end of fourth pumping period with drawdown increasing with each successive pumping period.

The lower graph on **Figure 16** provides the hydrographs for the seven wells located within the annexed area northeast Palms Project site. Here the mounding is less. The mounding reaches a maximum of 8 to 28 feet at the end of the recharge period and a residual mound of 7 to 12 feet remains at the beginning of the first pumping period. The drawdowns, however, are on the order of about 20 feet for each successive pumping period reflecting the influence of higher hydraulic conductivities in this area. The cumulative groundwater level declines range from 10 to 18 feet at the end of the fourth pumping period.

Figure 17 shows the hydrographs for Scenario B at the same locations shown on **Figure 15**. The difference between Scenarios A and B occurs in the fourth year of pumping during which Scenario B pumps 10,000 AF less. As a result, the graphs are identical until the end of the fourth year of pumping when groundwater levels are about 2 to 3 feet higher due to the reduced pumping. **Figure 18** shows the locations of the simulated monitoring points placed in the Superposition Model to document the spatial distribution of response from the combined Palms and Recovery Project operations. These do not reflect actual monitoring points; however, future simulations would include monitoring points at specific locations of interest for the groundwater impacts assessment.

Figure 19 shows the simulated change in groundwater levels produced by the Superposition Model for the Recovery Project Scenario at the simulated monitoring points. The upper graph on **Figure 19** provides the hydrographs for the six simulated monitoring points located near the center of the Palms Project site. These show responses similar to the recovery wells. The effects of the Palms Project operations diminish the further away the simulated monitoring points are located. This is also seen on the lower graph on **Figure 19** where the responses in simulated monitoring points located farther from the center show cumulative groundwater level changes of five feet or less.

Figure 20 shows the hydrographs for Scenario B for the same locations shown on **Figure 18**. The change after the fourth year of pumping is generally 0 to 11 feet for the monitoring points closer to the center and 0 to 2 feet for the monitoring points further from the center. The magnitude of effects is a function of the distance from the Recovery Project wells.

5.6 Recovery Project Scenario Superposition Hydrographs

Superposition hydrographs provide a means to assess the effect of the Recovery Project at various locations. For this analysis, the simulated groundwater elevation change is added, or superimposed, onto the measured groundwater elevation data to evaluate Project-related impacts relative to historical groundwater elevation data. This analysis evaluates the scale of the impacts of the Recovery Project compared to the historical variation in groundwater levels over time. The superposition hydrographs add the change in groundwater levels from Scenario B to the measured historical groundwater elevations for the selected wells.

For the superposition hydrographs assessment, the recharge event is assumed to occur in 2011, which was a wet hydrologic year where water was available for potential recharge. The recovery pumping is assumed to occur during 2013 through 2016, which was a period of critically dry drought conditions. This period was selected because if represents a recent period where extreme conditions were experienced in the Kern County Subbasin.

A representative selection of wells that have periods of measurements over the 2011 to 2016 period were selected to provide an assessment of the relative change resulting from the combined Palms and Recovery Project operations relative to the historical groundwater level

variations observed at these locations. **Figure 21** shows the locations of the selected wells relative the Recovery Project. These hydrographs are shown on **Figures 22** through **26**, and a brief summary is listed below:

- **Figure 22** shows BVWSD monitoring wells near to the Recovery Project. Due to their proximity, these wells show the greatest groundwater level changes. The early mounding as a result of the recharge increases groundwater levels about 60 feet relative to the historical. Maximum drawdown from recovery pumping is about 10 feet at these locations.
- **Figure 23** shows monitoring wells in the western RRBWSD near the Recovery Project. The early mounding as a result of the recharge increases groundwater levels about 2 to 10 feet relative to the historical. Maximum drawdown from recovery pumping ranges from about 1 to 5 feet at these locations.
- **Figure 24** shows Kern Water Bank (KWB) monitoring wells along the western margin of KWB which is closest to the Recovery Project. The early mounding as a result of the recharge increases groundwater levels about 5 to 20 feet relative to the historical. Maximum drawdown from recovery pumping is about 1 to 4 feet.
- **Figure 25** shows monitoring wells in the central RRBWSD area. Due to their distance from the Recovery Project (**Figure 21**), the change in groundwater levels is negligible.
- **Figure 26** shows monitoring wells in the Pioneer Project and the WKWD South wellfield. Due to their distance from the Recovery Project (**Figure 21**), the change in groundwater levels is negligible.

5.7 Groundwater Impacts Assessment

The results of these Recovery Project scenarios indicate that most of the drawdown associated with the recovery wells occurs within and adjacent to BVWSD and the Recovery Project. The simulations results indicate that drawdowns of 0 to 10 feet would be expected at areas adjacent to BVWSD as a result of the Recovery Project recovery wells after four years of full recovery of a recharge volume of 100,000 AF.

6. CUMULATIVE SCENARIO

For the Cumulative Scenario, the C2VSimFG-Kern model used for the 2020 GSPs was used. For the GSPs, the Kern County Subbasin GSAs developed a set of projects to meet the sustainability goals for the Subbasin. The following discussion provides a brief overview of how the C2VSimFG-Kern model was applied for the 2020 GSPs and how it was applied to evaluate the cumulative impacts of the combined Palms and Recovery Project operations.

6.1 C2VSimFG-Kern Model

The Kern County Subbasin Coordination Agreement refers to the local groundwater-surface water model (C2VSimFG-Kern) as the agreed upon method for generating coordinated water budgets for the Kern County Subbasin. Appendices 2 and 4 of the Kern County Subbasin Coordination Agreement include a technical report (Maley and Brush 2020) on the development and application of C2VSimFG-Kern for these purposes. The following provides a brief overview of this technical report.

The primary objective of the C2VSimFG-Kern model is to fulfill the GSP requirement for a coordinated subbasin-wide water budget analysis, while also providing information required to fulfill other GSP requirements. C2VSimFG-Kern was updated to include local water budget data provided by water and irrigation districts, municipalities, and GSAs in the Subbasin. The C2VSimFG-Kern was provided to DWR so the Kern County Subbasin revisions can be incorporated into their master version of the C2VSim model.

The C2VSimFG-Kern results were used to assess whether the simulated groundwater levels would meet the minimum threshold and measurable objective (MT/MO) for the 186 proposed representative monitoring well (RMW) locations spread across the Kern County Subbasin based on MT/MO assigned to each of the 186 locations by their respective GSA or management area (**Figure 27**). A requirement of SGMA is for groundwater levels not to cross their minimum thresholds (MT) to the extent that undesirable results would occur in the basin, and moreover, that proposed SGMA projects and management actions would lead to meeting the measurable objectives.

Because C2VSimFG-Kern is not fully calibrated, the results are presented as relative change (which does not require calibration) instead of simulated groundwater levels using the superposition method. Future change in groundwater level was determined for each of the 186 locations for each of the six projected future simulations. The change was calculated from the simulated March 2015 groundwater levels from the model. The projected-future change in groundwater levels was then applied to the measured March 2015 groundwater level at the monitoring location (i.e., the result was superimposed on top of the simulated change in groundwater levels of the projected future C2VSimFG-Kern scenarios relative to the measured March 2015 groundwater level).

Based on the historical C2VSimFG-Kern results, an estimated level of uncertainty of the overall water budget was determined to be on the order of 10 to 20 percent (Maley and Brush 2020). The C2VSimFG-Kern simulated groundwater levels provide a reasonable approximation of observed groundwater levels in the central part of the Kern County Subbasin producing simulated water budget components that generally match historical values compiled by local agencies. The model is well suited to estimating the impacts of management actions on Subbasin groundwater storage. Notwithstanding some limitations, C2VSimFG-Kern is considered to be the best available information and well-suited as a planning tool to estimate the impacts of the proposed SGMA projects and management actions on groundwater conditions in the Kern County Subbasin.

6.2 SGMA Baseline with Projects Simulation

Potential-future conditions were simulated over a 50-year planning horizon under a range of potential climatic conditions including Baseline (repeat of historical hydrology and climate change analyses for 2030 and 2070 climate change conditions following DWR guidance). Projected water budgets are required by GSP regulations to represent future conditions over a 50-year GSP planning and implementation horizon.

The Baseline Scenarios simulate potential future groundwater conditions in the Kern County Subbasin aquifer if the recent hydrology were repeated with current expected surface water availability and current land use. The Baseline condition was developed that projects water supply, demand and operations based on current land use and expected water supply availability over 50 years. C2VSimFG-Kern simulation results for the last timestep of the

historical simulation (September 30, 2015) were used as initial conditions for all projected future simulations, including initial conditions for the root zone, saturated and unsaturated aquifer zones, and small watersheds.

The Baseline Scenarios were run both with and without SGMA projects. Proposed future projects and management actions were provided by the GSAs. The types of proposed SGMA projects and management actions are summarized as follows:

- Demand Reduction is the volume of water reduced by changing the land use
- New Supply groups together planned increases in imported water supplies,
- Other Supply groups together proposed projects to increase local water supplies such as increased use of surface water, recycled water and low-quality groundwater.

The Baseline Scenario with SGMA Projects simulates the proposed SGMA projects and management actions applied to the Baseline Scenario. **Figure 28** shows the implementation of the SGMA projects by volume and time period as presented in the Coordination Agreement (Maley and Brush 2020). No other changes were made except for the addition of the SGMA projects to provide a direct comparison of the relative benefits of about 422,000 AFY from proposed SGMA projects and management actions. Collectively, the C2VSimFG-Kern simulation results indicate that the currently-proposed SGMA projects and management actions, once fully implemented, provide a reasonable approach to achieve sustainable management of the groundwater basin and can be adaptively managed to meet future challenges as necessary. The projects included in the Projected-Future Baseline with Projects scenario are described in the Kern County Subbasin GSPs (KGA 2020; KRGSA 2020; HMGSA 2020), and excepts from those GSPs describing these projects are provided in **Attachment D**.

6.3 Cumulative Scenario Setup

The proposed recharge and recovery pumping rates of the combined Palms and Recovery Project operations were added to the C2VSimFG-Kern model's SGMA Baseline with Projects Scenario developed for the Kern County Subbasin GSPs under the Coordination Agreement. No other changes were made to the scenario. The purpose of this scenario is to assess the potential effects of the Recovery Project on top of the effects from the possible projects and management actions listed in the Kern County Subbasin GSPs (see **Attachment D**). The projected-future conditions are based on assumptions of future climatic conditions, water management operations and configurations of the proposed SGMA projects. These assumptions are based on historical climatic conditions and planned future water operations as provided by the local water districts.

The Cumulative Scenario setup is limited to adding the recharge at the Palms Project during scenario wet years. These wet years are equivalent to the historical hydrology years of 1998, 2006 and 2011. The Cumulative Scenario follows the 90 percent recovery methodology of Scenario B where pumping occurs at a rate of 25,000 AFY over six months in the years after the recharge event until the total recovery equals 90 percent of the total recharge.

The Cumulative Scenario includes recharge at different volumes. This was done primary to fit straightforward cycles of groundwater recharge followed by a complete 90 percent recovery of the recharge to provide a clear cause and effect analysis of the simulation results without consideration of the effects of recharge account carryover to later years.

- 1998 hydrology equivalent – 100,000 AF recharge event occurred in simulation years 2036 and 2056 followed by four years of pumping of 90 percent of recharge total.
- 2006 hydrology equivalent – 50,000 AF recharge event occurred in simulation years 2036 and 2056 followed by two years of pumping of 90 percent of recharge total.
- 2011 hydrology equivalent – 75,000 AF recharge event occurred in simulation years 2036 and 2056 followed by three years of pumping of 90 percent of recharge total.
- Final two years of simulation - 25,000 AF recharge event occurred in simulation year 2069 followed by one year of pumping of 90 percent of recharge total.

This distribution is graphically displayed on **Figure 29** (blue bars above the 0 line). Over the 50-year simulation, the total recharge is 525,000 AF with 472,500 AF of pumping to recover 90 percent of the Palms Project recharge. The remaining 10 percent of the recharge (52,500 AF) is left in the aquifer. The distribution of recovery pumping from the Palms Project over the 50-year duration of the Cumulative Scenario is depicted as the red bars below the 0 line on **Figure 29**.

6.4 Cumulative with Deferred Recovery Scenario Setup

As discussed below, the simulation results indicated that groundwater elevations at some RMW locations adjacent to the Recovery Project recovery wells fall below their MT. There are many potential mitigation measures that are possible for addressing this issue. For this scenario, the approach was to apply the recharge following the same schedule as for the Cumulative Scenario, but to stop Recovery Project pumping prior to groundwater levels at the RMW locations reaching their MTs. This scenario was developed to test whether deferring the pumping to a later period would keep groundwater levels above MTs.

This pumping was then applied during a later period in the 50-year simulation when simulated groundwater levels were higher, thus simulating a deferred recovery mitigation measure. As a result, the total recharge and pumping over the 50-year simulation period is the same as the Cumulative Scenario. The distribution of recharge and pumping from the combined Palms and Recovery Project operations over the 50-year duration of the Cumulative with Deferred Recovery Scenario is shown as the green bars below the 0 line on **Figure 29** to provide a comparison to the Cumulative Scenario.

6.5 Groundwater Impacts Assessment

The simulation results of the Cumulative Scenario are provided on a series of hydrographs from RMW locations in the vicinity of the Recovery Project. **Figures 30, 31, 32** and **33** provide the results of the RMW locations in the vicinity of the Recovery Project. The locations of the RMWs are shown on **Figure 27**. The graphs show the MT/MO for each RMW location along with the SGMA Baseline and Baseline with Project Scenarios.

The Recovery Project Cumulative Scenario results are presented within context of the SGMA simulations. These results indicate the potential for recovery pumping by the Recovery Project to cause the groundwater levels at the WKWD North Wellfield (**Figure 30**) and the far western areas of RRBWSD (**Figure 31**) to fall below the MT (red line) during simulation years. Conversely, groundwater levels during the recharge events are higher than those without the existing Palms Recharge Project.

Other RMW locations more distant from the Recovery Project (WKWD South Wellfield, RRBWSD, KRGSA (City of Bakersfield) and the Pioneer Project) show negligible effects from the Recovery Project operations (**Figures 32** and **33**). **Figure 32** shows hydrographs of RMWs in the vicinity of the Recovery Project while **Figure 33**shows hydrographs of RMWs further away (distal) from the Recovery Project . The Kern Water Bank did not include RMW locations in their GSP so the KWB does not have MT/MOs for assessment under the cumulative analysis. However, it can be assumed that they will show similar effects as a function of distance from the Recovery Project as seen in the other RMW locations. Therefore, there is the potential for effects like those seen in the WKWD North Wellfield to occur in the western Kern Water Bank. These effects will diminish to negligible in the central and eastern areas of the Kern Water Bank.

The Recovery Project Cumulative with Deferred Recovery Scenario shows that groundwater levels at the WKWD North Wellfield (**Figure 30**) and the far western areas of RRBWSD (**Figure 31**) are generally higher than those with the Baseline with Project Scenarios. By deferring the recovery pumping, these RMW locations still have some benefit of the Recovery Project recharge. The deferred pumping occurs during a period when the simulated groundwater levels for the planned SGMA projects are above the MTs for the WKWD North Wellfield and the far western RRBWSD RMW locations.

In the GSPs for the WKWD and RRBWSD, the definition of the potential undesirable results from groundwater levels falling MTs is defined in terms of number of wells within an area and duration of the occurrence. Excerpts taken from the WKWD and RRBWSD GSPs defining undesirable results is provided below.

- West Kern Water District (excerpt taken from WKWD 2019, Section 5.4.2, page 5-3)–
    - *An undesirable result would occur when the minimum threshold for groundwater levels are exceeded in at least three adjacent management areas that represent at least 15 percent of the Subbasin, or that represent greater than 30 percent of the Subbasin (as measured by each management area; see Section 7.0 for more information about Subbasin management areas). Each GSAs will set minimum thresholds by each of Chapter GSP that participates in the KGA*.
- Rosedale-Rio Bravo Water Storage District/Rosedale-Rio Bravo Management Agency (RRBMA) (excerpt taken from RRBWSD 2019, Section 5.1, page 69)
    - *The RRBMA will seek to maintain at least two water level monitoring points for each monitoring zone. To the extent that average water levels in of designated monitoring points has exceeded the minimum threshold of the monitoring zone, it will be considered an undesirable result. To the extent that two of the North, Central, and South of River zones exceed this criterion, the RRBMA will consider it an undesirable result. To the extent that either the South or East zones exceed this criterion, the RRBMA will consider it an undesirable result*.

As described above, undesirable results are defined in terms of sustained exceedances of minimum thresholds for multiple wells over an extended period of time. The results of the Recovery Project Cumulative with Deferred Recovery Scenario indicate that active measures are available for Recovery Project operations to reduce the effects on groundwater levels to limit potential undesirable results.

The operations used for the Cumulative Scenario represent an aggressive operational strategy to represent a maximum operational scenario consistent with the hydrological conditions presented over the 50-year Baseline Scenario. Actual operations would be dependent upon actual hydrologic conditions which would affect the availability of surface water for recharge and local water demand.

7. CLOSURE

The conclusions and recommendations presented herein are professional opinions based on the model simulations described herein. The findings and professional opinions presented in this memorandum are presented within the limits prescribed by the client contract and in accordance with generally accepted professional engineering, geologic and modeling practices. There is no other warranty, either expressed or implied, regarding the conclusions, recommendations, and opinions presented in this report.

8. REFERENCES

Buena Vista Water Storage District (BVWSD), 2014, Groundwater Management Plan Revised May.

Buena Vista Water Storage District (BVWSD), 2016, 2015 Agricultural Water Management Plan.

Buena Vista Water Storage District Groundwater Sustainability Agency (BVGSA), 2020, Buena Vista Water Storage District GSA Final Groundwater Sustainability Plan, January.

Dale, R.H., French, J.J., and Gordon, C.V., 1966, Ground-Water Geology and Hydrology of the Kern River Alluvial-Fan Area, California, USGS Open-File Report.

ESA, 2017, Kern River Water Allocation Plan Draft Supplemental Environmental Impact Report (SCH# 2011041082), prepared for Kern Delta Water District, August 2017.

Faunt, C., ed, 2009, Groundwater Availability of the Central Valley, California, USGS Professional Paper 1766.

Faunt, C.C., R.T. Hanson, and K. Belitz, 2009, Development of a Three-Dimensional Model of Sedimentary Texture in Valley-Fill Deposits of Central Valley, California, USA, Hydrogeology Journal (2010) 18: 625–649.

GEI Consultants, 2017, Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

Henry Miller Groundwater Sustainability Agency (HMGSA), 2020, Henry Miller Water District Groundwater Sustainability Plan, Kern County Subbasin, January.

Kern Groundwater Authority (KGA), 2020, Kern Groundwater Authority Groundwater Sustainability Plan, January.

Kern River Groundwater Sustainability Agency (KRGSA), 2020, Final Groundwater Sustainability Plan (GSP), Kern River Groundwater Sustainability Agency (KRGSA), January.

Kern Water Bank (KWB), 2020, Kern Water Bank Storage Project within the Kern Groundwater Authority Groundwater Sustainability Plan, January.

Leake, S. A., 2011, Capture—Rates and Directions of Groundwater Flow Don't Matter!, Ground Water, 49: 456–458.

Maley, M. and C. Brush, 2020, SGMA Water Budget Development using C2VSimFG-Kern in support of the Kern County Subbasin Groundwater Sustainability Plans (GSPs), included as Appendices 2 and 4 in the Kern County Subbasin Coordination Agreement. Available at: https://sgma.water.ca.gov/portal/gsp/coordagreement/preview/11.

Reilly, T.E., O.L. Franke, and G.D. Bennett, 1987, The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6.

RRBWSD, 2013, Rosedale-Rio Bravo Water Storage District Groundwater Management Plan, February.

Rosedale-Rio Bravo Water Storage District (RRBWSD), 2019, Groundwater Sustainability Plan chapter for the Rosedale-Rio Bravo Management Area (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December.

Sierra Scientific Services, 2013, The Geology and Groundwater Hydrology of the Buena Vista Water Storage District, Buttonwillow, CA, including Descriptions of Relevant Facilities and Operations, prepared for Buena Vista Water Storage District, May 20.

Todd Groundwater, 2017, Final Groundwater Impacts Assessment Report Kern River Water Allocation Plan, as Appendix D in Supplemental Environmental Impact Report for Kern River Water Allocation Plan, SCH# 2011041082, July, 1,345 pp.

Western Regional Climate Center, 2016, Station 041244 data for January 1, 1940 through January 1, 2015.

West Kern Water District (WKWD), 2016, Urban Water Management Plan 2015 Update.

West Kern Water District (WKWD), 2019, Chapter Groundwater Sustainability Plan (for inclusion in the Kern Groundwater Authority Groundwater Sustainability Plan), December .

List of Figures (following text)

Figure 1 Regional Location Map

Figure 2 BVWSD Palms and Recovery Project Locations

Figure 3 Regional Water Districts and Groundwater Banking Operations

Figure 4 Location of Nearby Groundwater Banking Operations

Figure 5 Local Cross Section through the Palms Project Site

Figure 6 Representative Hydrographs Showing Regional Groundwater Trends near Recovery Project

Figure 7 January 2015 Groundwater Elevation Map of the Buena Vista WSD

Figure 8 January 2015 Depth to Groundwater Map Across Buena Vista WSD

Figure 9 Simulated Recharge and Recovery Operations for Scenarios A and B

Figure 10 Scenario A and B Maximum Groundwater Mound after One Year of Palms Project Recharge

Figure 11 Scenario A and B Residual Mound Prior to Start of Recovery Project Pumping

Figure 12 Scenario A and B Groundwater Level Change at End of First Year of Recovery Project Pumping

Figure 13 Scenario A Groundwater Level Change at end of Fourth Year of Recovery Project Pumping

Figure 14 Scenario B Groundwater Level Change at end of Fourth Year of Recovery Project Pumping

Figure 15 Location of Recovery Project Wells Used in Project Scenarios A and B

Figure 16 Hydrographs of Scenario A Groundwater Level Change in Recovery Project Wells

Figure 17 Hydrographs of Scenario B Groundwater Level Change in Recovery Project Wells

Figure 18 Location of Specified Simulation Points for Recovery Project Scenarios

Figure 19 Hydrographs of Scenario A Groundwater Level Change at Specified Simulation Points

Figure 20 Hydrographs of Scenario B Groundwater Level Change at Specified Simulation Points
Figure 21 Location of Measured Monitoring Wells Used for Superposition Analysis
Figure 22 Superposition Hydrographs of Scenario B onto Measured Water Levels at BVWSD Wells
Figure 23 Superposition Hydrographs of Scenario B onto Measured Water Levels at KWB and RRBWSD Wells
Figure 24 Superposition Hydrographs of Scenario B onto Measured Water Levels at KWB Wells
Figure 25 Superposition Hydrographs of Scenario B onto Measured Water Levels at Eastern RRBWSD Wells
Figure 26 Superposition Hydrographs of Scenario B onto Measured Water Levels at WKWD and Pioneer
Figure 27 Regional Monitoring Well (RMW) Locations
Figure 28 Average Annual Benefit of Proposed SGMA Projects and Management Actions
Figure 29 Cumulative Project Scenario Simulated Recharge and Recovery Operations
Figure 30 Cumulative Scenario Hydrographs of WKWD North Locations
Figure 31 Cumulative Scenario Hydrographs of Western RRBWSD Locations
Figure 32 Cumulative Scenario Hydrographs in Vicinity of Recovery Project Site
Figure 33 Cumulative Scenario Hydrographs Distal from Recovery Project Site

List of Attachments (following figures)

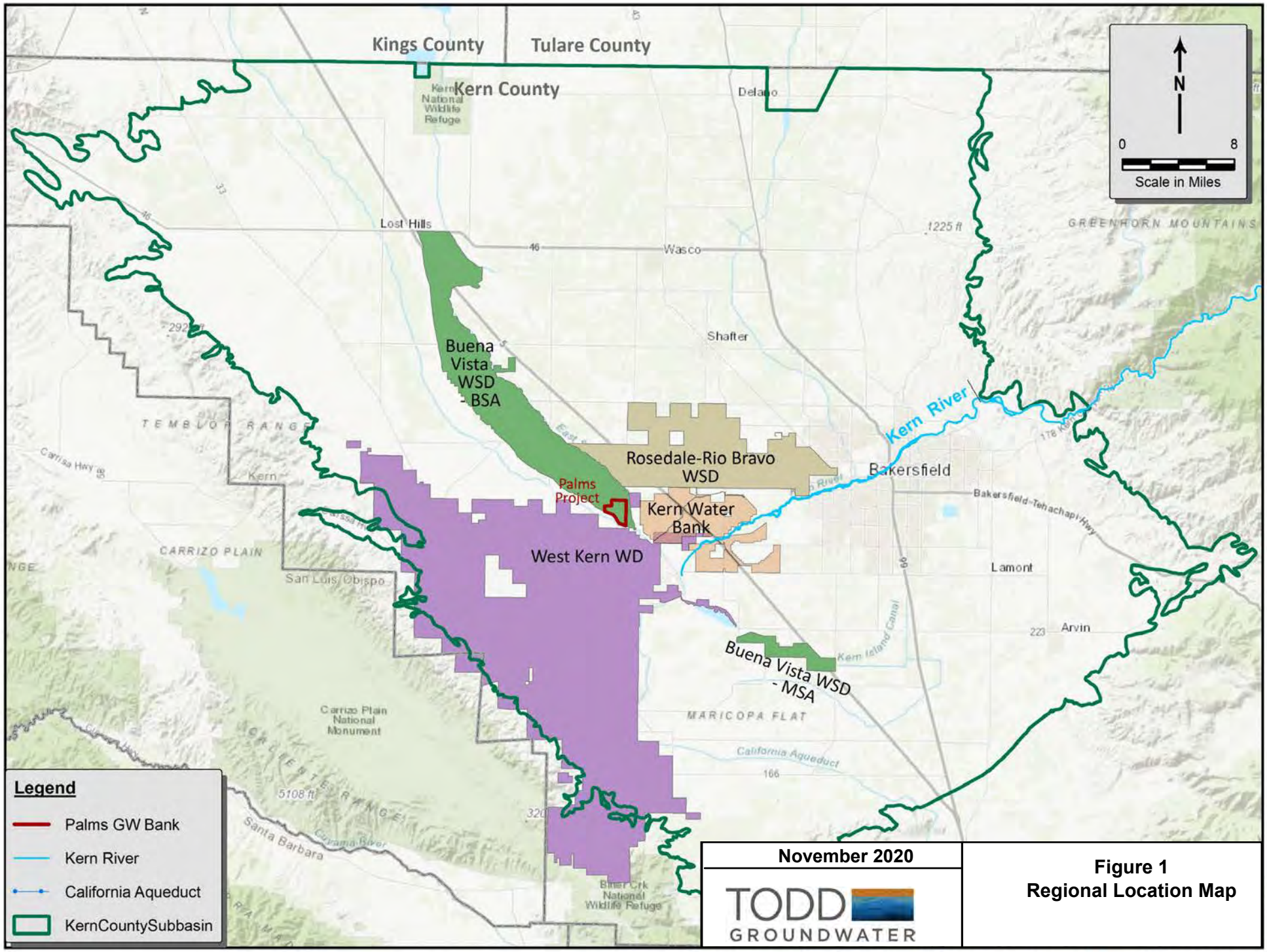
Attachment A Superposition Modeling Approach

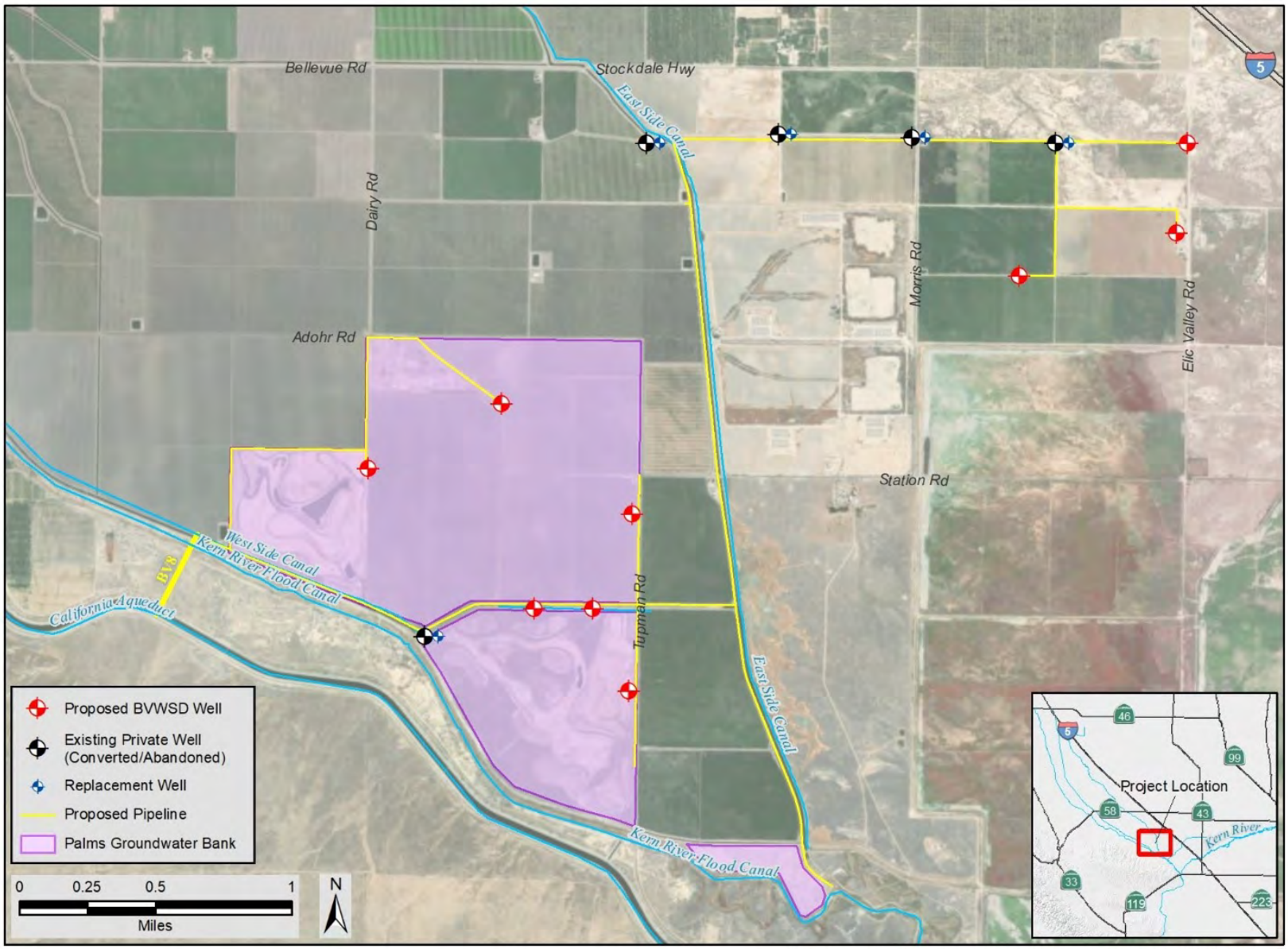
Attachment B Superposition Model Setup

Attachment C Recovery Project Model Validation

Attachment D Recovery Project Cumulative Scenario Project Lists

FIGURES

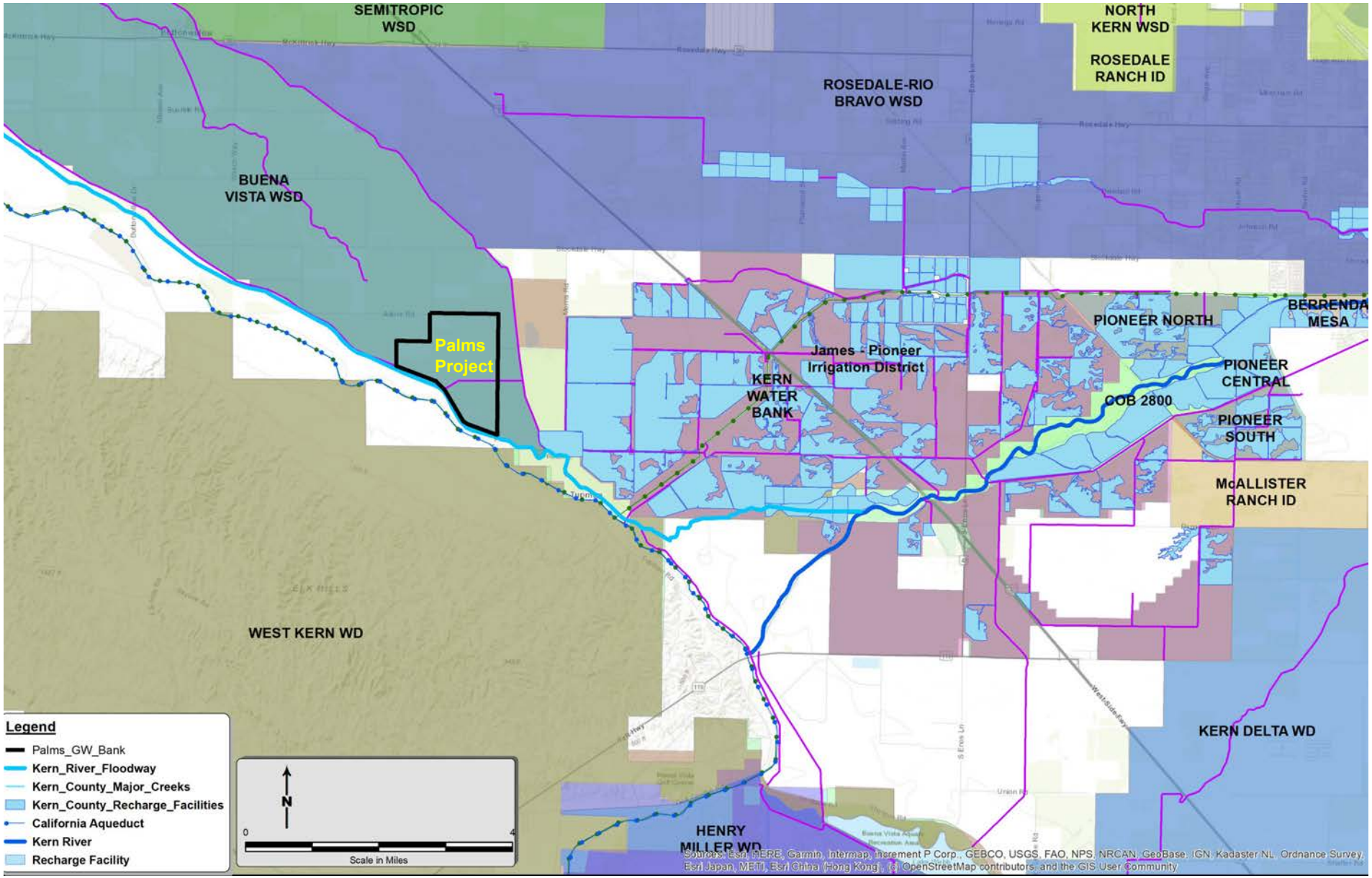

Kings County
Tulare County
Kern County
Kern National Wildlife Refuge
Delano
N
0
8
Scale in Miles
Lost Hills
Wasco
1225 ft
GREENHORN MOUNTAINS
Shafter
Buena Vista WSD - BSA
Kern River
Rosedale-Rio Bravo WSD
Bakersfield
Palms Project
Kern Water Bank
Bakersfield-Tehachapi-Hwy
West Kern WD
Lamont
Arvin
Buena Vista WSD - MSA
MARICOPA FLAT
Kern Island Canal
California Aqueduct
Carrizo Plain National Monument
CARRIZO PLAIN
San Luis Obispo
Santa Barbara
Bitter Crk National Wildlife Refuge
Legend
Palms GW Bank
Kern River
California Aqueduct
KernCountySubbasin
November 2020
TODD GROUNDWATER
Figure 1
Regional Location Map



November 2020

TODD GROUNDWATER

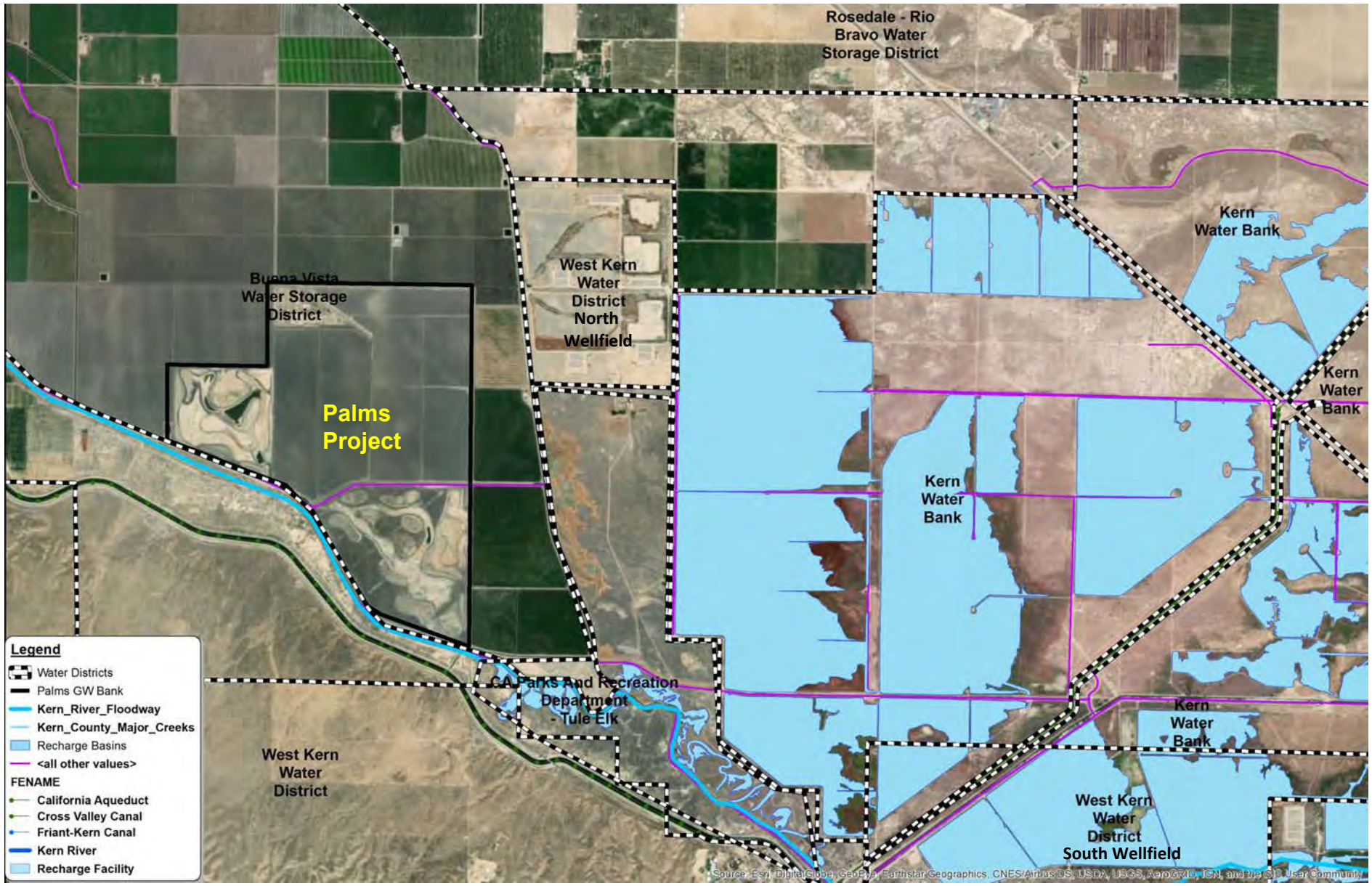
Figure 2
BVWSD Palms and Recovery Project Locations



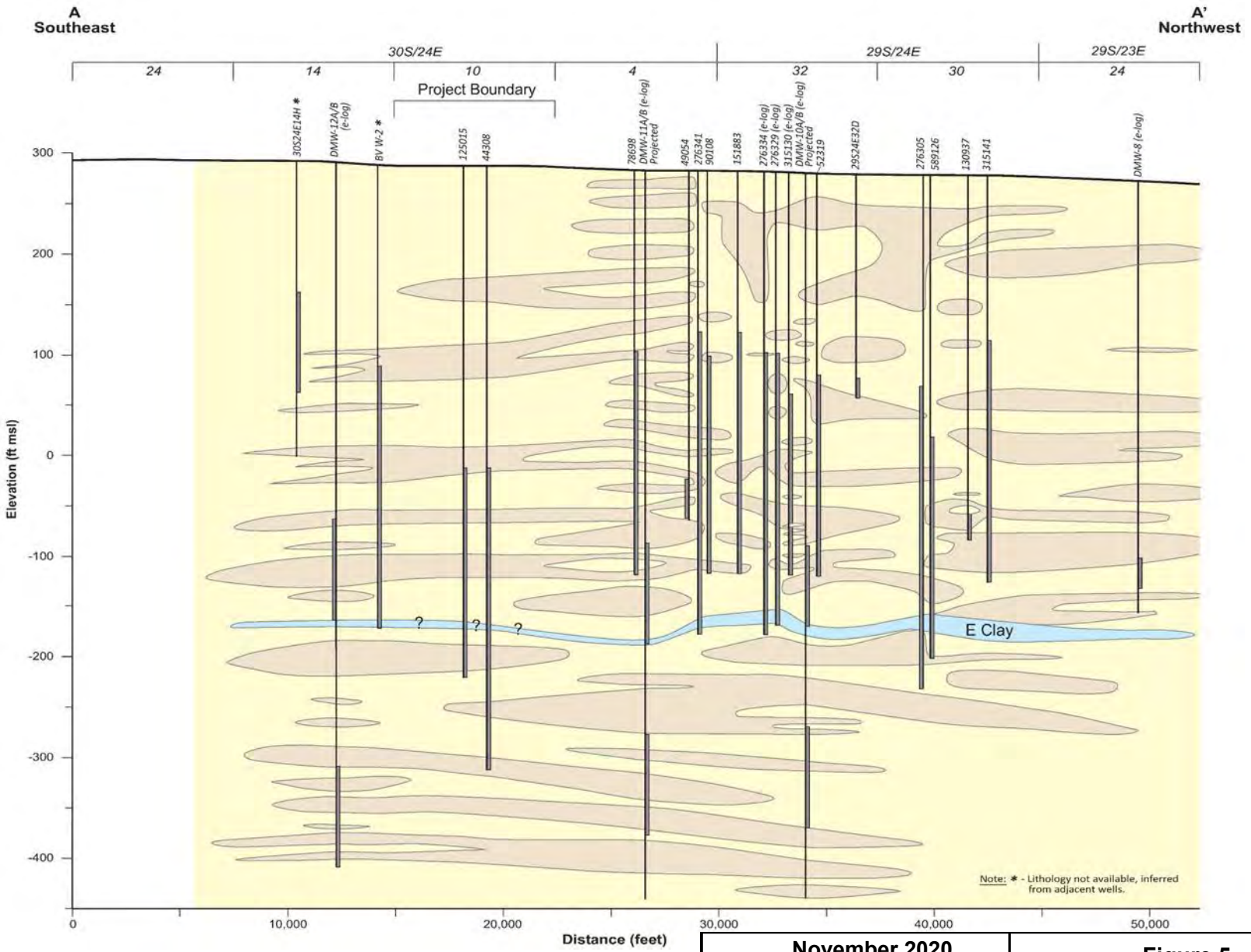
November 2020

TODD GROUNDWATER

Figure 3
Regional Water Districts and Groundwater Banking Operations



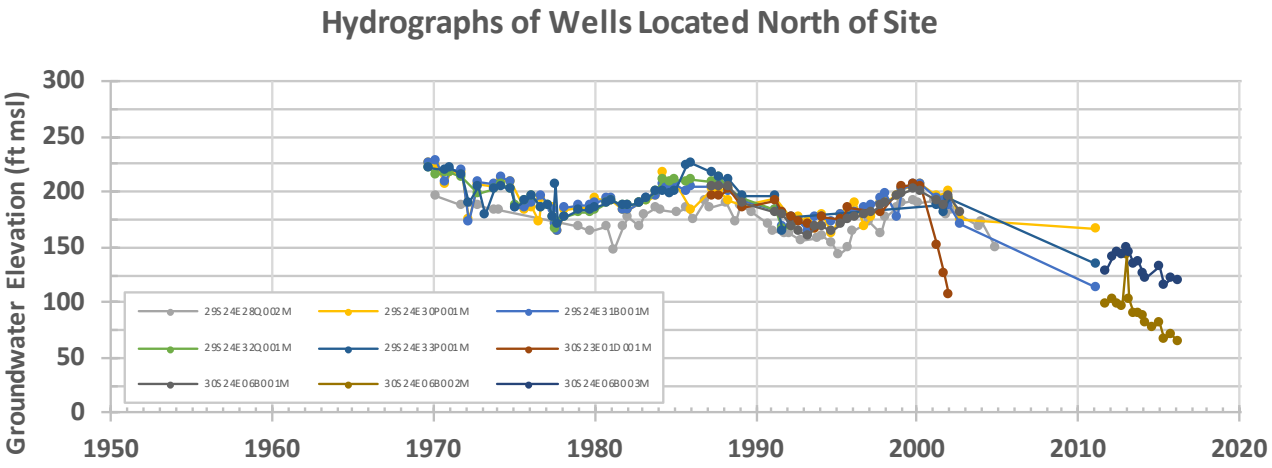
November 2020	Figure 4 Location of Nearby Groundwater Banking Operations
TODD GROUNDWATER	

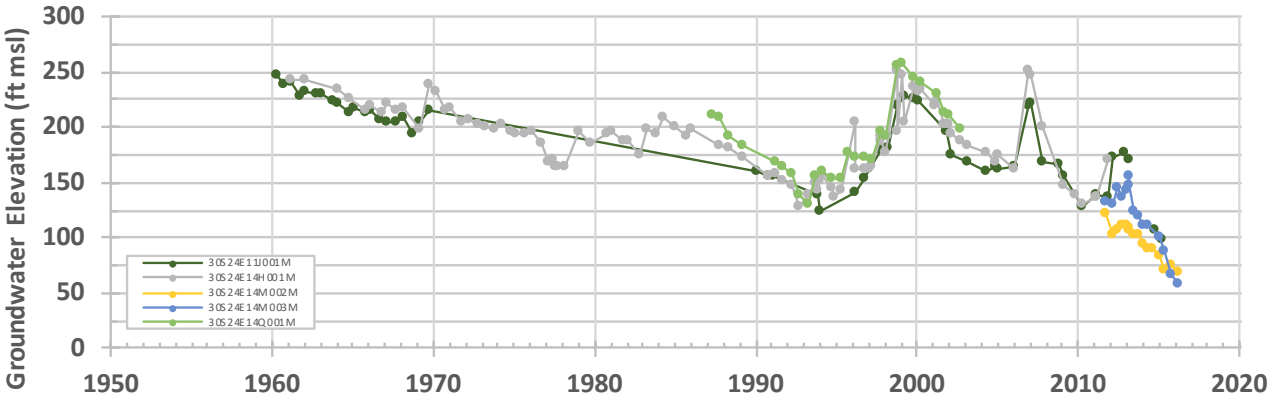


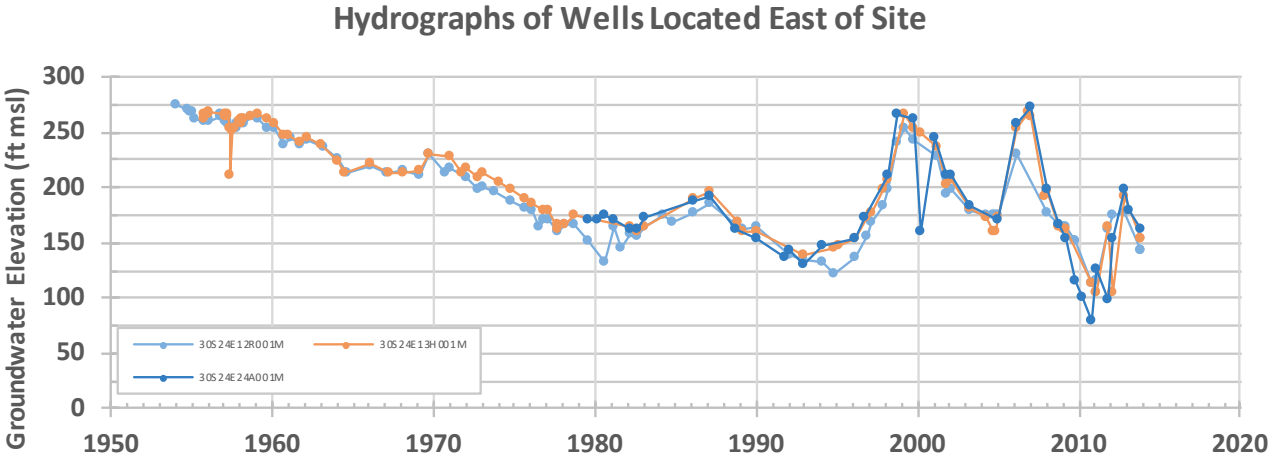
November 2020

TODD GROUNDWATER

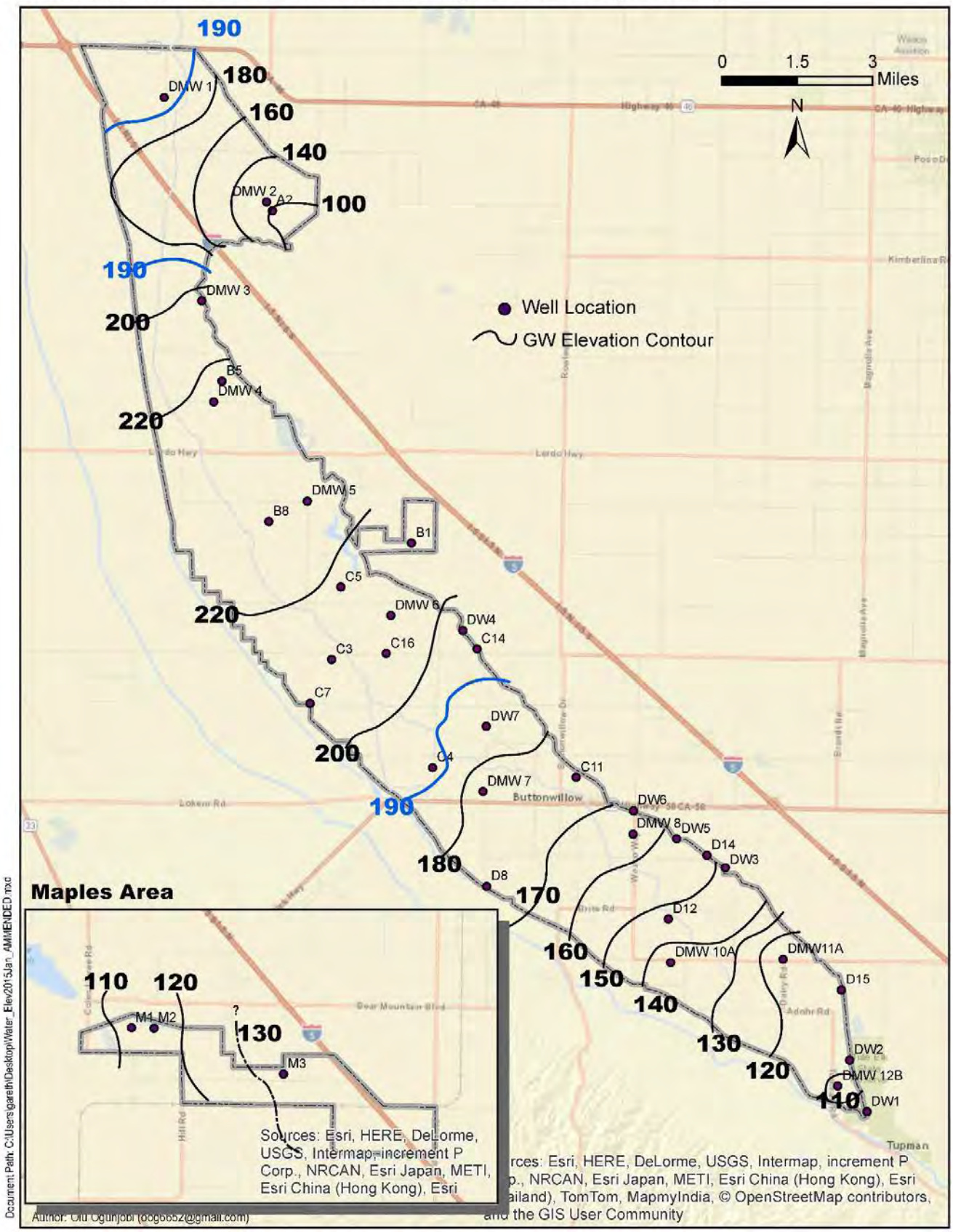
Figure 5
Local Cross Section through the Palms Project Site





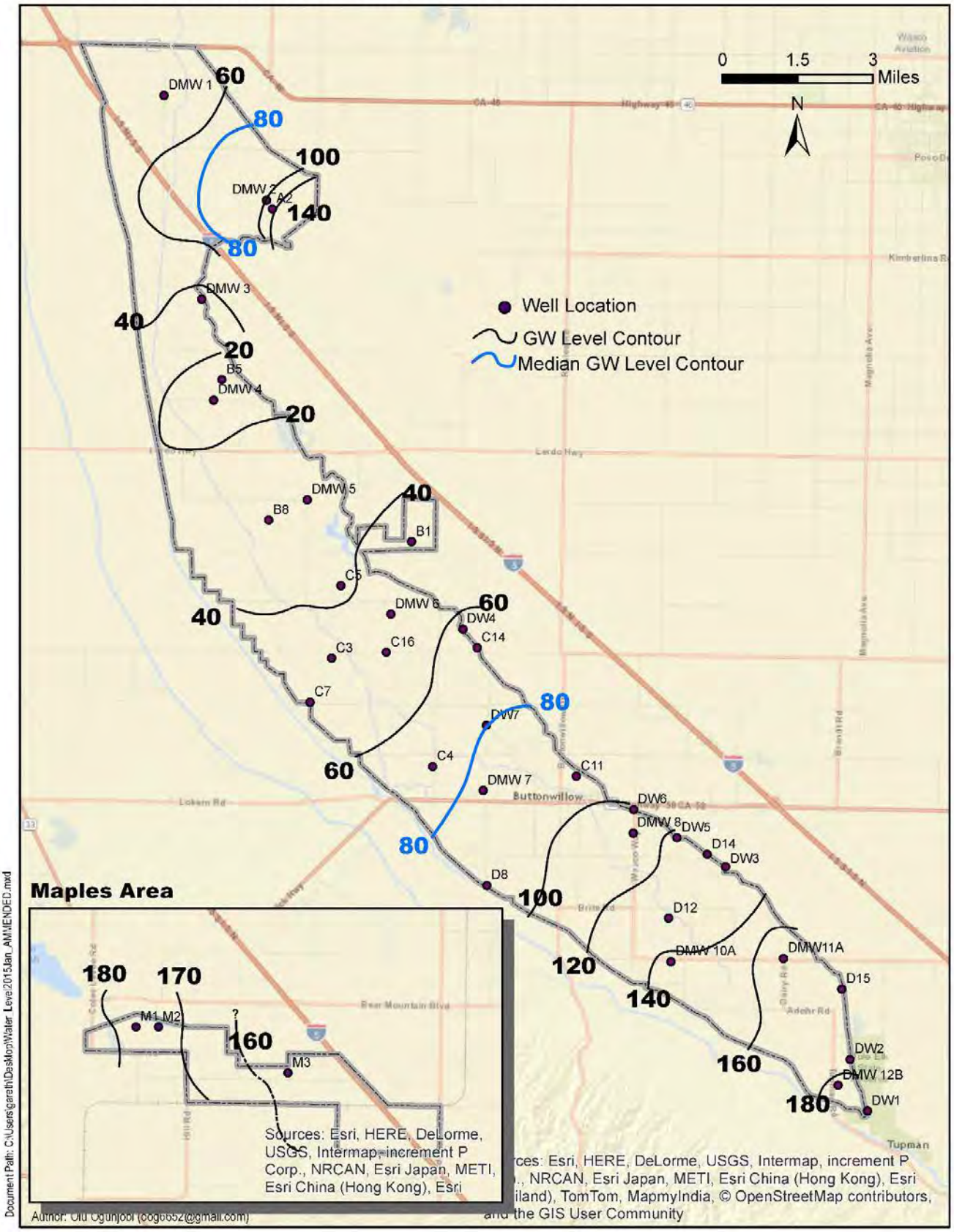


November 2020	Figure 6 Representative Hydrographs Showing Regional Groundwater Trends near Recovery Project
TODD GROUNDWATER	

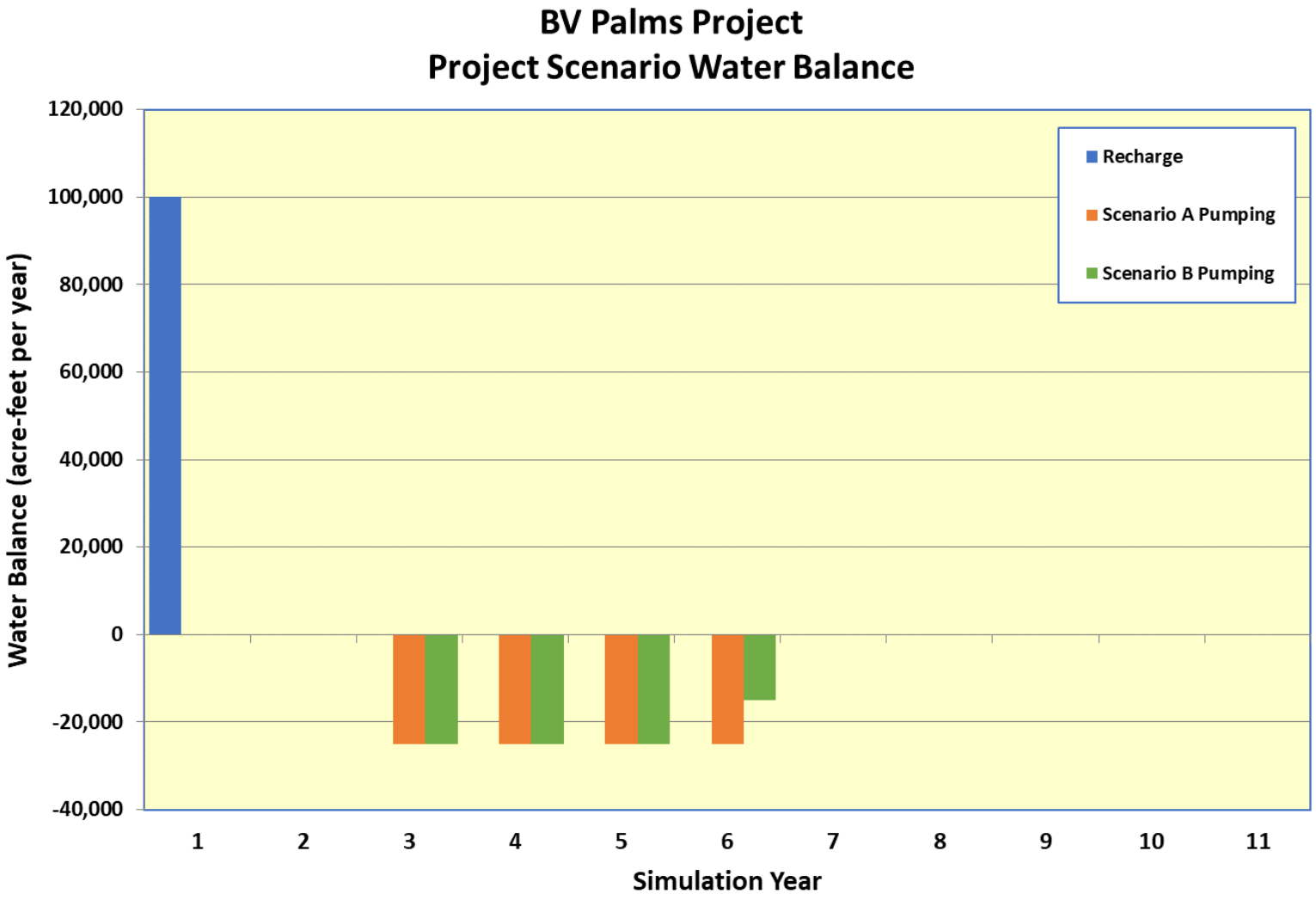


November 2020	Figure 7 January 2015 Groundwater Elevation Map of the Buena Vista WSD
TODD GROUNDWATER	

Groundwater Level Contour Map-Jan 2015 (ft)

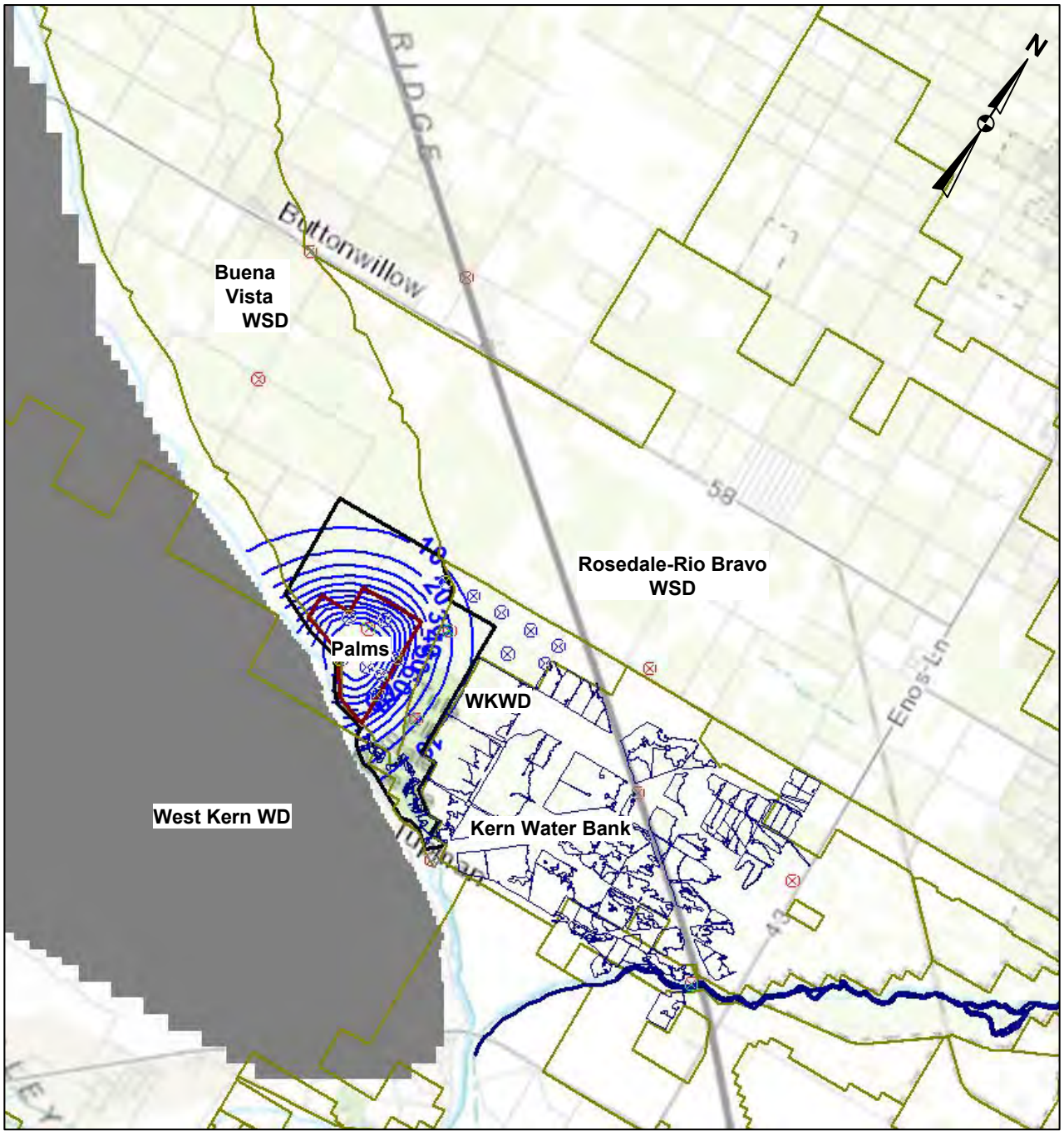


November 2020	Figure 8 January 2015 Depth to Groundwater Map Across Buena Vista WSD
TODD GROUNDWATER	



November 2020	Figure 9 Simulated Recharge and Recovery Operations for Scenarios A and B
TODD GROUNDWATER	

Palms Scenario A and B Maximum Mounding Year 1



Legend

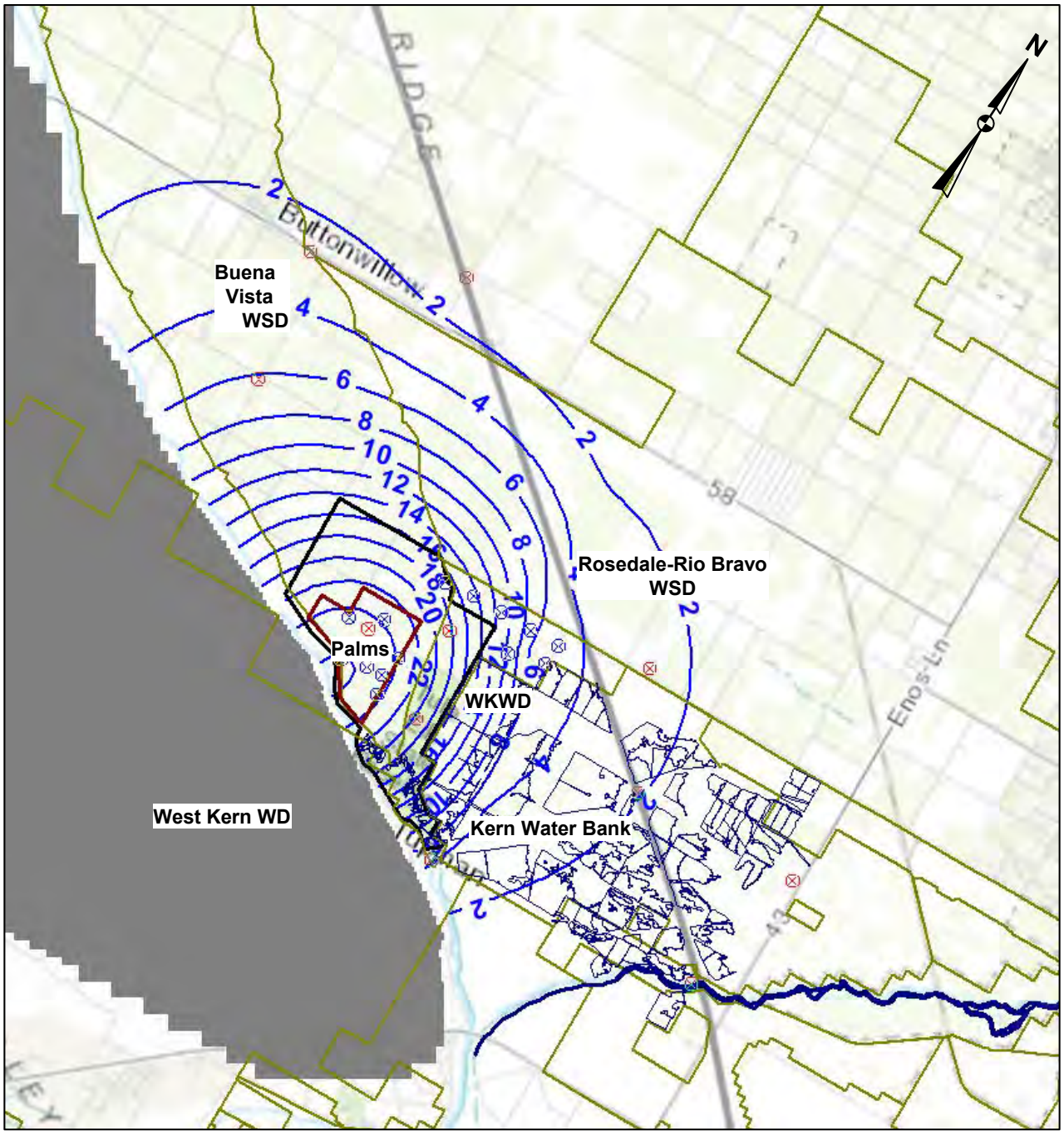
- 10 — Change in Groundwater Level Contour (feet)
- Water District Boundary
- Recharge Pond

November 2020

TODD GROUNDWATER

Figure 10
Scenario A and B Maximum Groundwater Mound after One Year of Palms Project Recharge

Palms Scenario A and B
Residual Model Prior to Pumping
Year 3



0 2 4

Scale: Miles

Legend

10 — Change in Groundwater Level Contour (feet)

Water District Boundary

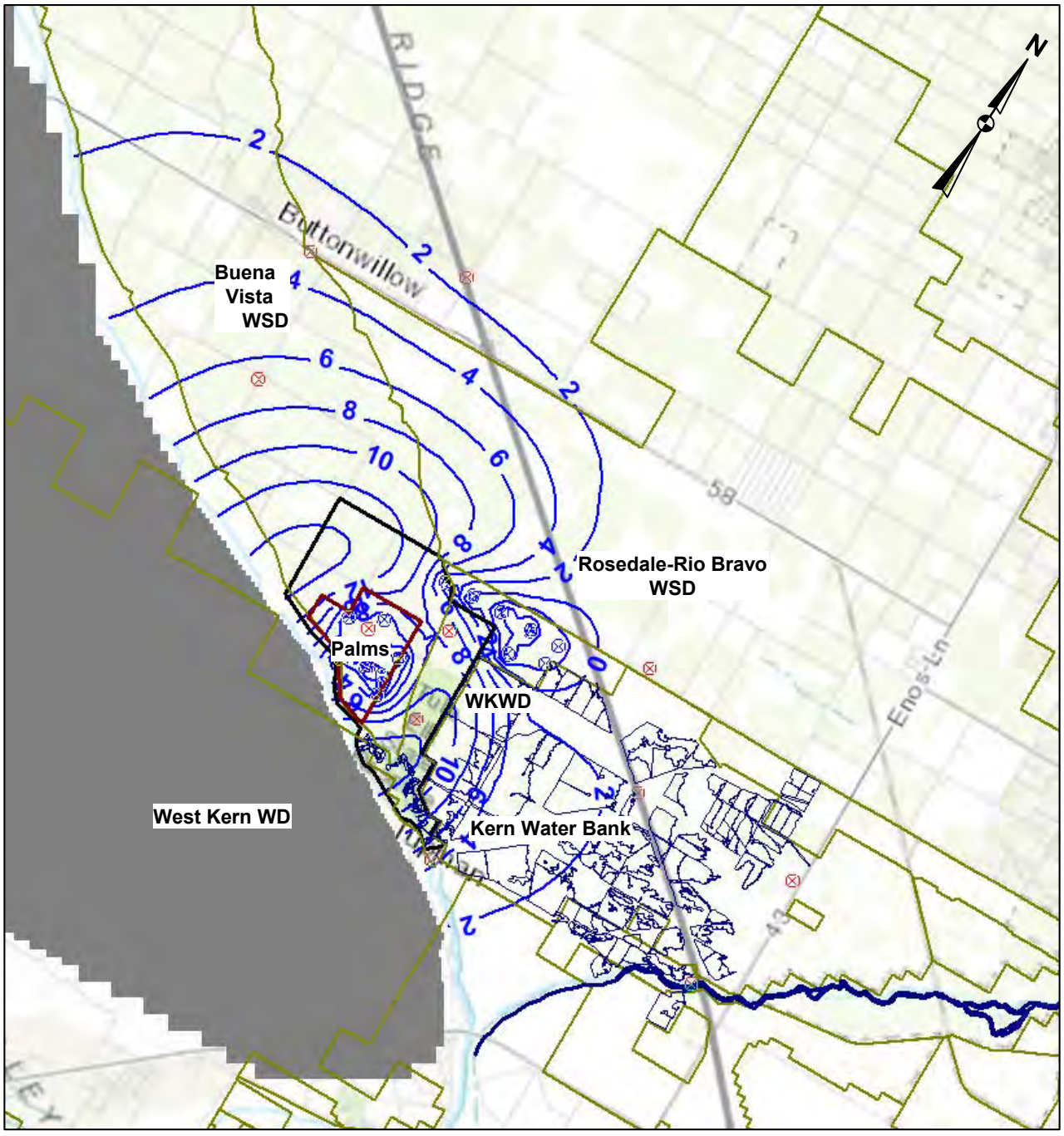
Recharge Pond

November 2020

TODD GROUNDWATER

Figure 11
Scenario A and B Residual Mound Prior to Start of Recovery Project Pumping

Palms Scenario A and B
Drawdown after One Year of Pumping



0 2 4

Scale: Miles

Legend

10 — Change in Groundwater Level Contour (feet)

Water District Boundary

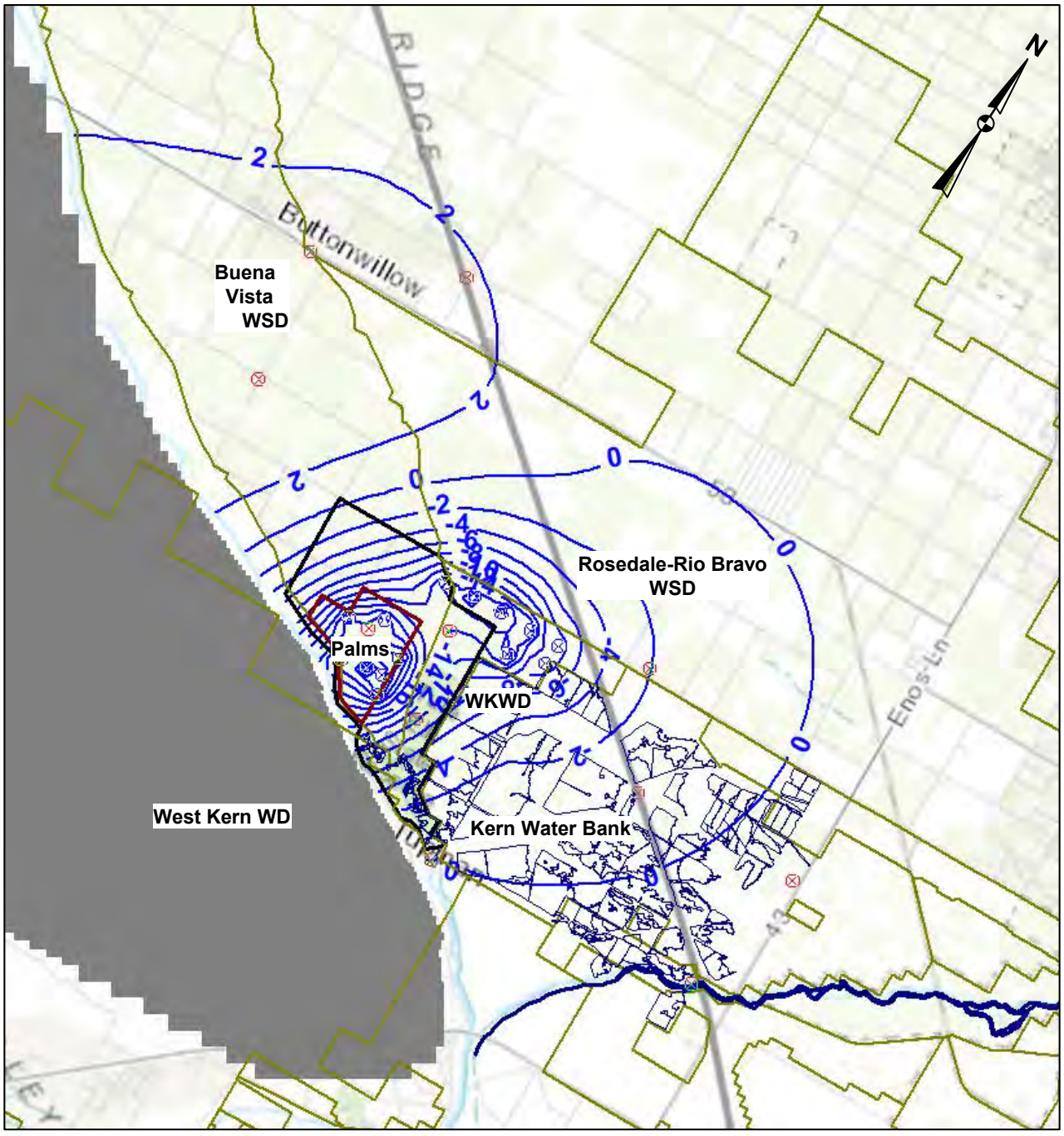
Recharge Pond

November 2020

TODD GROUNDWATER

Figure 12
Scenario A and B Groundwater Level Change at End of First Year of Recovery Project Pumping

Palms Scenario A
Maximum Drawdown
After Four Years of Pumping



Legend

- 10 — Change in Groundwater Level Contour (feet)
- Water District Boundary
- Recharge Pond

November 2020

TODD GROUNDWATER

Figure 13
Scenario A Groundwater Level Change at end of Fourth Year of Recovery Project Pumping

Palms Scenario B
Maximum Drawdown
After Four Years of Pumping

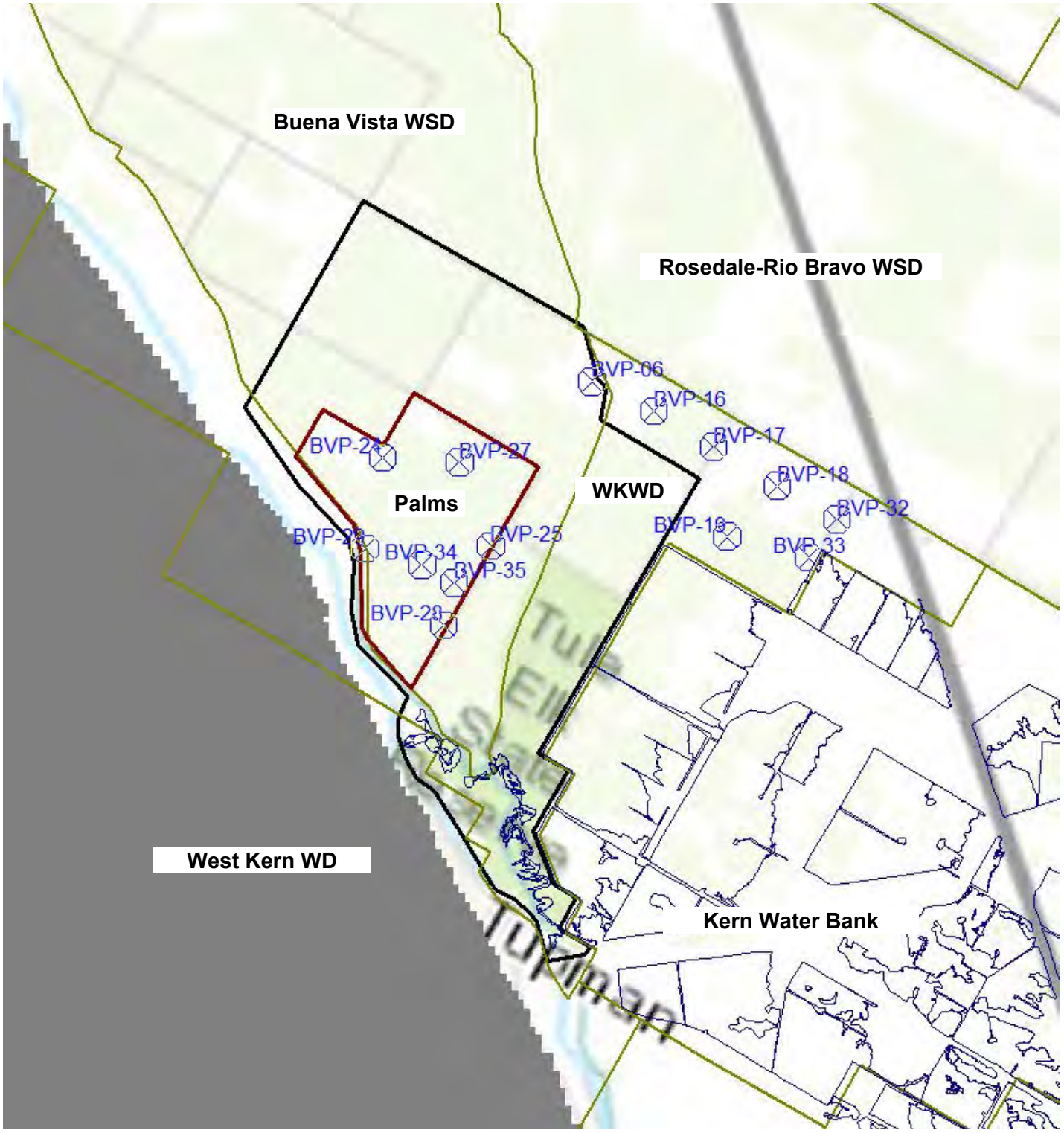
Legend

- 10 — Change in Groundwater Level Contour (feet)
- Water District Boundary
- Recharge Pond

November 2020

TODD GROUNDWATER

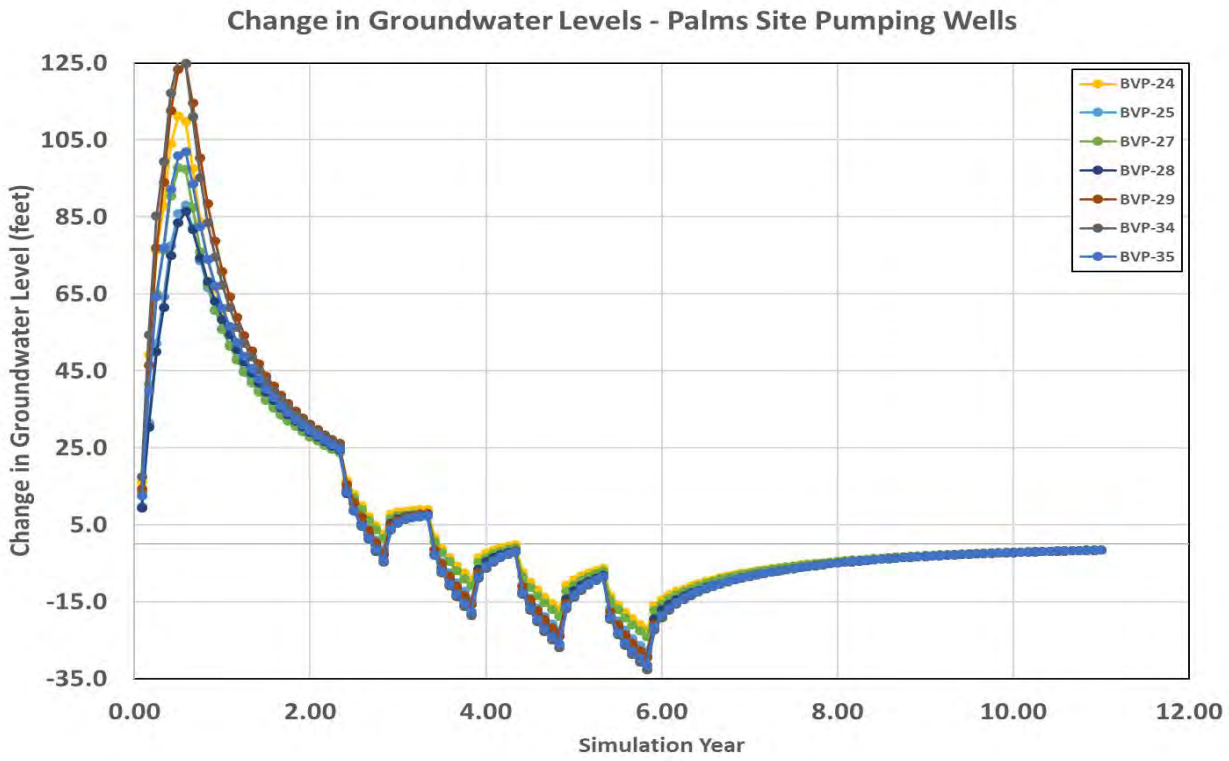
Figure 14
Scenario B Groundwater Level Change at end of Fourth Year of Recovery Project Pumping

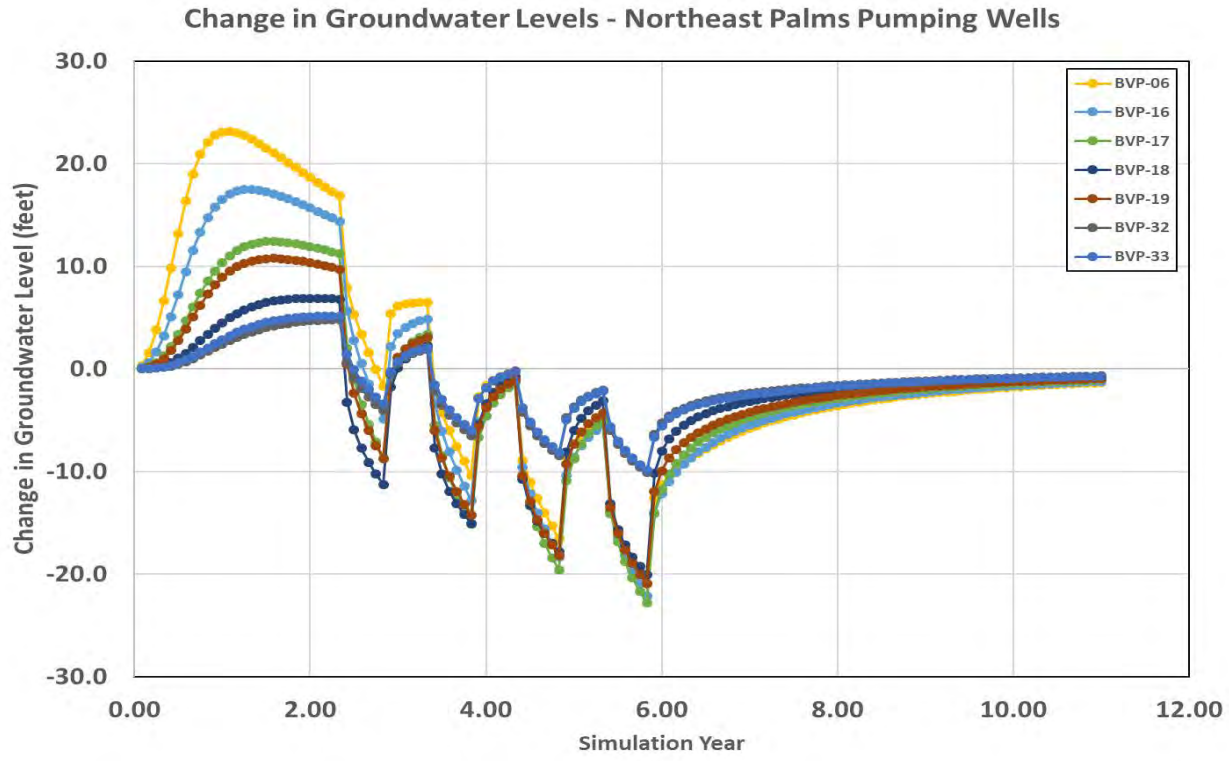


November 2020

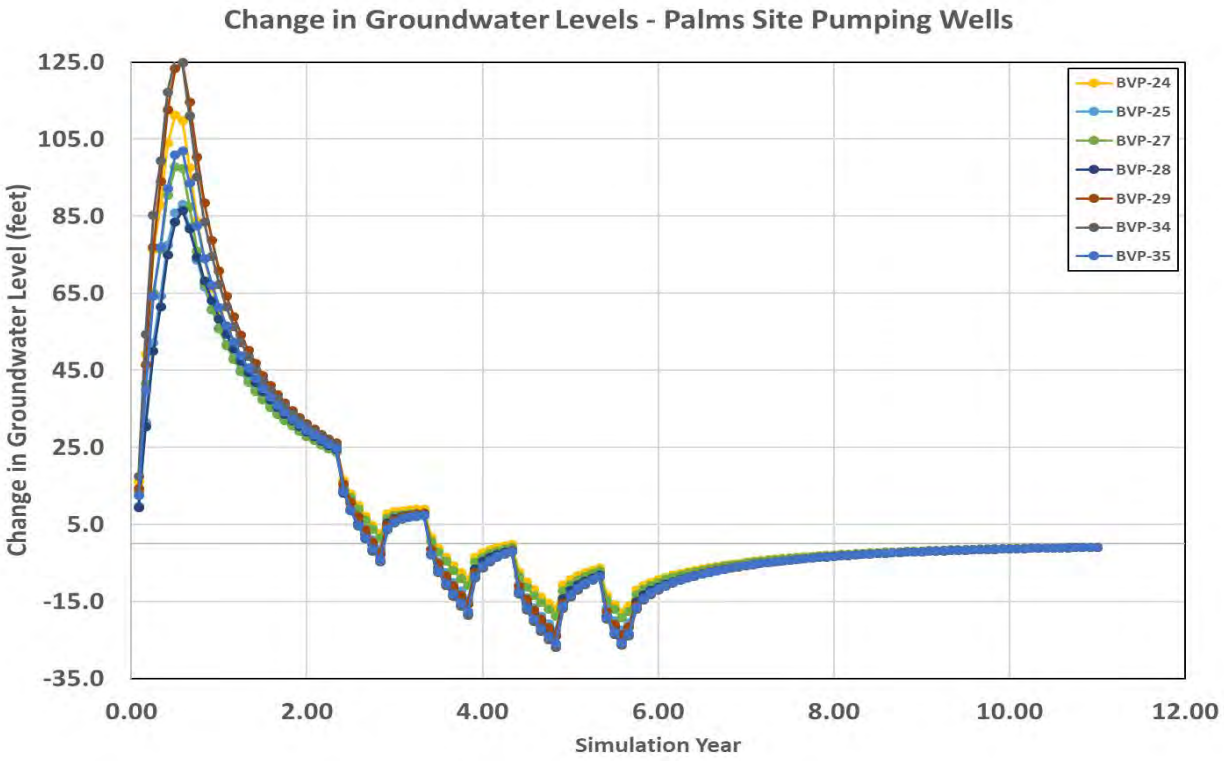
TODD GROUNDWATER

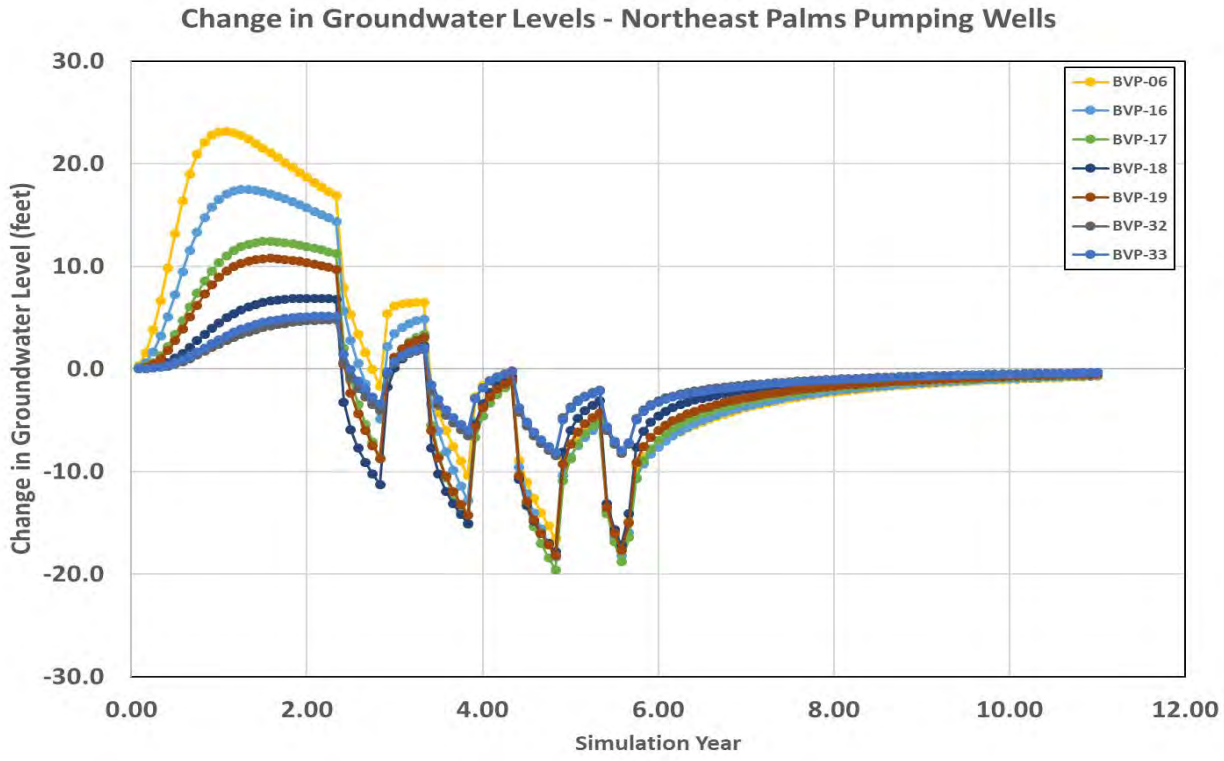
Figure 15
Location of Recovery Project Wells Used in Project Scenarios A and B



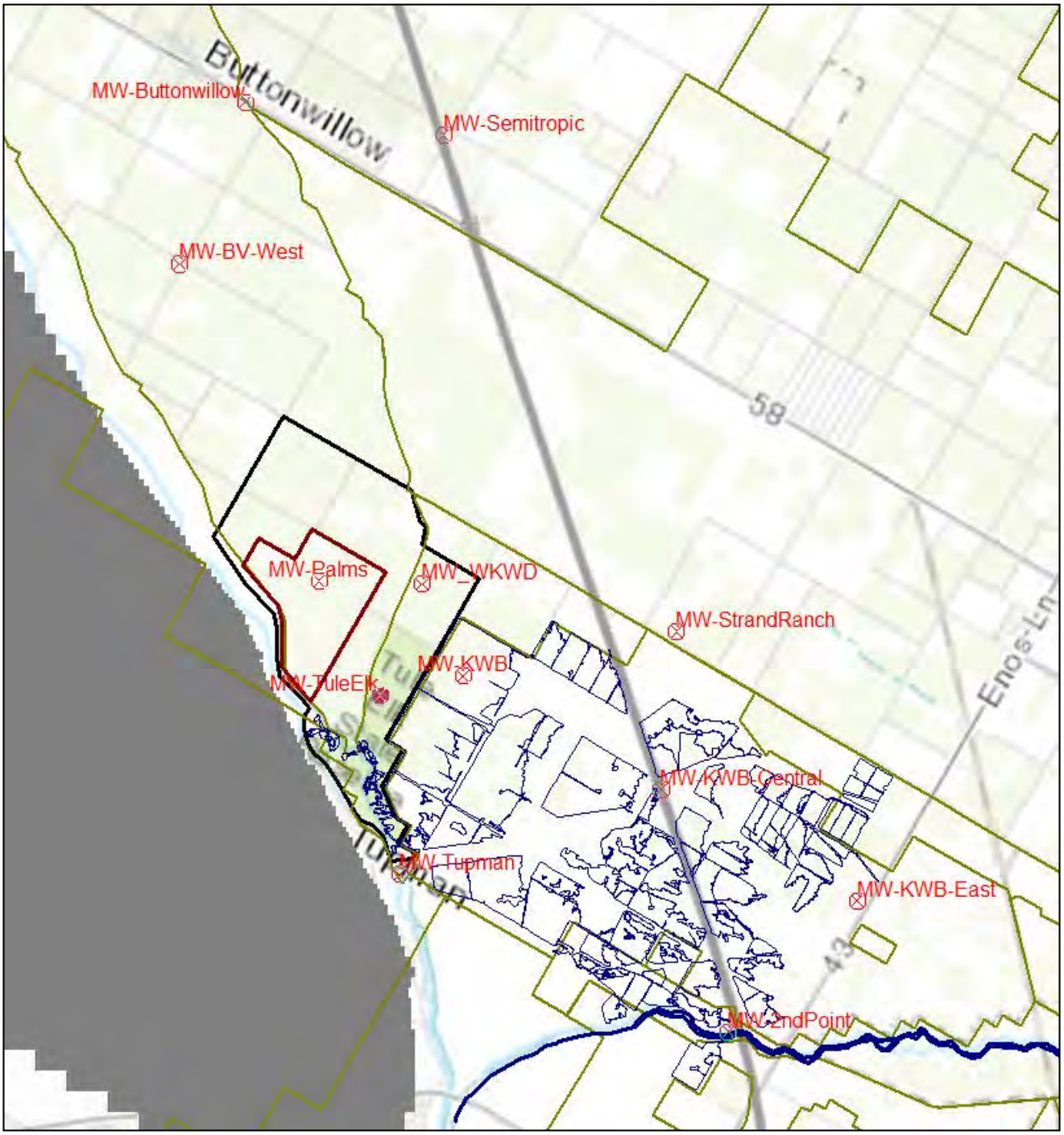


November 2020	Figure 16 Hydrographs of Scenario A Groundwater Level Change in Recovery Project Wells
TODD GROUNDWATER	





November 2020	Figure 17 Hydrographs of Scenario B Groundwater Level Change in Recovery Project Wells
TODD GROUNDWATER	

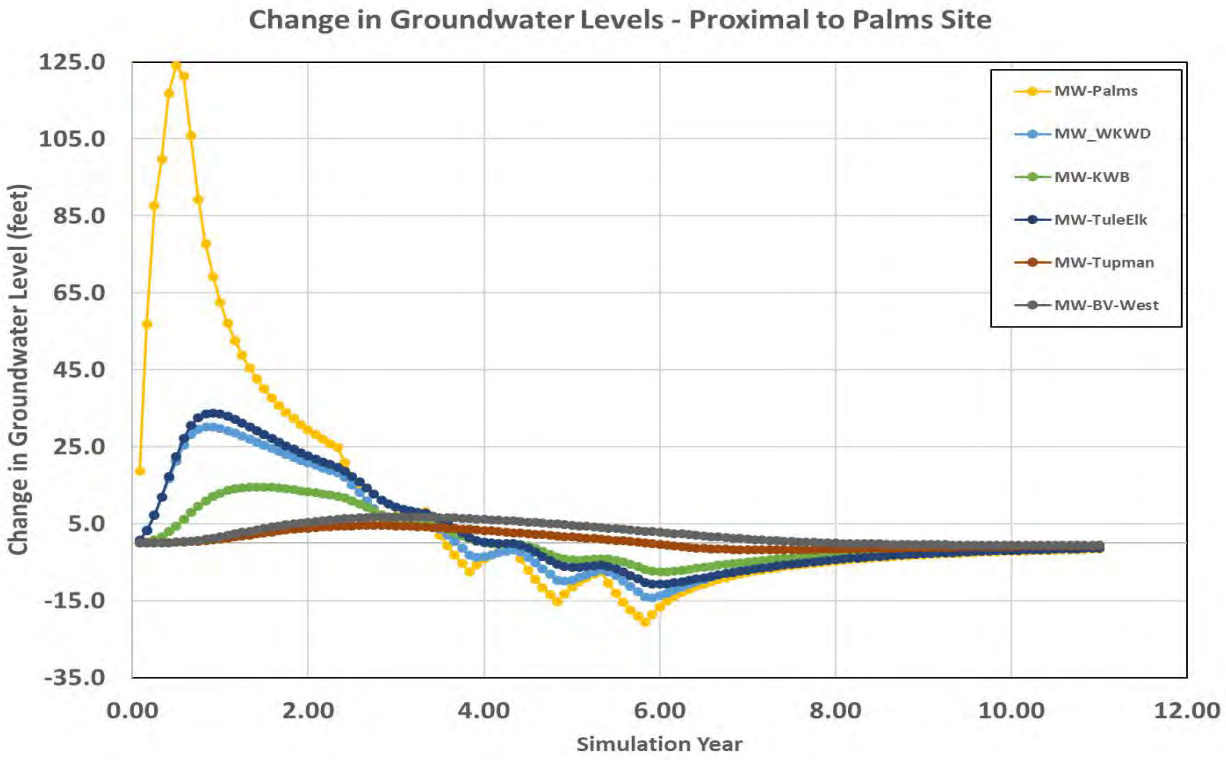


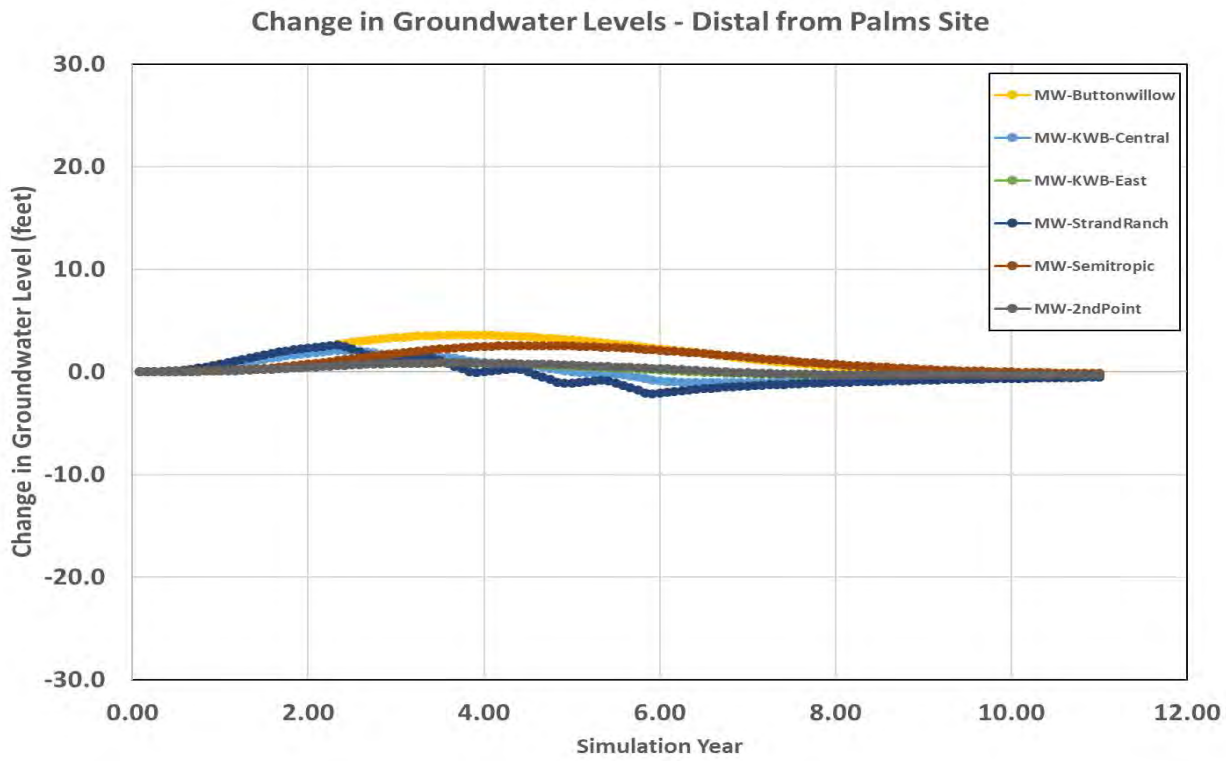
N

0 1 2

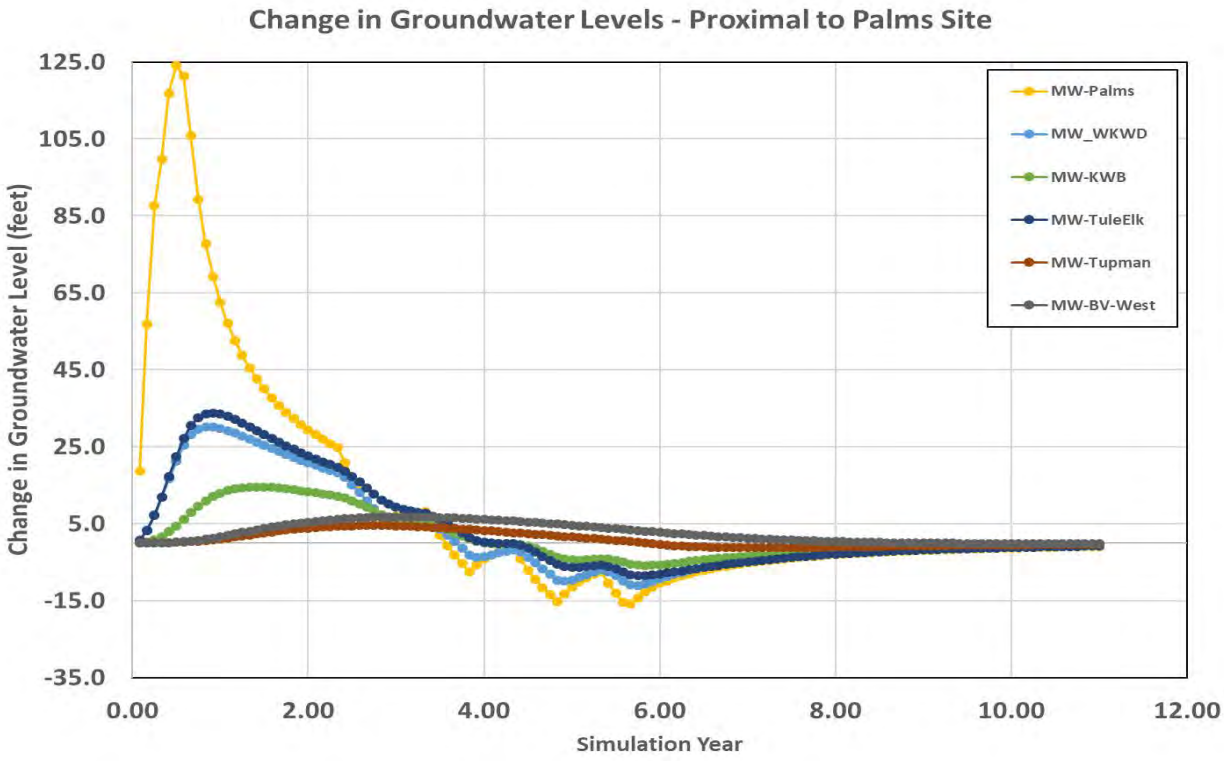
Scale: Miles

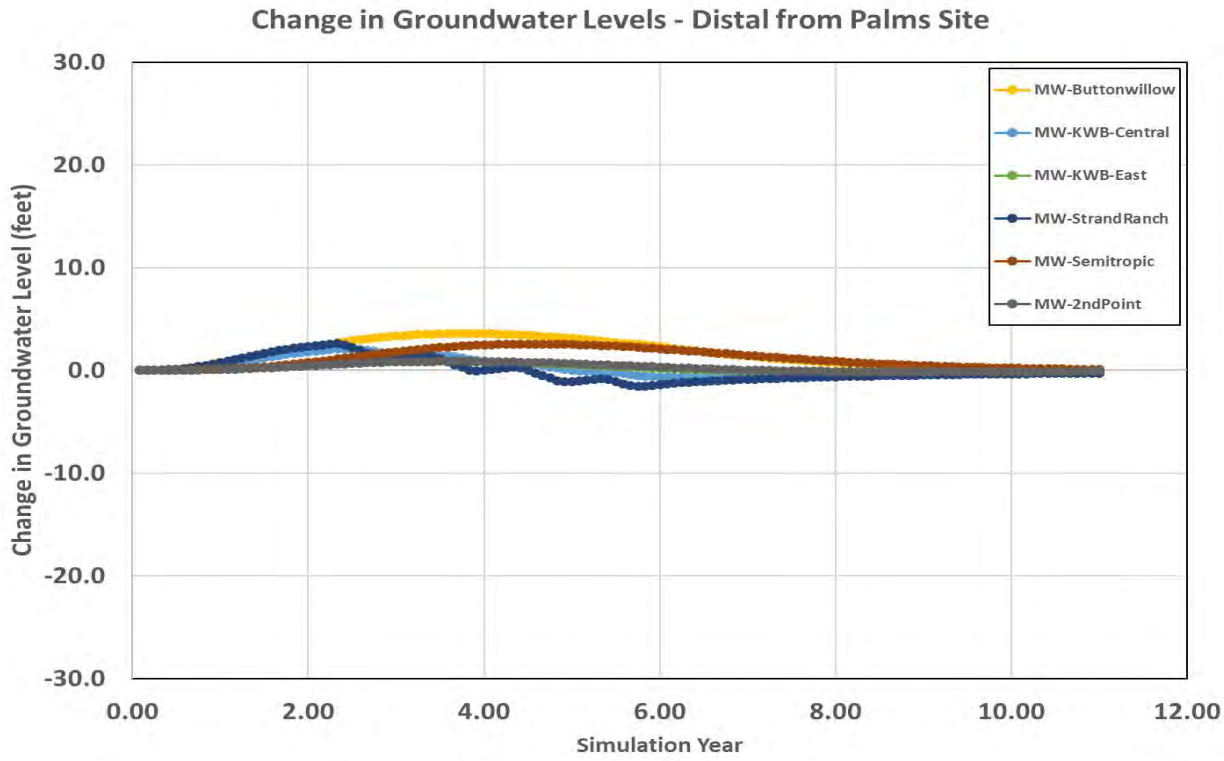
November 2020	Figure 18 Location of Specified Simulation Points for Recovery Project Scenarios
TODD GROUNDWATER	



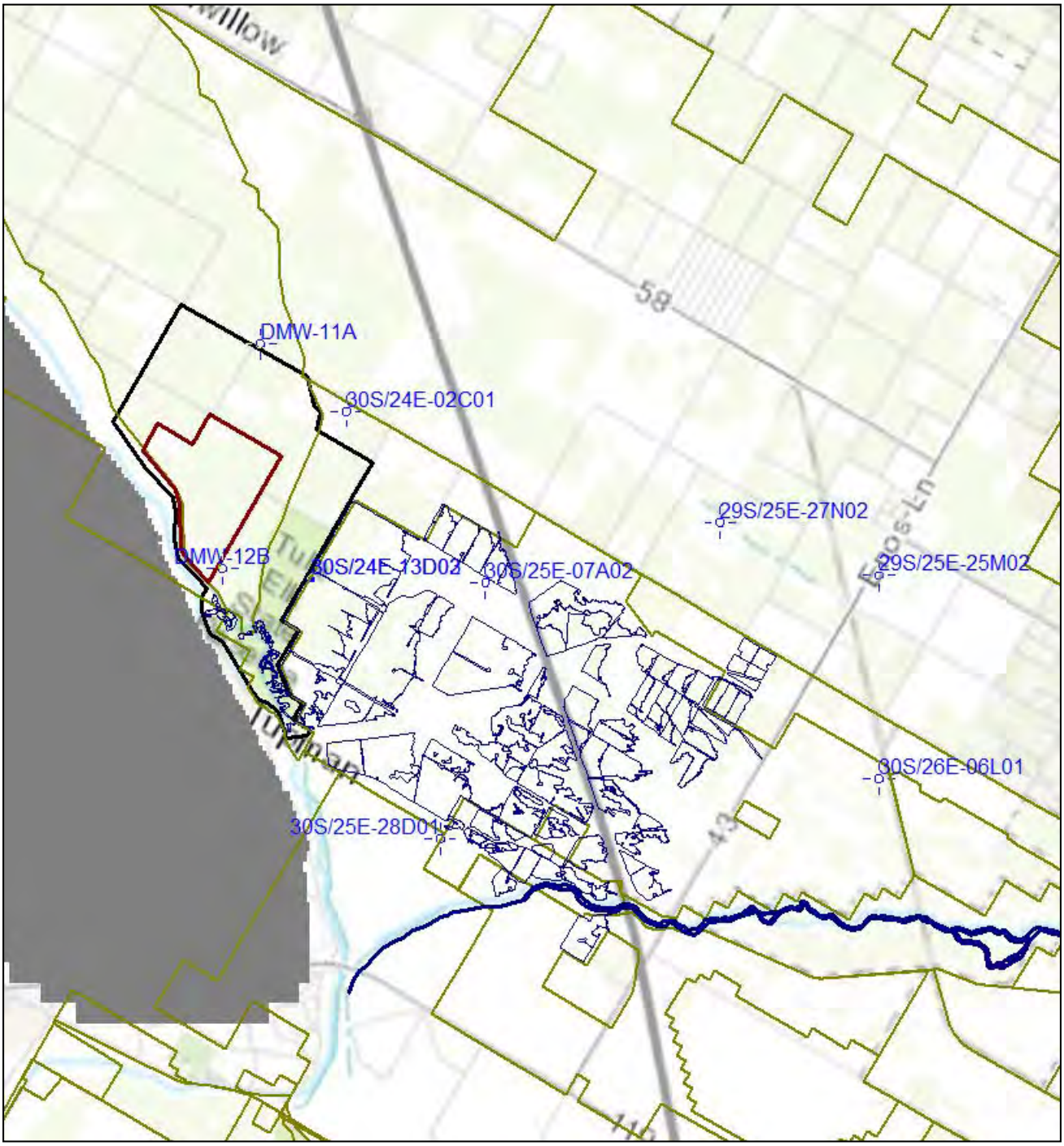


November 2020	Figure 19 Hydrographs of Scenario A Groundwater Level Change at Specified Simulation Points
TODD GROUNDWATER	





November 2020	Figure 20 Hydrographs of Scenario B Groundwater Level Change at Specified Simulation Points
TODD GROUNDWATER	



N

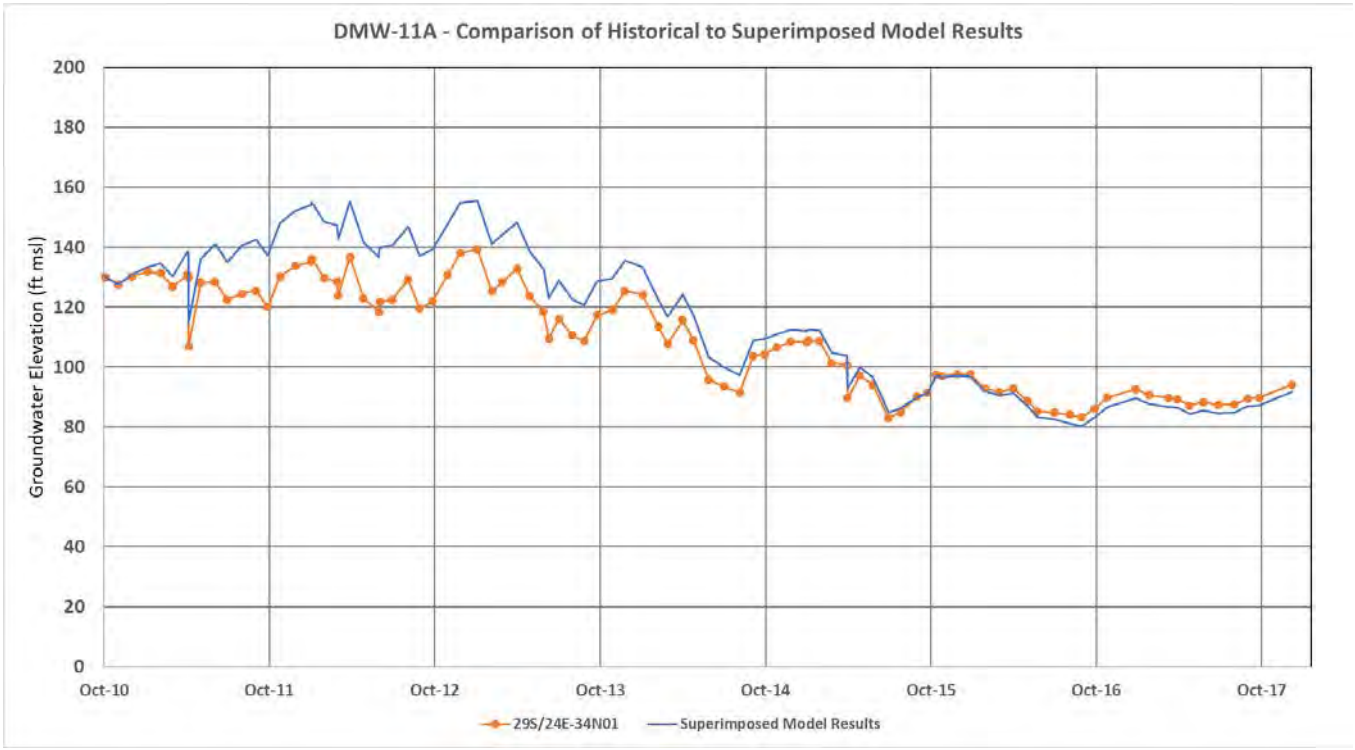
0 1 2

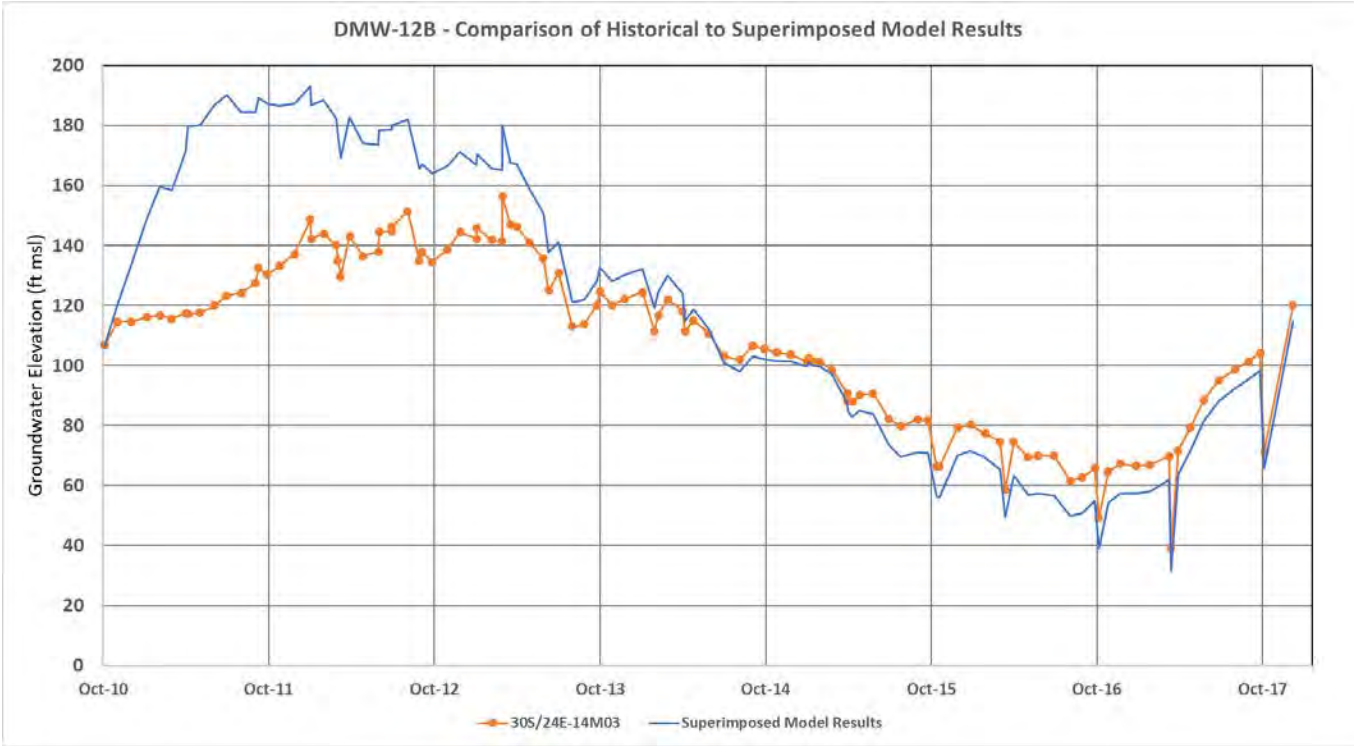
Scale: Miles

November 2020

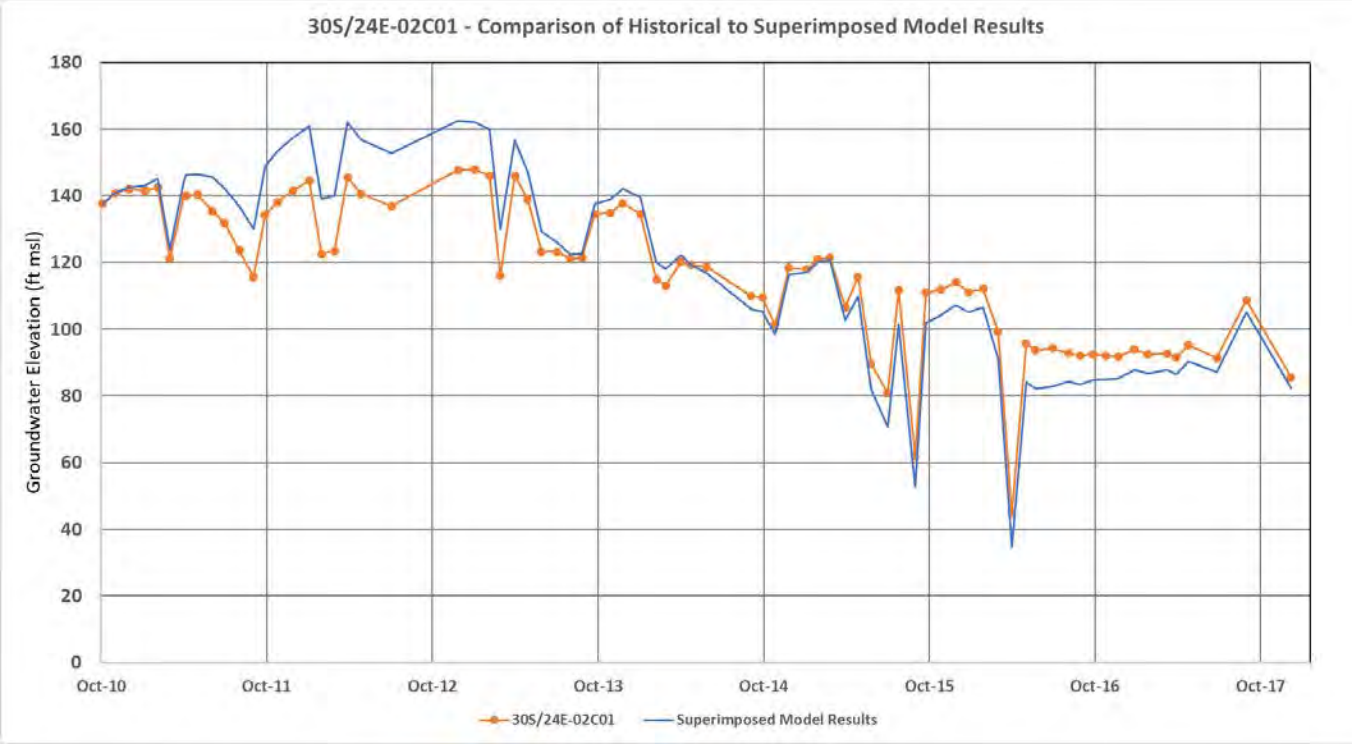
TODD GROUNDWATER

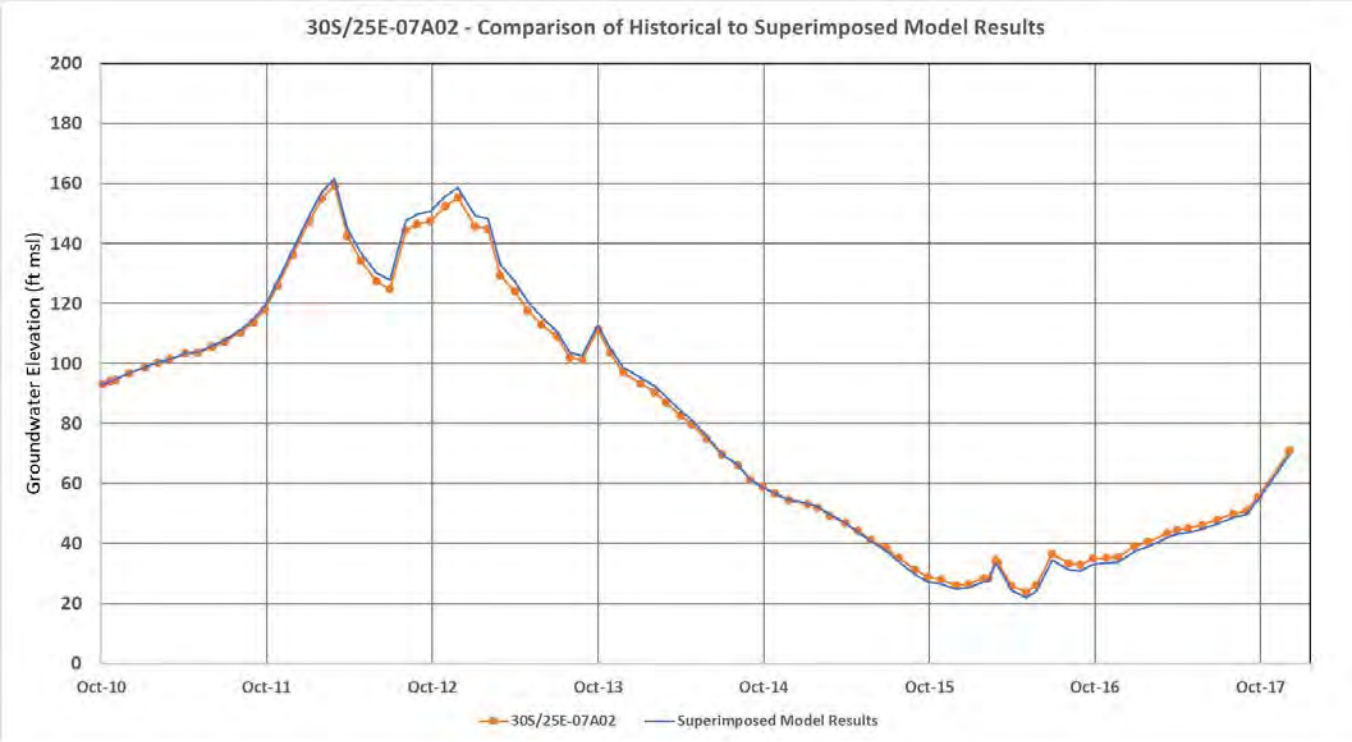
Figure 21
Location of Measured Monitoring Wells Used for Superposition Analysis



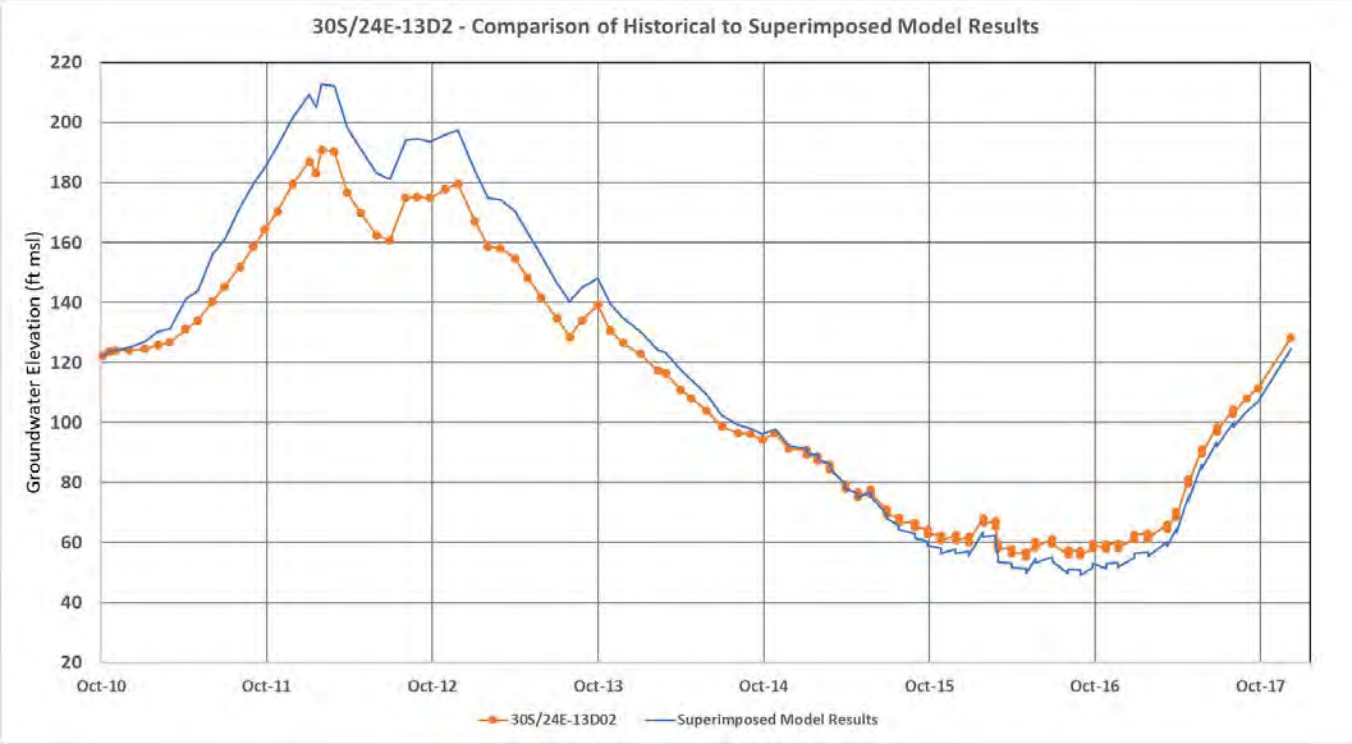


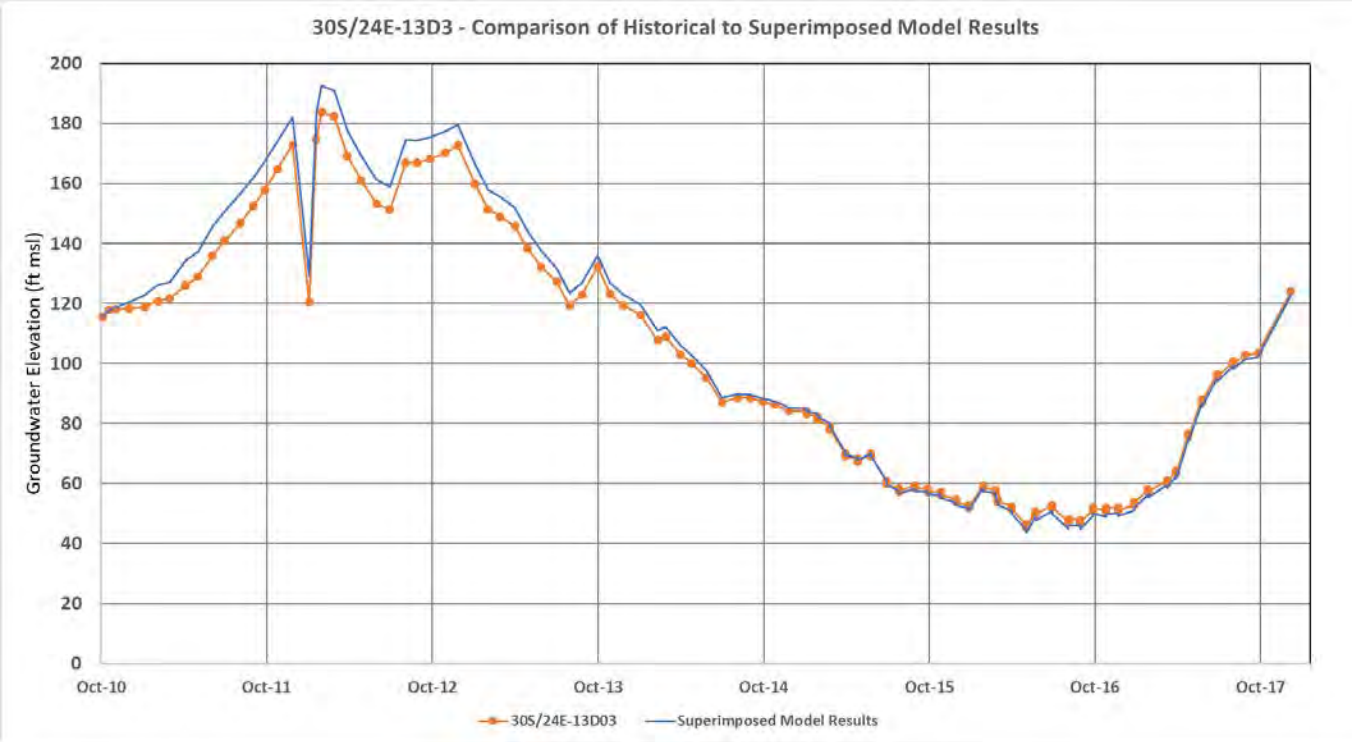
November 2020	Figure 22 Superposition Hydrographs of Scenario B onto Measured Water Levels at BVWSD Wells
TODD GROUNDWATER	



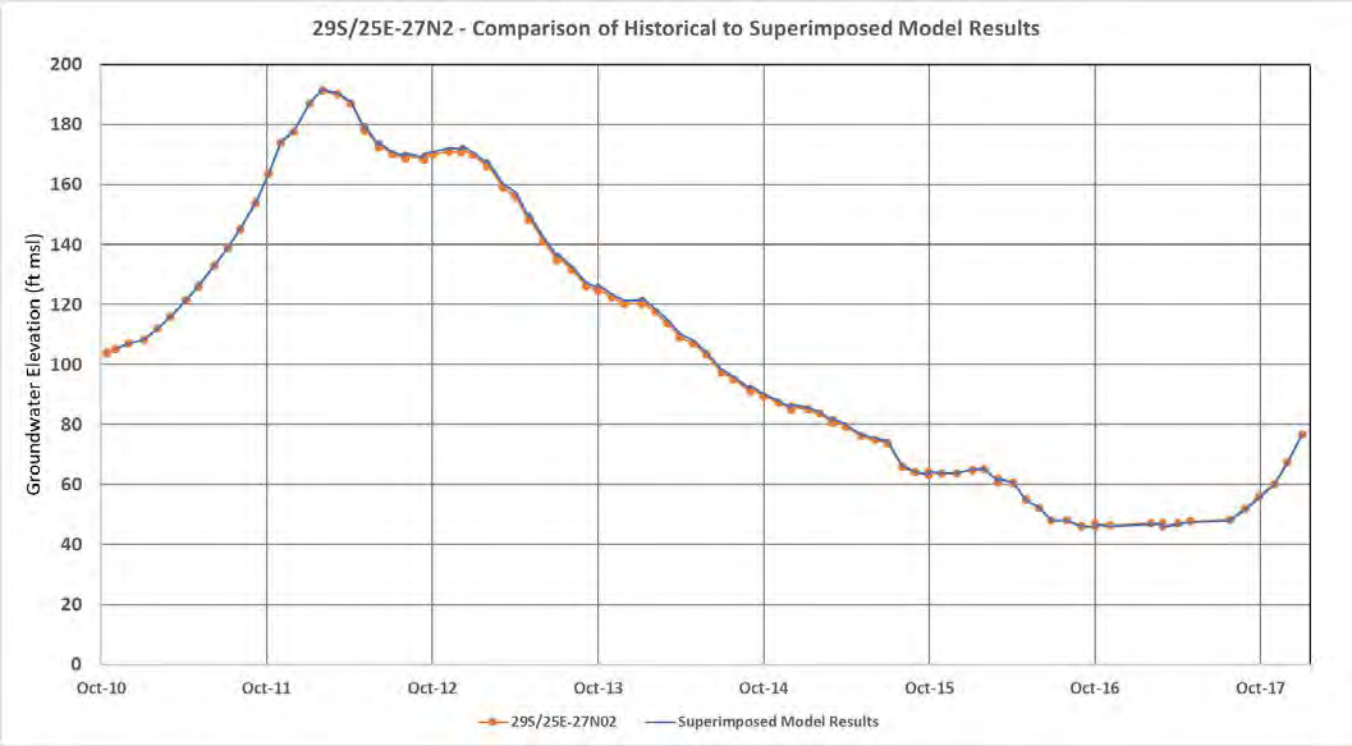


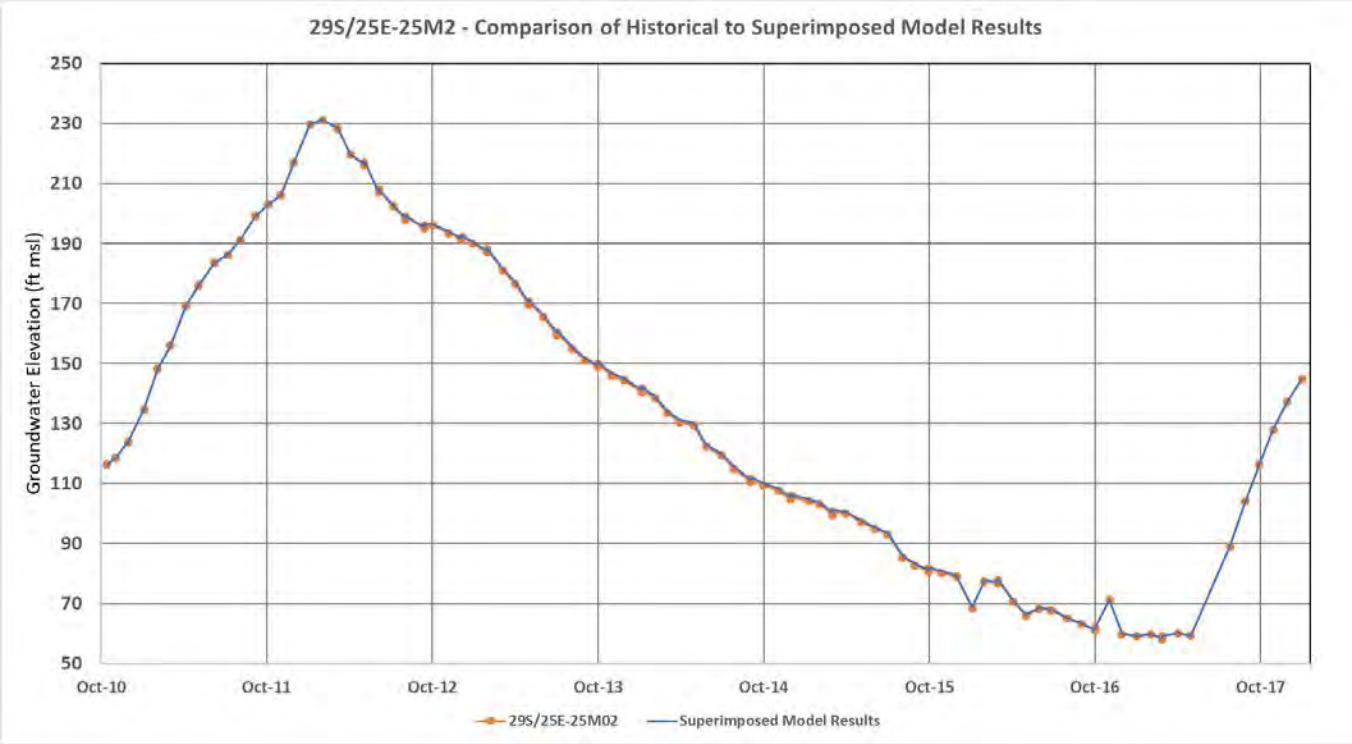
November 2020	Figure 23 Superposition Hydrographs of Scenario B onto Measured Water Levels at KWB and RRBWSD Wells
TODD GROUNDWATER	



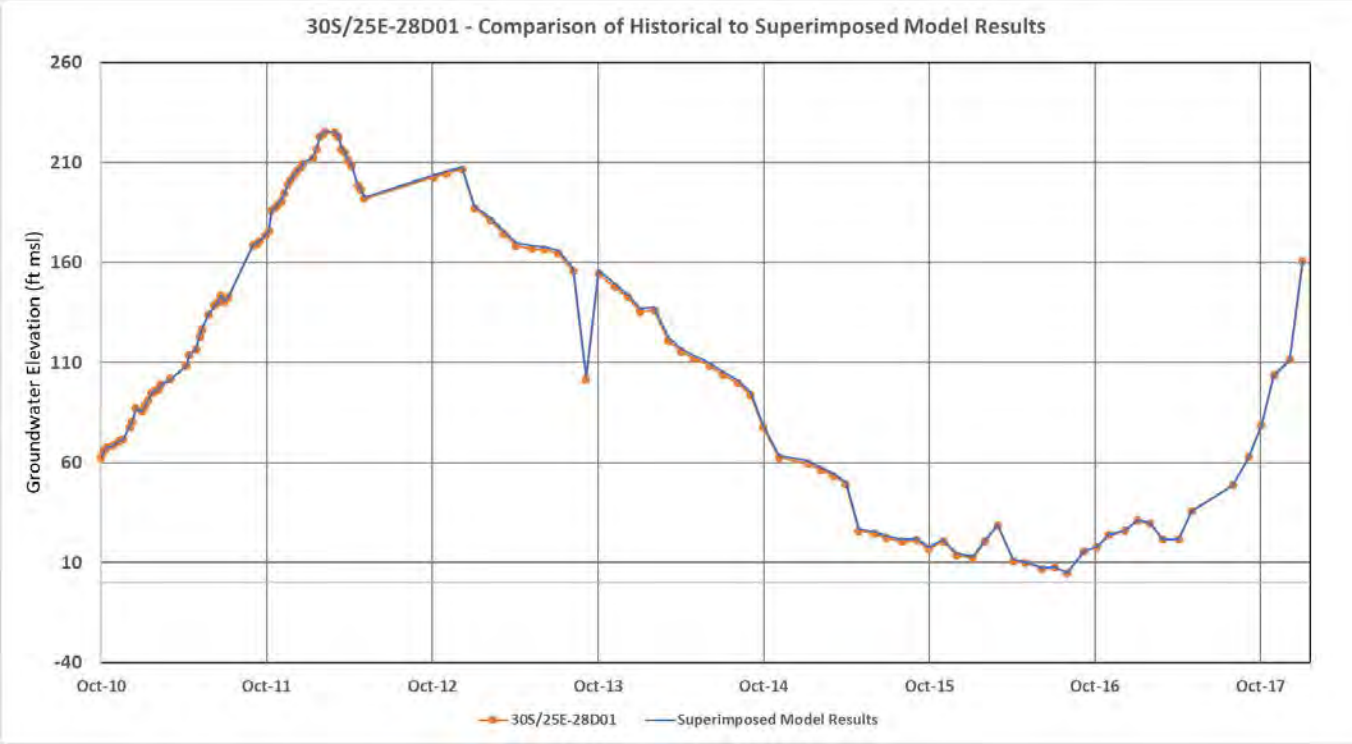


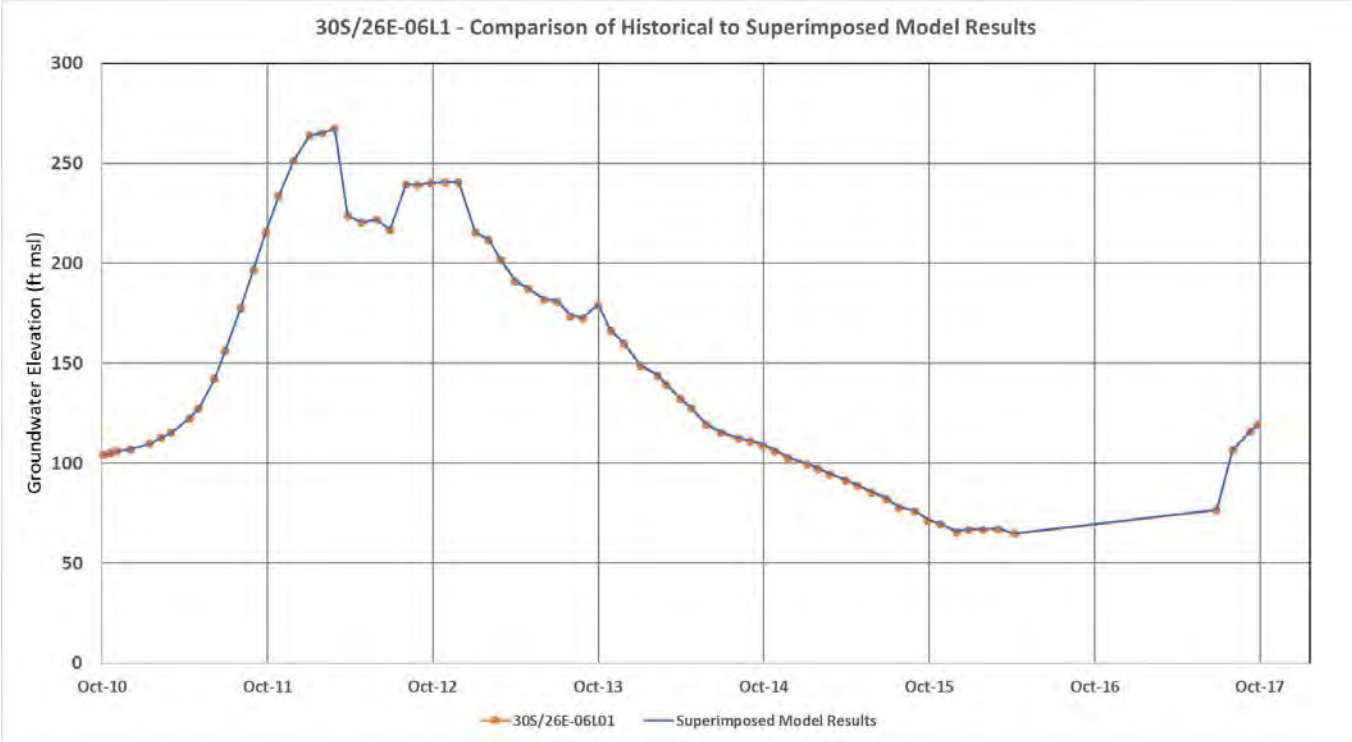
November 2020	Figure 24 Superposition Hydrographs of Scenario B onto Measured Water Levels at KWB Wells
TODD GROUNDWATER	



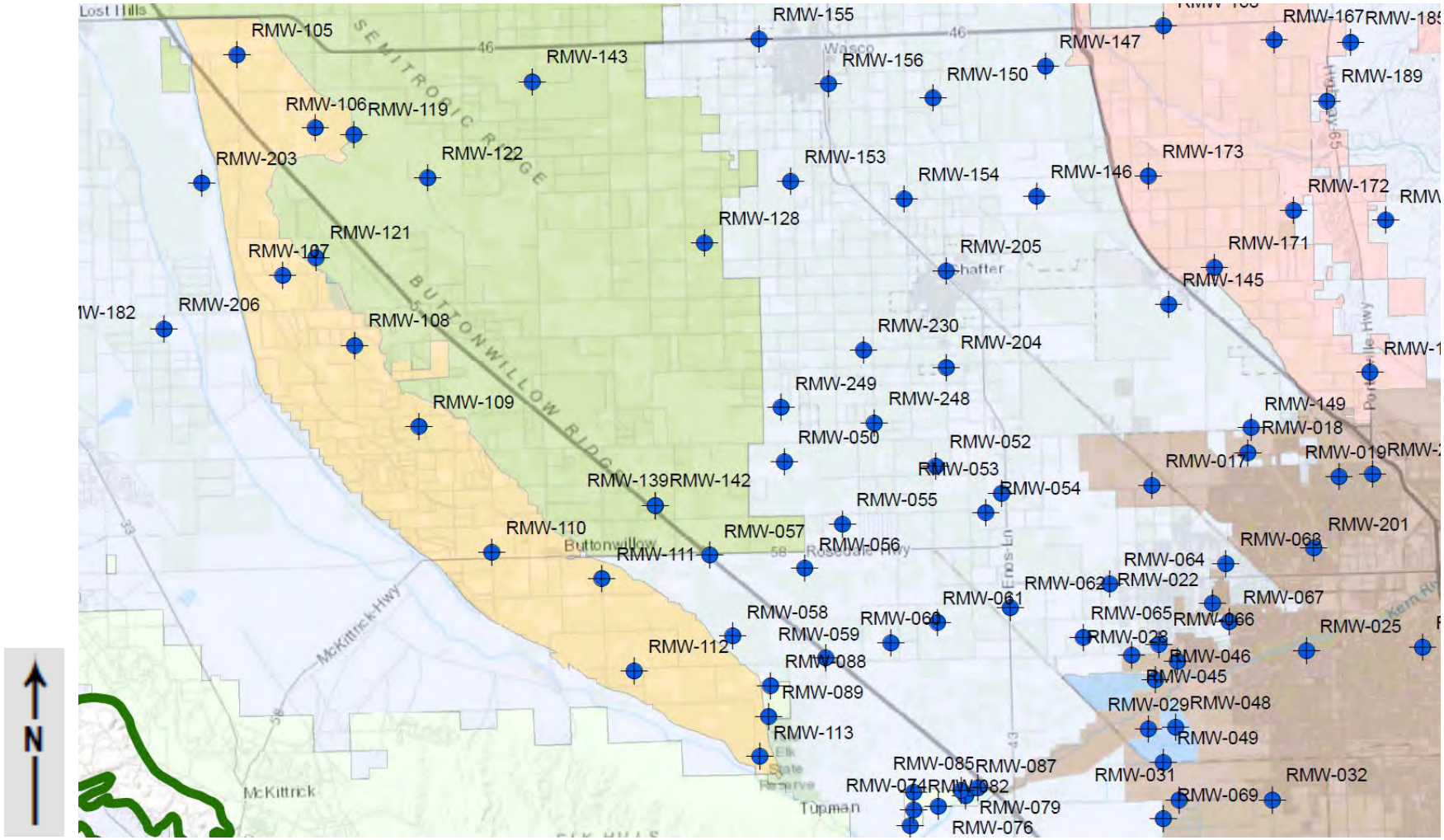


November 2020	Figure 25 Superposition Hydrographs of Scenario B onto Measured Water Levels at Eastern RRBWSD Wells
TODD GROUNDWATER	





November 2020	Figure 26 Superposition Hydrographs of Scenario B onto Measured Water Levels at WKWD and Pioneer
TODD GROUNDWATER	



Legend

- Regional Monitoring Well (RMW) Location
- Kern County Line

Subbasin Name

- Kern County Subbasin

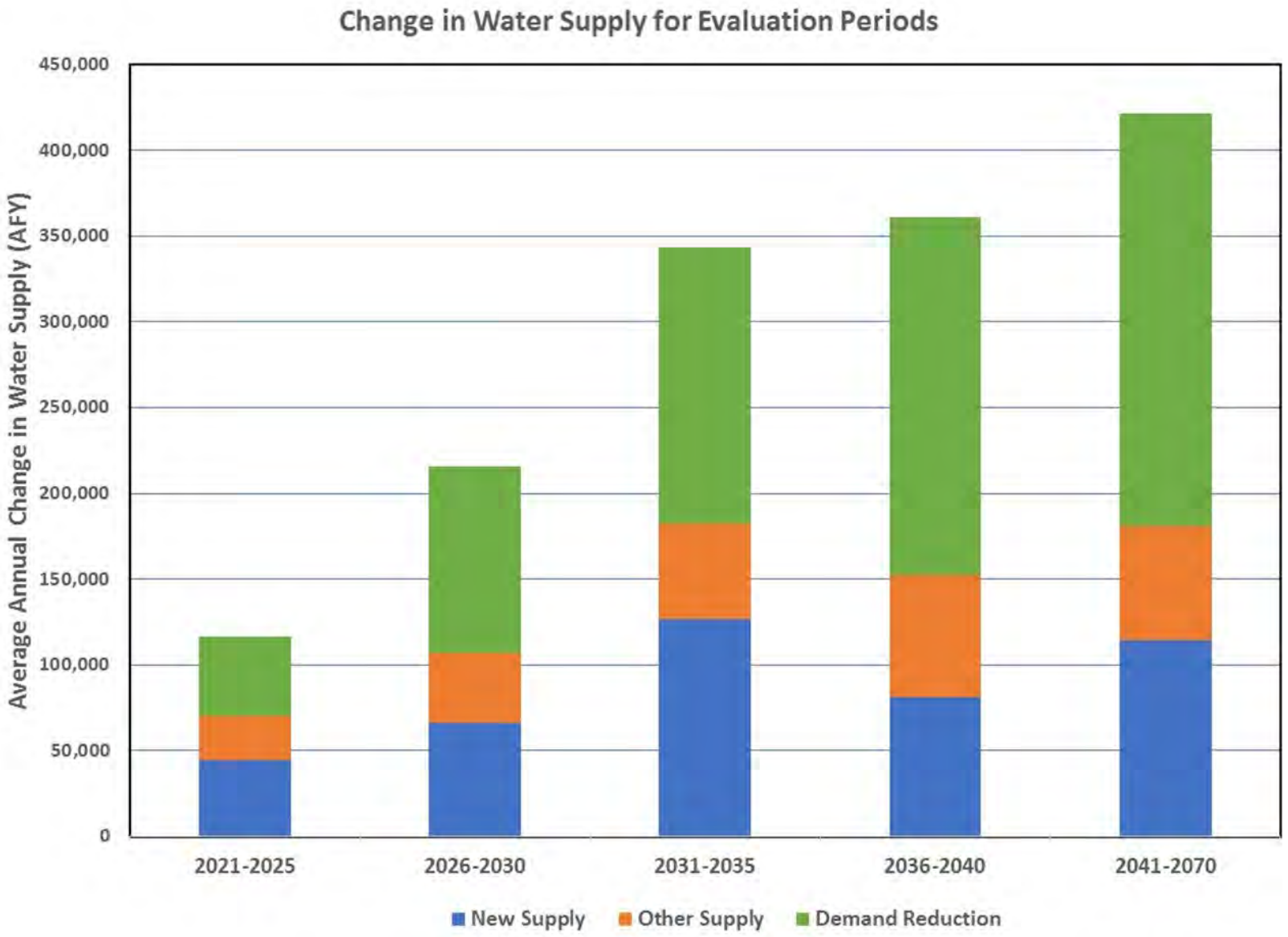
0 10

Scale in Miles

November 2020

TODD GROUNDWATER

Figure 27
Regional Monitoring Well (RMW) Locations

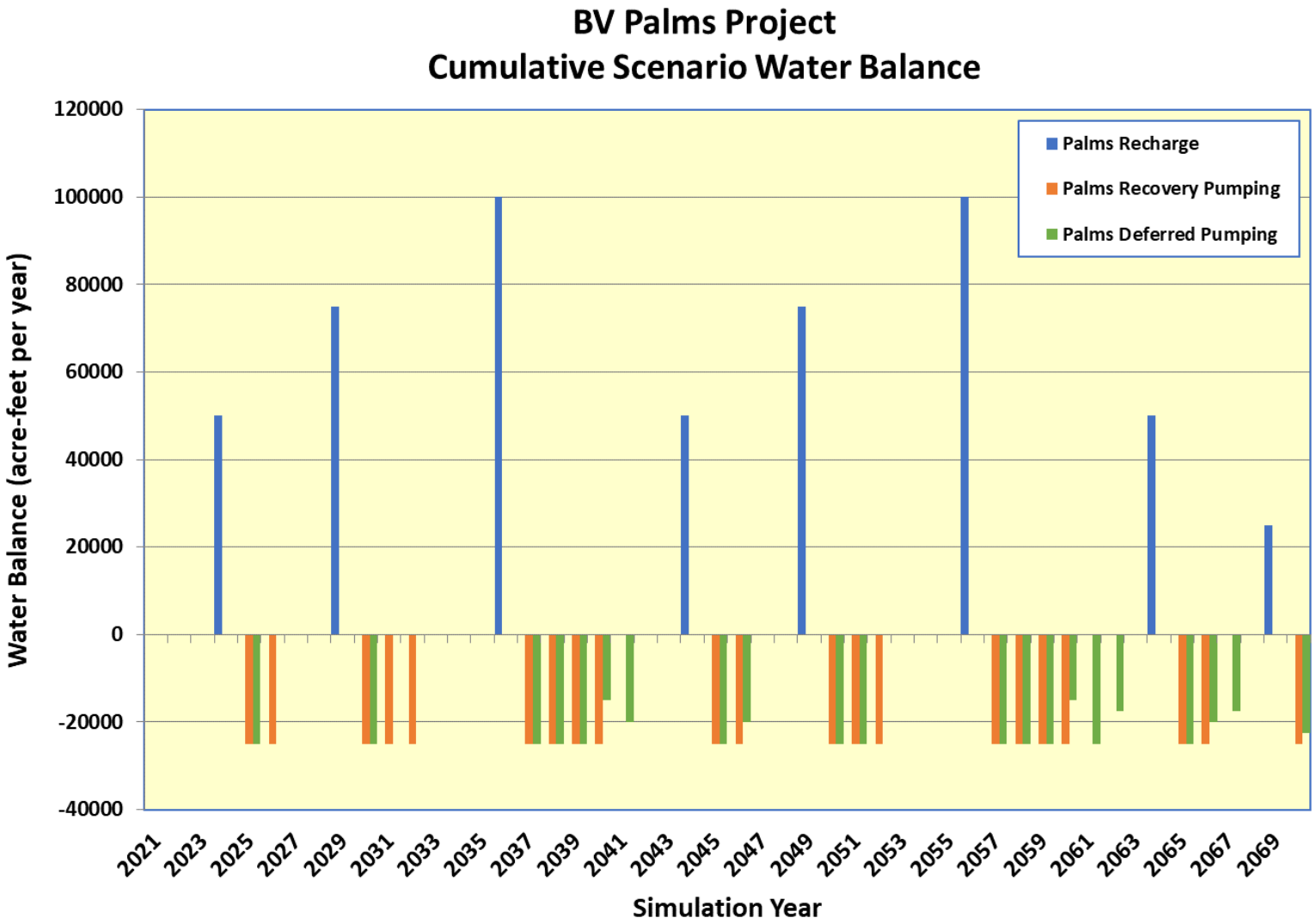


Source: Kern County Subbasin Coordination Agreement, Appendices 2 and 4, Figure 15

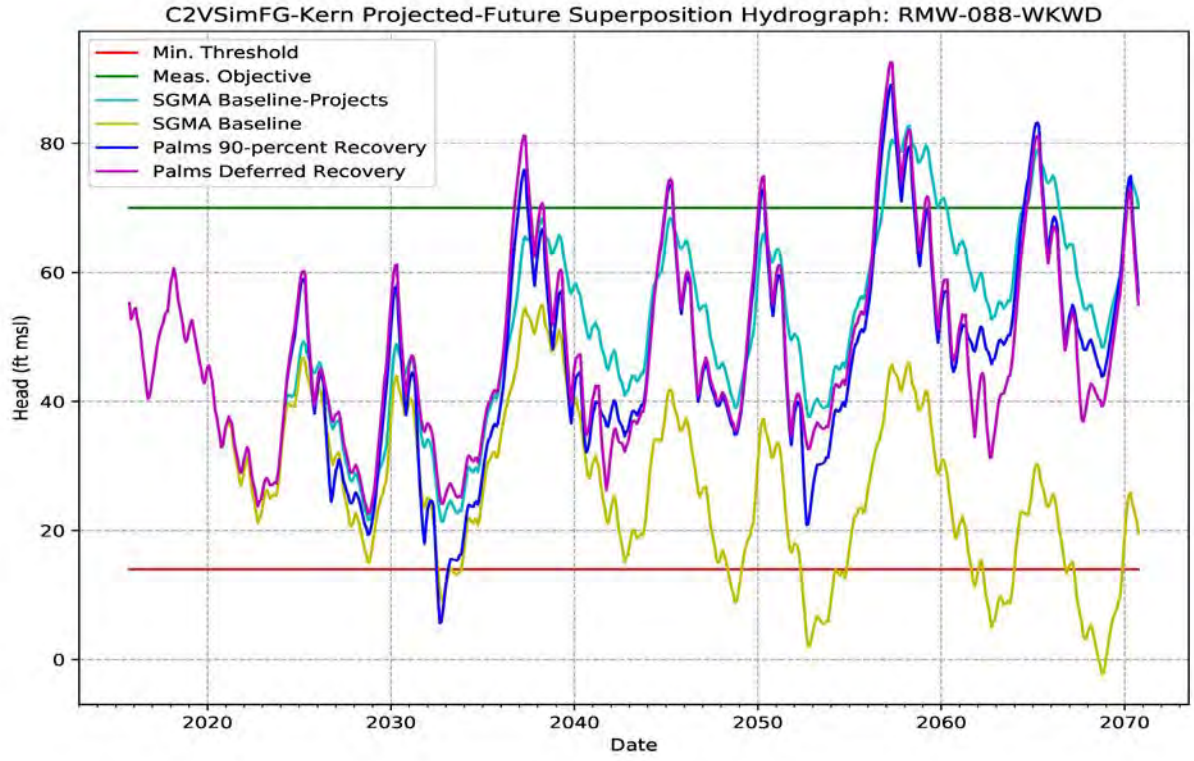
November 2020

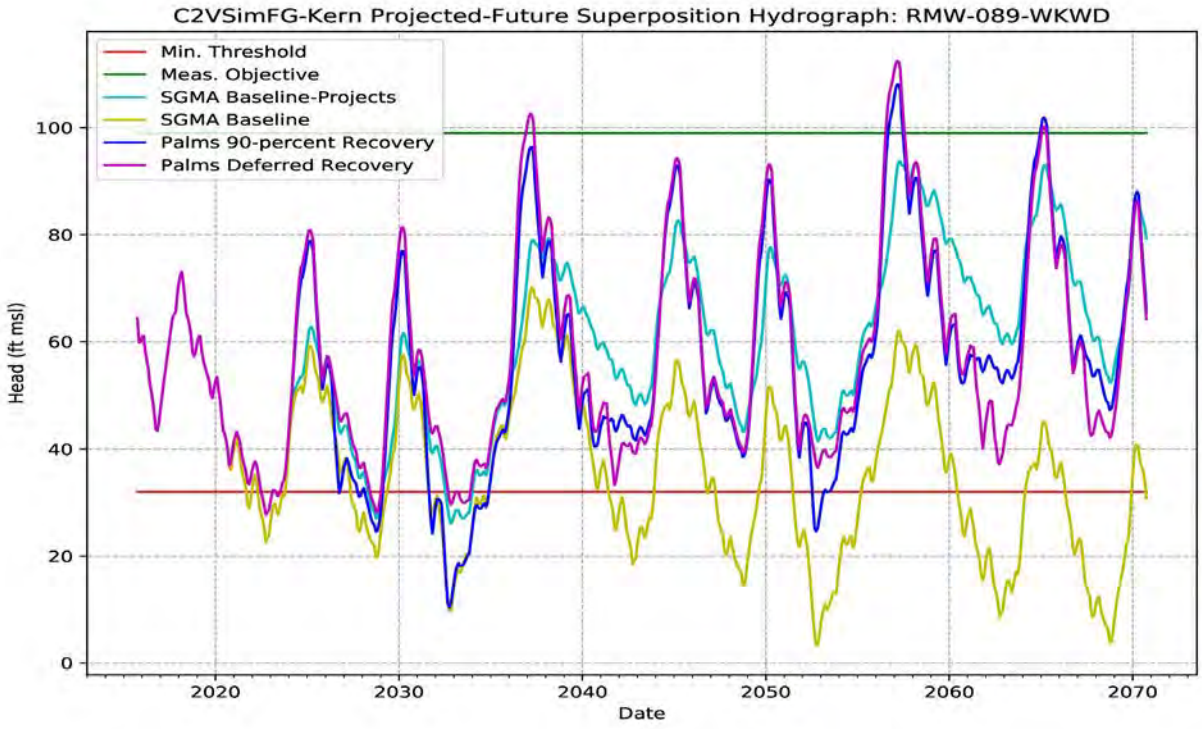
TODD GROUNDWATER

Figure 28
Average Annual Benefit of Proposed SGMA Projects and Management Actions

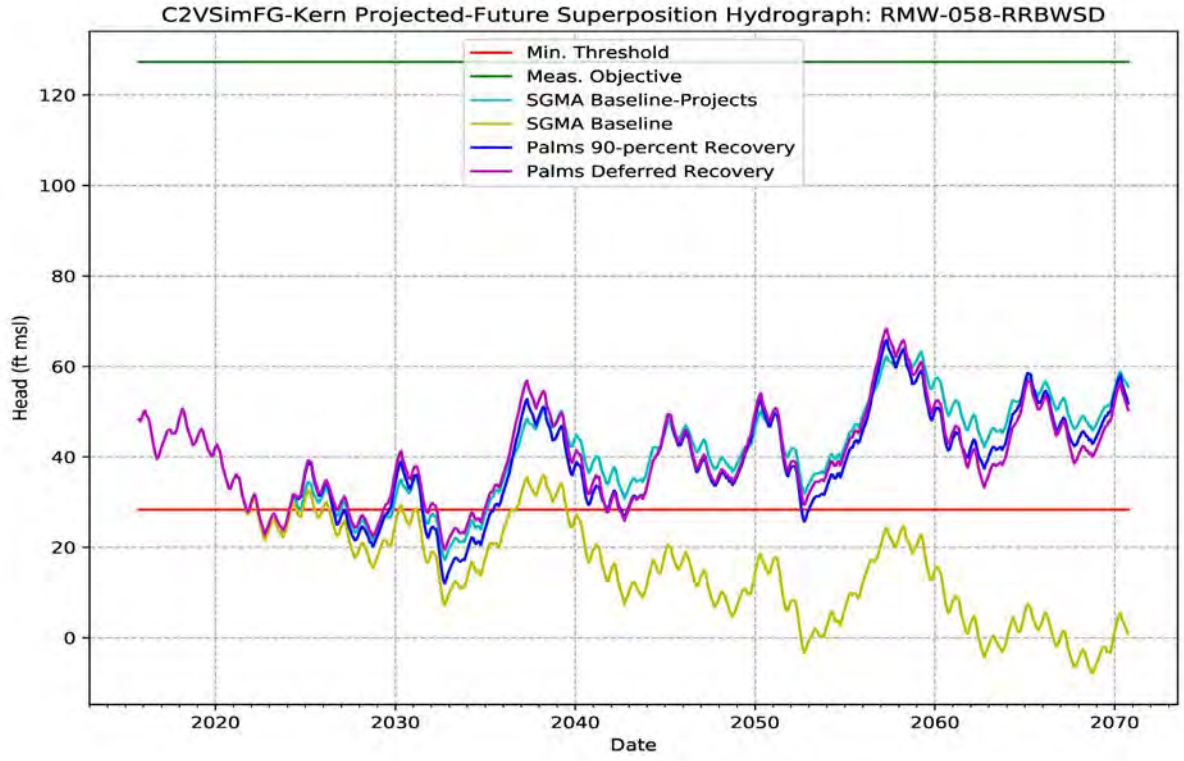


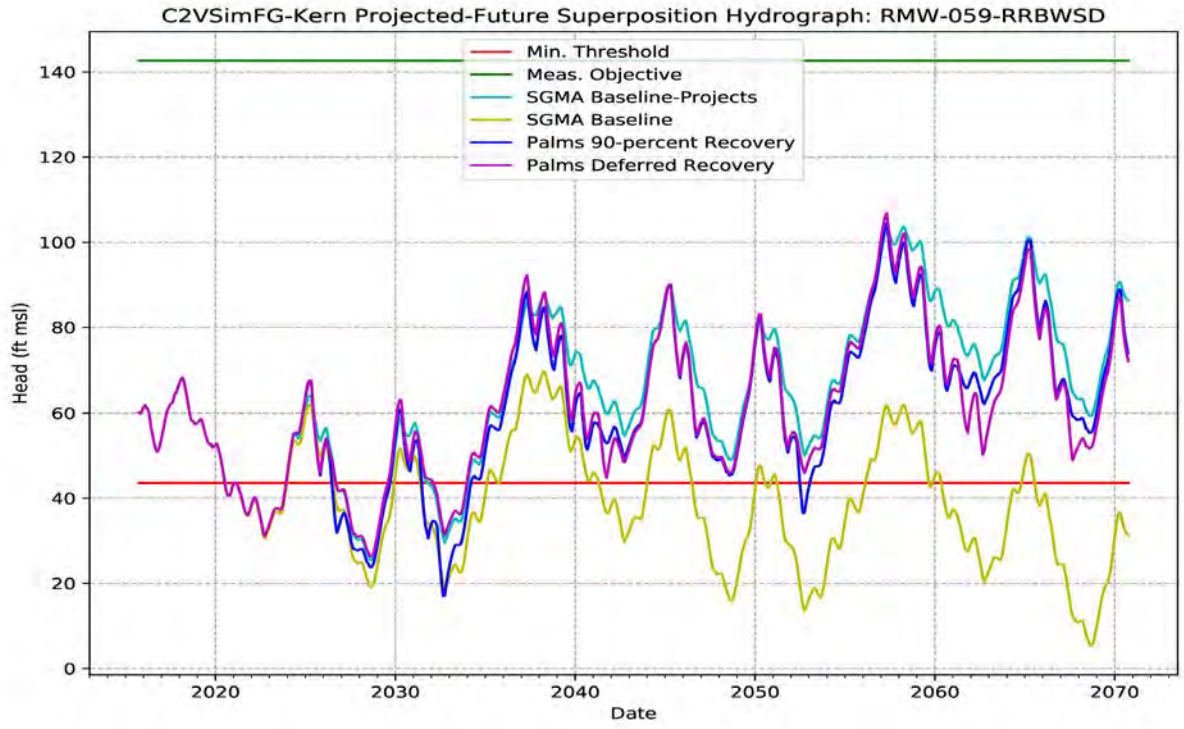
November 2020	Figure 29 Cumulative Project Scenario Simulated Recharge and Recovery Operations
TODD GROUNDWATER	



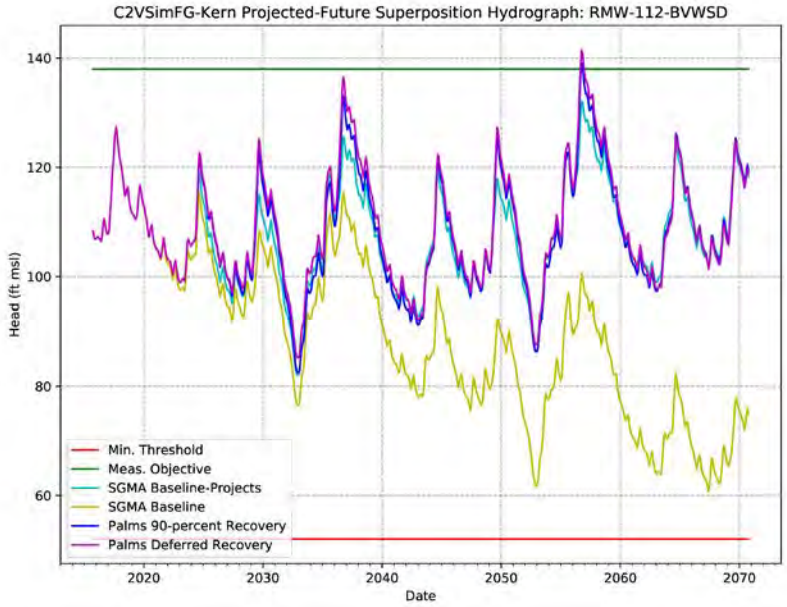


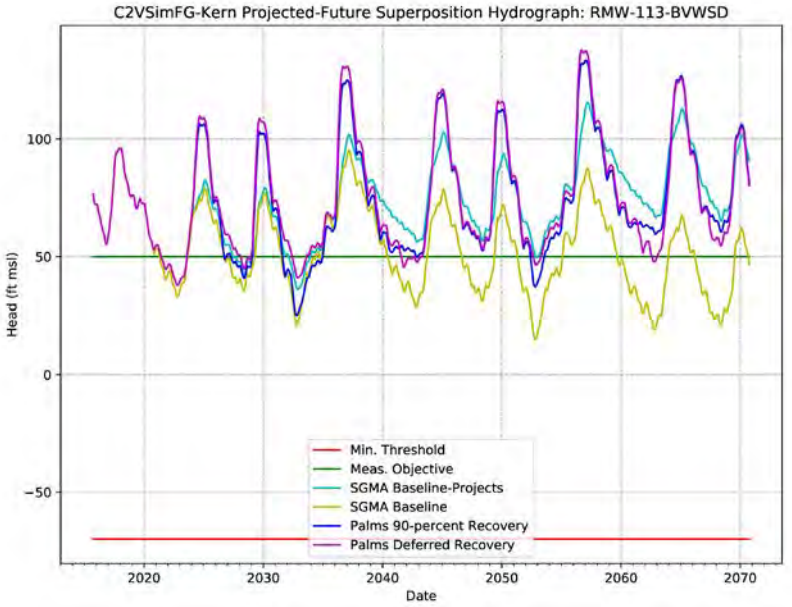
November 2020	Figure 30 Cumulative Scenario Hydrographs of WKWD North Locations
TODD GROUNDWATER	

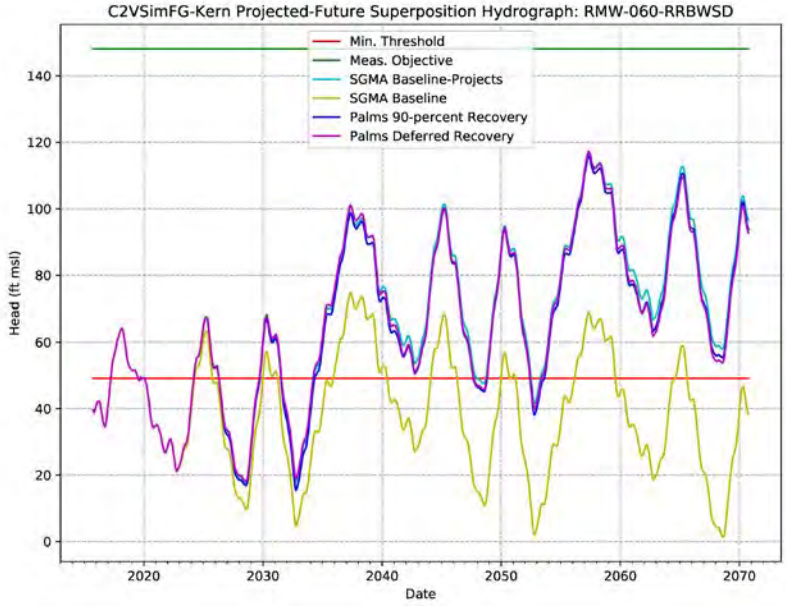


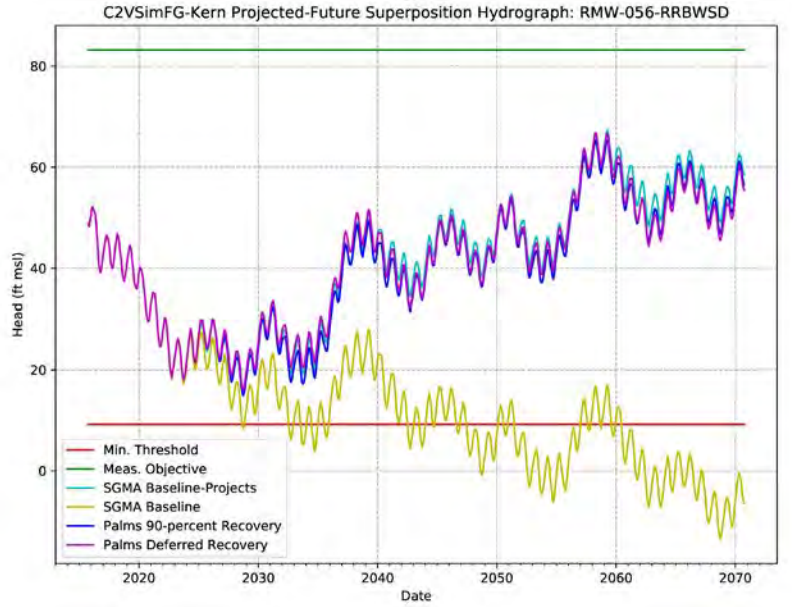


November 2020	Figure 31 Cumulative Scenario Hydrographs of Western RRBWSD Locations
TODD GROUNDWATER	





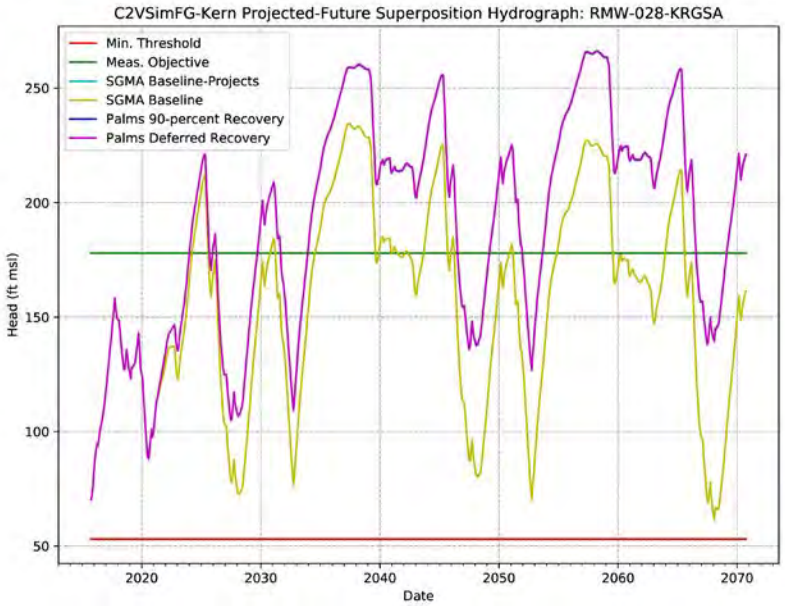


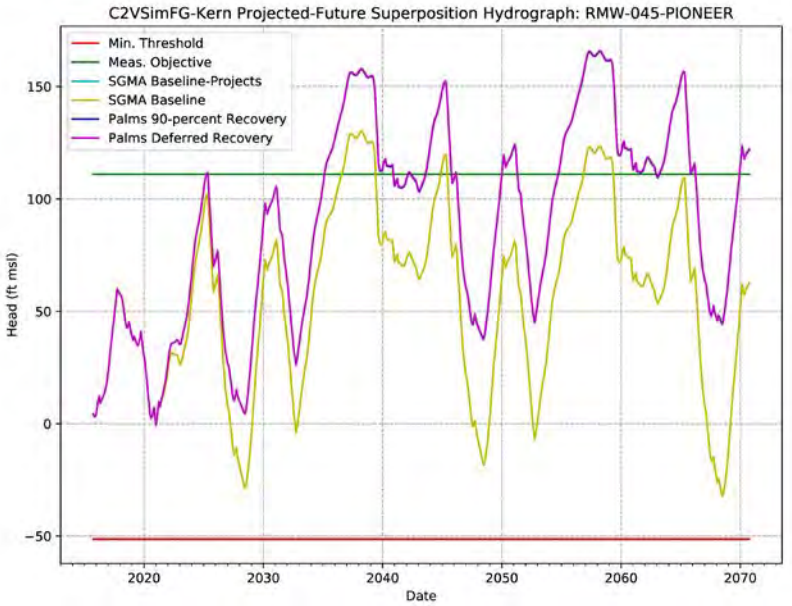


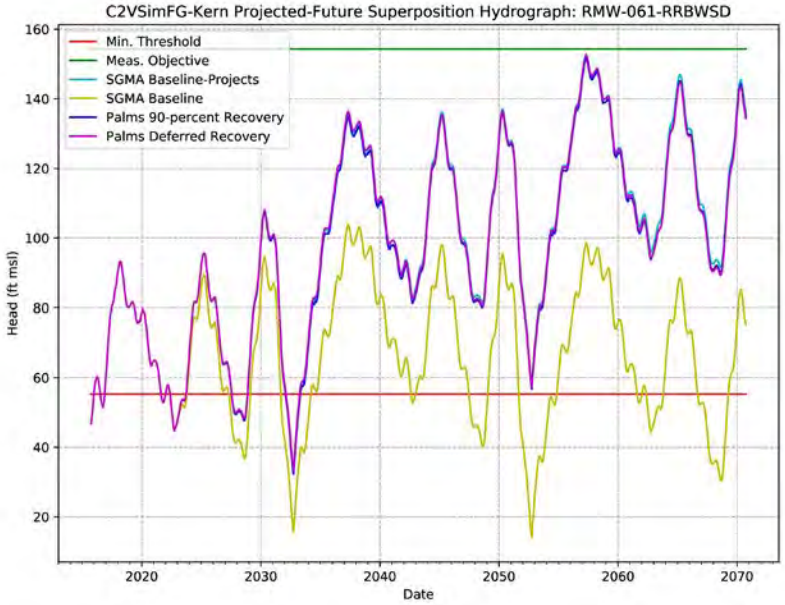
November 2020

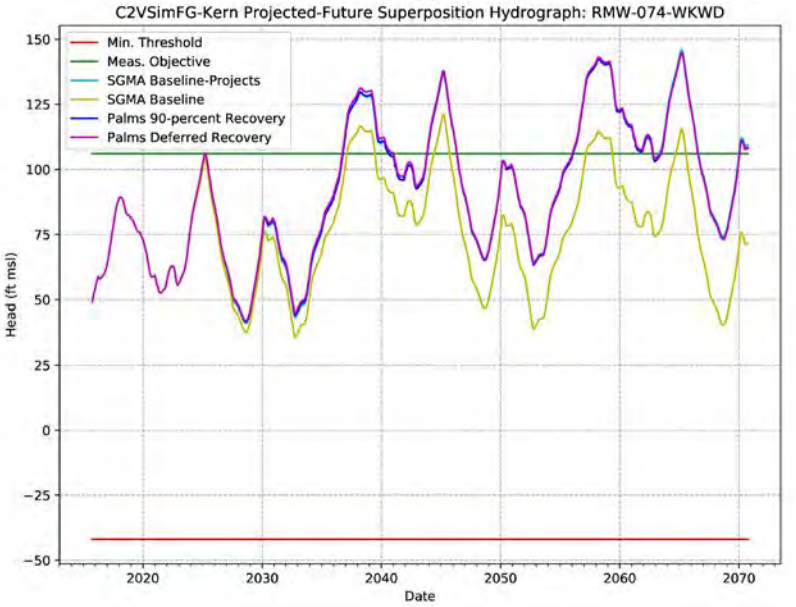
TODD GROUNDWATER

Figure 32
Cumulative Scenario Hydrographs in Vicinity of Recovery Project Site









November 2020	Figure 33 Cumulative Scenario Hydrographs Distal from Recovery Project Site
TODD GROUNDWATER	

ATTACHMENTS

Attachments A through D

ATTACHMENT A

SUPERPOSITION MODELING APPROACH

A. SUPERPOSITION MODELING APPROACH

The model analysis described in this report uses the principle of superposition for simulating impacts to groundwater as a result of the Proposed Project.

A.1 CONCEPTUAL UNDERSTANDING

The principle of superposition, as applied to a ground-water system, means that the result of multiple stresses on an aquifer system is equal to the sum of the results of the individual stresses. A superposition modeling approach enables the Project-related changes to be calculated throughout the basin and superimposed upon the groundwater system so that the accumulated effects of the Project over time can be determined. For a detailed discussion of the application of superposition to ground-water problems, the reader is referred to Reilly et al. (1987).

The purpose of the groundwater impacts analysis is to evaluate the change in groundwater levels as a result of the Proposed Project's recharge and pumping. **Figure A-1** provides a conceptual example of the anticipated effects of the Proposed Project that require analysis. When surface water is diverted to a recharge basin, a groundwater mound forms under the facility during operations resulting in higher groundwater levels (see top diagram, **Figure A-1**). The volume of groundwater in the aquifer represented by the relative change in groundwater levels is referred to as the change of groundwater in storage. Similarly, groundwater recovery pumping would result in increased drawdown (i.e., lowering) of groundwater levels in a pattern that is greatest near the pumped well and diminishes with increasing distance.

A.2 PRINCIPLE OF SUPERPOSITION

The groundwater flow equation is derived from the fundamentals of groundwater hydraulics, including Darcy's Law and the Law of Conservation of Mass (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978). This equation can be used to calculate the changes in groundwater levels resulting from the Project-related changes in recharge or pumping. The Principle of Superposition, in general terms, states that the net change in groundwater levels due to the Proposed Project can be calculated independently from other pumping and recharge occurring in the basin. Furthermore, the net change in groundwater levels can be added to other groundwater level distributions to determine the combined effects on the groundwater system (Reilly et al., 1987; Bennett, 1976)

Mathematically, the Principle of Superposition within groundwater systems is based from the equation of groundwater flow derived on Darcy's Law (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978), which is provided below:

$$\frac{d}{dx}\left(Tx\frac{dh}{dx}\right) + \frac{d}{dy}\left(Ty\frac{dh}{dy}\right) + W = S\frac{dh}{dt} \quad (1)$$

where h = groundwater level or head
T = transmissivity
W = water sink or source term representing the water balance
S = Storage Coefficient

This differential equation is linear in terms of the groundwater head (*h*) – that is, anywhere that *h* appears in this equation, it is only to a single power; for example, it is not squared or cubed. Because the equation is linear in *h*, any number of equations – representing, for example, multiple different stresses on the groundwater system - can be summed to provide the total change to the system resulting from all of the individual stresses. Furthermore, the right-hand side of the equation shows that the change in head (*dh*) is a function of time (*dt*). This indicates that Equation 1 can be used to superimpose the effect of the changes in multiple, transient (i.e., time-varying) stresses to determine the accumulated impact of these stresses on groundwater levels over time. This means that calculated changes in groundwater levels associated with an action (such as the Proposed Project) can be added to other groundwater level distributions to determine the combined effects on the groundwater system (Reilly et al., 1987; Bennett, 1976).

Figure A-2 provides an example of the application of the Principle of Superposition. The example shows the effects of pumping from two different wells on groundwater levels measured at a single monitoring location. The pumping rates are different, and the timing of the pumping varies (top and middle panels on **Figure A-2**). The drawdown associated with each well can be calculated independently and then added together. The bottom panel depicts the total, accumulated effect of the pumping at both wells on the water levels measured at the single monitoring location when the two independent calculations are superimposed to provide the combined drawdown.

A.3 GENERAL METHODOLOGY

The development of a superposition model is typically based on modification of an existing, calibrated, historical groundwater model. The advantage of this approach is that the superposition model incorporates the aquifer basin structure, hydrostratigraphy and parameter values determined through calibration of the pre-existing model. The general methodology requires that the initial simulated groundwater level for the aquifer and all model boundaries be set equal to zero, making all initial fluxes in the model also equal to zero. A detailed discussion of the application of superposition to groundwater hydraulics is provided by Reilly et al. (1987). The conversion of an existing groundwater model to a superposition model requires some modification. The general process for setting up a superposition model includes:

- The model layer top and bottom elevations are recalculated relative to the initial groundwater elevations to provide a saturated thickness that preserves the hydrogeology of the aquifer system.
- All boundary conditions not associated with the Project are removed.
- All head-dependent boundary conditions representing subsurface flow, such as constant head boundaries, are set to an elevation of zero.
- Elevations of natural features included in the model, such as streambed elevations, are also recalculated relative to the initial groundwater elevations.
- All aquifer properties, including hydraulic conductivities, transmissivities and aquifer storage from the existing groundwater model are maintained and remain fixed for the analysis.

As a result, the superposition modeling approach incorporates detailed information about the hydrostratigraphy and distributions of stresses throughout the basin-wide groundwater system, yet it is relatively simple to use. The use of a superposition modeling approach thus enables the groundwater impacts analysis to assess the effects of the Project on the groundwater system in isolation from other

acting stresses (e.g., pumping, recharge, etc.) without having to obtain data of non-project related stresses. Using a superposition model, calculation of groundwater impacts is inherently precise because flow quantities other than Project-related components are set to zero (Leake, 2011). Thus, use of the superposition modeling technique allows for the formulation of the Proposed Project scenarios, and simulation of Proposed Project-related changes directly, in a manner that incorporates all of the details of the Proposed Project while mitigating the need to collect non-project related data that may not be obtainable.

A.4 APPLICATION OF SUPERPOSITION MODELS

A superposition modeling approach was selected as the most suitable method to support the groundwater impacts analysis. The superposition approach enables Project-related changes to be calculated throughout the basin and superimposed upon the groundwater system so that the accumulated effects of the Project over time can be determined.

A.4.1 Superposition Model Results

When the Principle of Superposition is used in groundwater modeling, the model results are presented in terms of change in groundwater levels rather than in absolute values of groundwater elevations. Therefore, the model results provide the relative change in groundwater levels due to the Proposed Project; in other words, a superposition model directly calculates the groundwater level impacts from the Proposed Project. By applying the Principle of Superposition, the relative change in groundwater levels can be added (superimposed) to measured or simulated groundwater elevations to determine a predicted groundwater elevation associated with Project impacts.

The water balance derived from a superposition model represents the change in the groundwater flux as a result of the simulated changes. Therefore, a positive flux may represent an increase in inflow or a decrease in outflow as a result of the Proposed Project. Likewise, a negative flux may represent an increase in outflow or a decrease in inflow as a result of the Proposed Project.

A.4.2 Assessment of Non-Linearities

The Principle of Superposition is derived for systems in which the change in groundwater is a linear function of the change in stresses. In natural settings, however, changes in a groundwater system may occur in a nonlinear manner. Nonlinearities are not uncommon in practice: indeed Reilly et al. (1987) noted that superposition models are commonly applied without significant modifications to simulate mildly nonlinear systems as long as the effects of the nonlinearity are small relative to the dimensions of the aquifer system. Methods for handling more complex nonlinearities have been advanced by Reilly and Harbaugh (2004), Durbin et al. (2008), Leake (2011), Takahashi and Peralta (1995), among others, who summarize practices to address complex nonlinearities in superposition models. Nonetheless, it is always best-practice to evaluate the likely degree and significance of any nonlinearities on a project-specific basis (Reilly et al., 1987; Reilly and Harbaugh, 2004; Morrison, 2006).

Following standard practice, the effects of nonlinearity are within an acceptable range that allow for use of the Superposition Model as a quantitative tool to support the groundwater impacts analysis (Reilly et al., 1987; Reilly and Harbaugh, 2004; Durbin et al., 2008; Morrison, 2006; Leake, 2011).

A.5 RELATED APPLICATIONS OF SUPERPOSITION MODELS

The Principle of Superposition is routinely applied in the solution of both analytical and numerical groundwater flow problems (Reilly et al., 1987). In contrast to a model that attempts to describe and predict each and every basin-wide stress – many of which may not be readily quantifiable – the superposition technique has the benefit that it focuses on calculating the water level changes that result from the specific stresses of interest and superimposing those upon the basin-wide system. Major advantages of the superposition technique are summarized by Reilly et al. (1987) as follows.

- The effects of a specified stress (i.e., groundwater pumping, managed recharge) on the system can be evaluated even if other stresses are unknown.
- The effects of a change in stress on the system can be evaluated even if the initial conditions are unknown.
- The effect of one stress on the system can be isolated from the effects of all other stresses on the system.

The superposition model approach has been applied for other comparable projects. **Table A-1** provides a representative list of reports documenting the use of a superposition models that are publicly available using an internet search. The superposition approach is a standard, well-established method that has been accepted for evaluating groundwater impacts, supporting groundwater management, and providing regulatory compliance. The use of superposition models has been increasing in recent years with several applications for complex projects, especially in western United States.

Table A-1 Representative Reference List of Superposition Model Applications

Citation	Location	Purpose of Model	Review Agency
Pollyea, 2019	Oklahoma	Long-range fluid pressure caused by oilfield wastewater disposal	USGS, Virginia Tech
Gailey, Fogg, et al., 2019	California Central Valley	On-farm groundwater recharge with surface water releases	UC Davis
Peeters et al., 2018	Gloucester Basin, Australia	Environmental impact assessment of coal development	Australian Dept Enviro and Energy
Todd GW, 2017	Kern County, California	Groundwater impacts analysis, Kern River Water Allocation Plan	Local Water Agencies
Fio et al., 2016	Upper Salinas Valley, California	Long-term water resources management plan	Monterey County WRA
Leake, et al., 2013	Parker-Palo Verde-Cibola, Arizona and California	Effects of groundwater withdrawals on Adjudicated Colorado River flow depletion	USGS, US Bureau of Reclamation
Riesterer et al., 2013	Pahrump Valley, Nevada	Groundwater impacts analysis, Hidden Hills Solar Energy Generating System	Nye County Water District
CH2MHill, 2010	Hanford Site, Washington	optimization of a large groundwater remedy at the 200-ZP-1 OU	US Department of Energy
Barroll, 2006, 2012	Taos Valley, New Mexico	Water rights administration under the 2006 Taos Adjudication Settlement	New Mexico State Engineer
Sukow, 2012	Eastern Snake Plain, Idaho	Support development of a Comprehensive Aquifer Management Plan	Idaho Dept. of Water Resources
Leonard Rice Engineers, 2012	Denver-Julesburg Basin, Colorado	Compliance with Colorado Ground Water Rules of discharge to streams	Colorado Div. of Water Resources
Leake, et al., 2008	Colorado River Valley from Lake Mead to Yuma	Assessment of possible depletion of water in the Colorado River by pumping wells	USGS
Leake, et al., 2008	Lower Colorado River Valley	Effects of pumping on Adjudicated Colorado River flow depletion (US Supreme Court, 2006)	USGS, US Bureau of Reclamation
Kendy and Bredehoeft, 2006	Gallatin Valley, Montana	Groundwater impacts analysis of irrigation pumping on streamflow	Gallatin Conservation Dist.
Wylie, 2005	Eastern Snake Plain, Idaho	Resolution of conflicts among water users and in future water administration	Idaho Depart. of Water Resources
Larson, et al., 2005	Roswell Underground Water Basin, New Mexico	Evaluate impacts associated with proposed changes in pumping patterns	New Mexico State Engineer
Bergeron and Freeman, 2005	Hanford Site, Washington	Estimate concentrations in groundwater for a specific constituent inventory	US EPA
Leake et al., 2005	Little Colorado River Area, Arizona	Effects of groundwater withdrawals on stream flow depletion	USGS
CH2MHill, 2004	Sacramento Valley, California	Groundwater impacts analysis, Sacramento River Settlement Contracts	US Bureau of Reclamation
Roark, 2001	Santa Fe Group Aquifer System, New Mexico	Surface water/groundwater interactions of Rio Grande River with aquifer system	City of Albuquerque
McAda, 2001	Rio Grande Valley, New Mexico	Induced infiltration from the Rio Grande surface-water system from pumping	City of Albuquerque
Hubbell et al., 1997	Eastern Snake Plain, Idaho	Demonstration of increased efficiency of groundwater flow modeling	Idaho Dept. of Water Resources
Bradner, 1996	Upper Floridan Aquifer, Orange County, Florida	Impacts from redistribution of recharge from drainage on groundwater levels	USGS, County Stormwater Dept.
Takahashi and Peralta, 1995	East Shore Area of the Great Salt Lake, Utah	Optimization of perennial groundwater yield planning	Utah State University
Focazio and Speiran, 1993	Coastal Plain Aquifer, southeastern Virginia	Estimate groundwater-level declines from episodic pumping from six well fields	Hampton Roads Planning Comm.
Prince and Schneider, 1989	Glacial aquifers, New York	Refine aquifer properties by simulating field conditions of pumping tests	USGS

A.6 REFERENCES

Barroll, P. and P. Burck, 2006, Documentation of OSE Taos Area Calibrated Groundwater Flow Model T17.0, January 11, 2006, report prepared by the New Mexico Office of the State Engineer, 37 pages, plus Appendices A, B and C.

Barroll, P, 2012, Development of the T17sup.M7 Superposition Version of the OSE Taos Area Groundwater Model and Water Rights Administration under the Taos (Abeyta) Settlement, report prepared by the New Mexico Office of the State Engineer - Water Resource Allocation Program - Hydrology Bureau, April 16, 2012, 17 pages, plus Appendices A, B, C, D and E.

Bear, J. and A. Verruijt, 1987, Modeling Groundwater Flow and Pollution, D. Reidel Publishing Company, Boston, 414 p.

Bennett, G.D., 1976, Introduction to ground-water hydraulics: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter B2, 172 p.

Bergeron, M.P. and E.J. Freeman, 2005, Estimating Groundwater Concentrations from Mass Releases to the Aquifer at the Integrated Disposal Facility and Tank Farms in the Hanford Central Plateau, report prepared by Pacific Northwest National Laboratory for the US Dept. of Energy, 59 p.

Bouwer, H., 1978, Groundwater Hydrology, McGraw-Hill Book Company, New York, 480 p.

Bradner, L.A., 1996, Estimation of Recharge Through Selected Drainage Wells and Potential Effects from Well Closure, Orange County, Florida, U.S. Geological Survey Open-File Report 93-316, 34 p.

CH2MHill, 2010, Results of Tritium Tracking and Groundwater Monitoring at the Hanford Site 200 Area State-Approved Land Disposal Site, Fiscal Year 2010, technical report to US Dept. of Energy, DE-AC06-08RL14788, Richland, WA, 93 p.

CH2MHill, 2004, Sacramento River Settlement Contractors Environmental Impact Statement, prepared for U.S. Bureau of Reclamation, September 2004.

Durbin, T., Delemos, D. and Rajagopal-Durbin, A., 2008, Application of Superposition with Nonlinear Head-Dependent Fluxes. Ground Water, 46: 251–258.

Fio J., C. Lucero, S. Deveral, 2016, North Marina Groundwater Model Update, Monterey Peninsula Water Supply Project, September 1, 2016.

Focazio, M.J. and G.K. Speiran, 1993, Estimating Net Drawdown Resulting from Episodic Withdrawals at Six Well Fields in the Coastal Plain Physiographic Province of Virginia, U.S. Geological Survey Water-Resources Investigations Report 93-4159, 24 p.

Freeze, R.A. and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Gailey, R.M., Fogg, G.E., Lund, J.R. et al. Hydrogeol J (2019) 27: 1183. https://doi.org/10.1007/s10040-019-01936-x

Hubbell, J.M., C.W. Bishop, G.S. Johnson and J.G. Lucas, 1997, Numerical Ground-Water Flow Modeling of the Snake River Plain Aquifer Using Superposition Technique, Ground Water Vol. 35 No. 1, January-February 1997, pp 59-66.

Kendy, E., and J. D. Bredehoeft, 2006, Transient effects of groundwater pumping and surface-water-irrigation returns on streamflow, Water Resour. Res., 42, W08415, doi:10.1029/2005WR004792

Larson, S.P., J. Choi, V.A. Lane, E. Keyes, and A.M. Elhassan, 2005, Using an Enhanced Superposition Model for Water Rights Administration in the Roswell Underground Water Basin, poster for 2005 New Mexico Water Research Symposium, by the New Mexico Water Resources Research Institute.

Leake, S. A., 2011, Capture—Rates and Directions of Groundwater Flow Don't Matter! Ground Water, 49: 456–458

Leake, S.A., Owen-Joyce, S.J., Heilman, J.A., 2013, Potential depletion of surface water in the Colorado River and agricultural drains by groundwater pumping in the Parker-Palo Verde-Cibola area, Arizona and California: U.S. Geological Survey Scientific Investigations Report 2013–5134, 13 p.

Leake, S.A., Greer W., Watt, D., and Weghorst, P., 2008, Use of superposition models to simulate possible depletion of Colorado River water by ground-water withdrawal: U.S. Geological Survey Scientific Investigations Report 2008-5189, 25 p.

Leake, S.A., Hoffmann, and Dickinson, J.E., 2005, Numerical ground-water change model of the C aquifer and effects of ground-water withdrawals on stream depletion in selected reaches of Clear Creek, Chevelon Creek, and the Little Colorado River, northeastern Arizona: U.S. Geological Survey Scientific Investigations Report 2005-5277, 29 p.

Leonard Rice Engineers, 2012, Location of Tributary/Nontributary Line Niobrara Formation, Lower Pierre Shale, Carlile Formation, and Greenhorn Formation, Southwestern Denver-Julesburg Basin, Colorado, report prepared for Ultra Petroleum, February 2012.

McAda, D.P., 2001, Simulation of a long-term aquifer test conducted near the Rio Grande, Albuquerque, New Mexico: U.S. Geological Survey Water-Resources Investigations Report 99-4260, 66 p.

Morrison, T., 2006, Basic Groundwater Hydrology and Evaluation Procedures Training Manual, report prepared by the New Mexico Office of the State Engineer, May 31, 2006, 134 p.

Peeters, L.J.M., D.E. Pagendamb, R.S. Crosbiec, P.K. Rachakondad, W.R. Dawese, L. Gaoc, S.P. Marvanekc, Y.Q. Zhangf, T.R. McVicarf, 2018, Determining the initial spatial extent of an environmental impact assessment with a probabilistic screening methodology, Environmental Modelling & Software, Volume 109, November 2018, Pages 353-367.

Pollyea, Ryan M., 2019, The Hydrogeologic Principle of Superposition Explains Long-range Fluid Pressure Transients Caused by Oilfield Wastewater Disposal, EarthArXiv. April 11. doi:10.31223/osf.io/h4kqx.

Prince, K.R., and Schneider, B.J., 1989, Estimation of hydraulic characteristics of the Upper Glacial and Magothy aquifers at East Meadow, New York, by use of aquifer tests: U.S. Geological Survey Water-Resources Investigations Report 87-4211, 43 p.

Reilly, T.E., O.L. Franke, and G.D. Bennett, 1987, The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6, 28p., http://pubs.usgs.gov/twri/twri3-b6/pdf/twri_3-B6_a.pdf.

Reilly, T.E., and Harbaugh, A.W., 2004, Guidelines for evaluating ground-water flow models: U.S. Geological Survey Scientific Investigations Report 2004-5038, 30 p.

Riesterer, J., Hodgins M., Lazarus, J., 2013, Preliminary Development of a Superposition Ground Water Model for Use in Administration of Water Right Transfers, abstract in the Pahrump Valley 2013 Devils Hole Conference, Furnace Creek, p7.

Roark, D.M., 2001, Estimation of Hydraulic Characteristics in the Santa Fe Group Aquifer System Using Computer Simulations of River and Drain Pulses in the Rio Bravo Study Area, near Albuquerque, New Mexico, U.S. Geological Survey Water-Resources Investigations Report 01-4069, 59 p.

Sukow, J., 2012, Comparison of Superposition Model with Fully Populated Model for Eastern Snake Plain Aquifer Model Version 2.0, report prepared by Idaho Department of Water Resources, July 18, 2012, 10 p.

Takahashi, S. and R.C. Peralta, 1995, Optimal perennial groundwater yield planning for complex nonlinear aquifers: methods and examples. Advances in Water Resources, 18: 49-62.

Todd, D.K. and L.W. Mays, 2004, Groundwater Hydrology, (Third Edition): John Wiley and Sons, New York, 636 p.

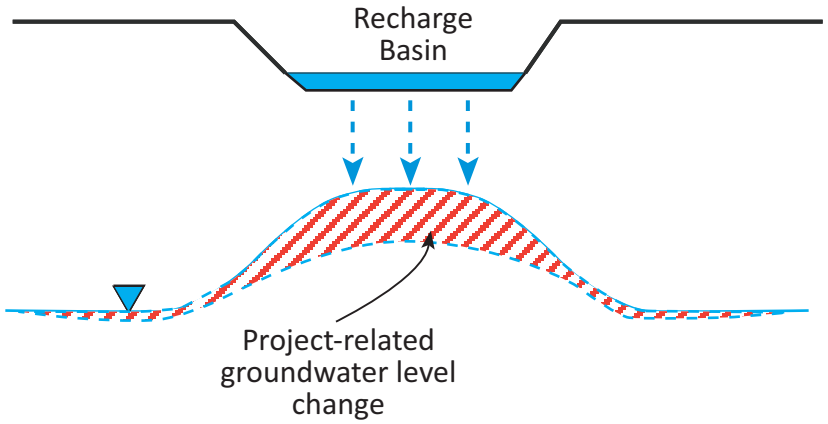
Todd Groundwater, 2017, Final Groundwater Impacts Assessment Report Kern River Water Allocation Plan, as Appendix D in Supplemental Environmental Impact Report for Kern River Water Allocation Plan, SCH# 2011041082, July 2017, 1345 pp.

U.S. Supreme Court, 2006, State of Arizona, plaintiff v. State of California, et al., defendants: U.S. Supreme Court Consolidated Decree—March 27, 2006, no. 8, original, 34 p.

Wylie, A., 2005, Snake River Plain Aquifer Model Scenario: The Sources of Drawdown at A&B "A&B Scenario," report prepared by Idaho Department of Water Resources with guidance from the Eastern Snake Hydrologic Modeling Committee, May 2005, 12 p.

ATTACHMENT A

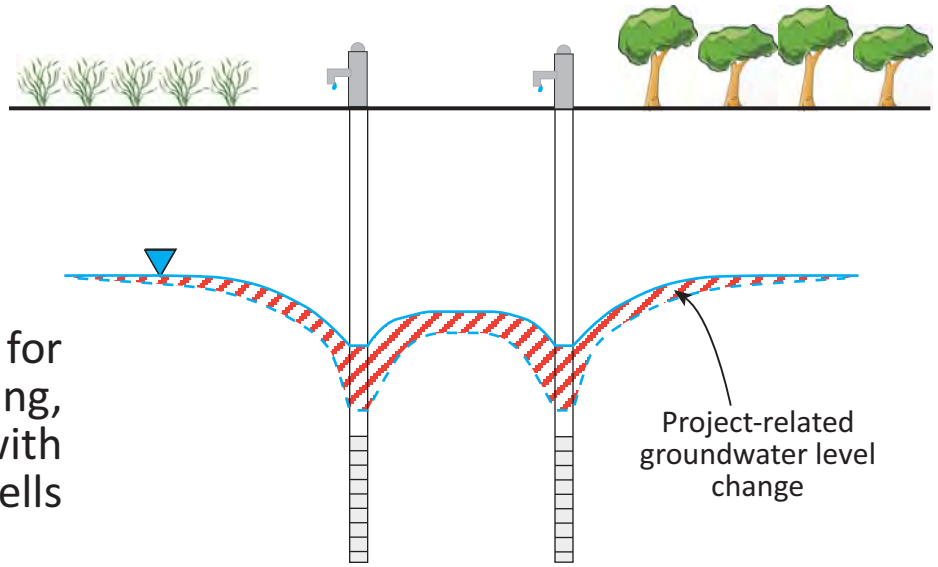
FIGURES



Reduction in surface water available for *local recharge or banking* results in lower groundwater levels with largest impact underneath facility

The volume of water in the zone of "Project-related groundwater level change" represents the change in groundwater storage in the aquifer

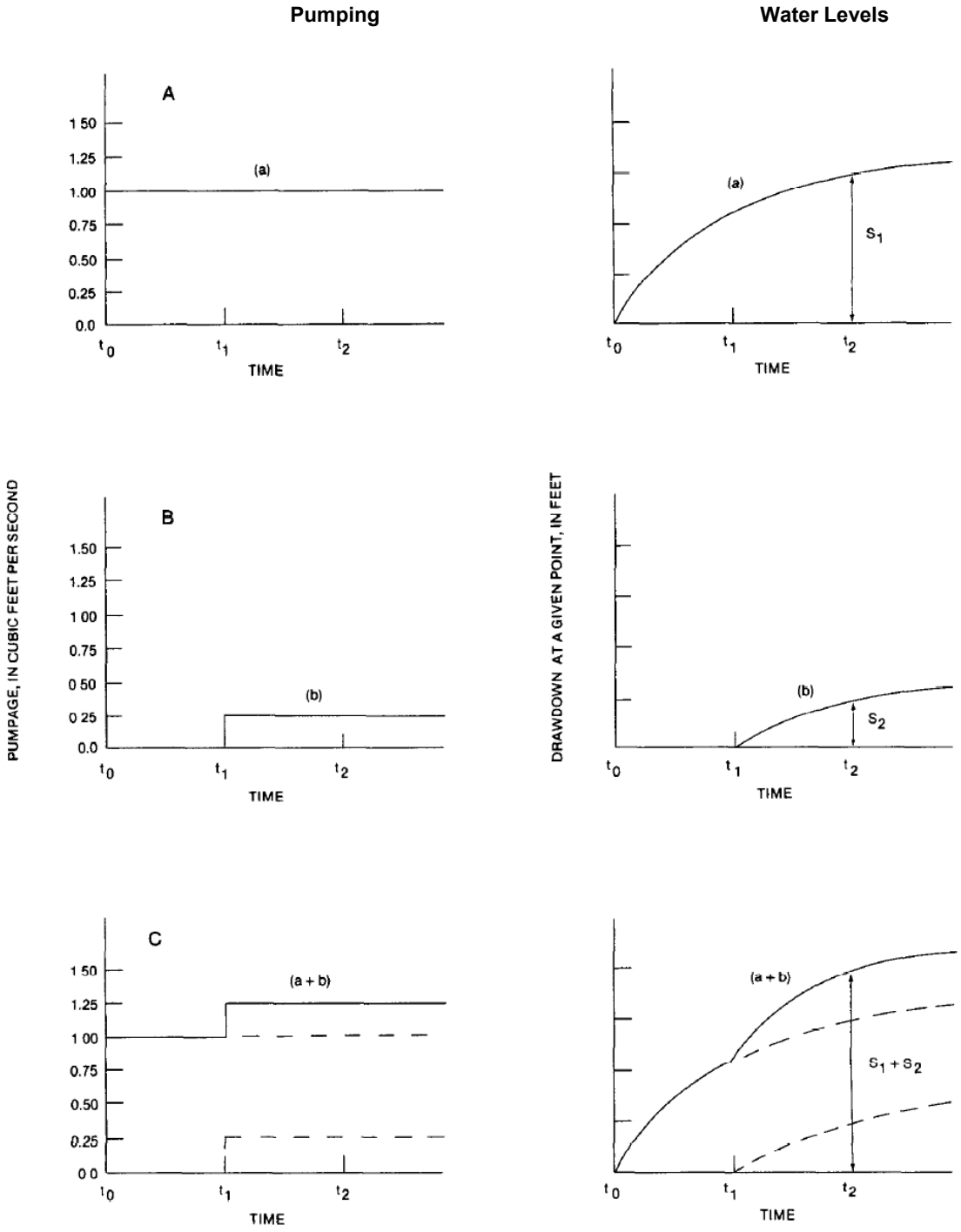
Reduction in surface water available for *irrigation* results in increased pumping, which lowers groundwater levels with largest impact at pumping wells



June 2020

TODD GROUNDWATER

Figure A-1
Conceptual Project Impacts on Groundwater Levels



Superposition of well solutions: A, Initial pumpage starting at t_1, and its resulting drawdown, s_2, at t_2
B, Change in pumpage from the initial rate starting at t_1 and its resulting drawdown, s_2, at t_2
C, Total pumpage starting at initial rate and increasing at t_1, and its resulting drawdown, $s_{1+}+s_{2,}$ as obtained by superposition.

Source: Figure 6 from Reilly, Franke and Bennett, 1987, The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6

June 2020

TODD GROUNDWATER

Figure A-2
USGS Example of Principle of Superposition

ATTACHMENT B

SUPERPOSITION MODEL SETUP

B. SUPERPOSITION MODEL SETUP

The Superposition Model used for the BVWSD Recovery Project was previously developed and used for the Supplemental Environmental Impact Report (SEIR) for the Kern River Water Allocation Plan for Kern Delta Water District (KDWD). The Draft SEIR was completed in 2017 (ESA, 2017) and the groundwater modeling was described in the Groundwater Impacts Assessment Report (Todd Groundwater, 2017) which is an appendix to the SEIR. A summary of the USGS Central Valley Hydrologic Model (CVHM) and the process used to develop the KDWD Superposition Model from CVHM is discussed below. In applying the model to BVWSD some additional modifications were made to the Superposition Model based on local data and model requirements. These are listed at the end of this section.

B.1 SUPERPOSITION MODEL BACKGROUND

Following the general methodology for applying the Principle of Superposition to groundwater modeling (Reilly et al., 1986), the Superposition Model was developed from the existing, previously calibrated, USGS CVHM (Faunt, 2009), referred to here as the Base Model. CVHM is a three-dimensional computer model developed by the USGS to simulate surface water and groundwater flow across the entire Central Valley (Faunt, 2009). The geologic framework and aquifer properties of CVHM are based on a comprehensive geologic analysis (USGS Sediment Texture Analysis) that provides a regionally consistent evaluation of aquifer properties based on the analysis of local well logs (Faunt et al., 2009).

B.1.1 Central Valley Hydrologic Model (CVHM) Overview

CVHM simultaneously accounts for changing water supply and demand across the landscape and simulates surface water and groundwater flow across the entire Central Valley (Faunt et al., 2009). CVHM is designed to simulate water usage in the Central Valley on a regional scale.

CVHM uses a uniform grid spacing of one square mile that is oriented parallel to the valley axis, about 34 degrees west of north. In order to adequately represent the growing season, the annual hydrologic cycle in CVHM is divided into 12 monthly stress periods.

CVHM simulates the Central Valley Aquifer by subdividing the subsurface into 10 layers (**Figure B-1**). The top layer (Layer 1) represents the land surface. Model Layers 2 and 3 represent the shallow aquifer. Model Layers 4 and 5 represent the Corcoran Clay Member of the Tulare Formation, or its equivalent, where present. Model Layers 6 through 10 represent the deeper aquifers.

For the CVHM, the bottom of the model was specified on the basis of well-completion records to incorporate the vertical intervals of the aquifer system being stressed by pumpage. The model bottom extends to 1,800 feet below land surface, and where the Corcoran Clay is present, to 1,500 feet below the Corcoran Clay (**Figure B-1**). For the most part, saline water is deeper than the model bottom (Faunt et al., 2009).

CVHM has a recognized deficiency in accurately representing the recharge volumes from the numerous groundwater banking operations in Kern County in the model (Faunt, 2009); this deficiency - rather than model structure and parameterization - is considered to be the primary factor impacting the CVHM calibration in Kern County. Since these water budget terms are not used in the Superposition Model, this deficiency is not considered to appreciably affect the use of the CVHM as the Base Model. Therefore, CVHM is considered the best model available to serve as the Base Model for the Superposition Model.

B.1.2 USGS Sediment Texture Analysis Overview

The USGS Sediment Texture Analysis was used to develop aquifer properties for the CVHM and subsequently used to develop the Superposition Model. The USGS conducted the Sediment Texture Analysis by compiling and describing lithology for approximately 8,500 driller's logs to better define aquifer properties for the heterogeneous valley-fill deposits of the Central Valley aquifer system (Faunt et al., 2009). The geologic descriptions on each log were classified using a discrete binary texture classification of either "coarse-grained" or "fine-grained" similar to those originally defined by Page (1986). The coarse-grained sediment texture is defined as consisting of sand, gravel, pebbles, boulders, cobbles, or conglomerate. Fine-grained sediment texture is defined as consisting principally of clay, lime, loam, mud, or silt. The basis for calculating aquifer properties from texture data is based on the spatial correlation between saturated hydraulic conductivity[1] and pore-size distributions in geologic media (Faunt et al., 2009).

The spatial distribution of the sediment texture, both horizontally and vertically, was developed by applying a geostatistical analysis. For this analysis, the percentage of coarse-grained sediment texture was computed for each 50-foot depth interval. The utilization of the percentage of coarse-grained deposits, or texture, was based on a methodology developed in earlier works by Page (1986) and Burow et al. (2004). The geostatistical analysis applied a three-dimensional kriging technique to map the percentage of coarse-grained deposits onto a one-mile spatial grid at 50-foot depth intervals from land surface down to 3,000 feet below land surface across the Central Valley (Faunt et al., 2009).

The results of the USGS Sediment Texture Analysis show substantial heterogeneity and systematic variation in the texture of the sediments in the Central Valley that reflect the observed regional, spatial, and vertical heterogeneity in the aquifer system. These characteristics were correlated to known sediment source areas, independently mapped geomorphic provinces, and factors affecting the development of alluvial fans (Faunt et al., 2009). In the San Joaquin Valley, especially on the eastern side, the areas of coarse-grained texture are more widespread than the areas of fine-grained texture and occur along the major rivers. In the southern part of the San Joaquin Valley, the alluvial fans derived from the Sierra Nevada are much coarser grained than the alluvial fans to the north. In contrast to the eastern San Joaquin Valley, the western San Joaquin Valley generally is finer-grained and is underlain by the Corcoran Clay Member of the Tulare Formation. These finer textures reflect the source material consisting of shales and marine deposits from the Coast Range. These rocks generally yield finer-grained sediments than the granitic parent rocks that make up the alluvial fans on the eastern side of the valley (Faunt et al., 2009).

USGS used the Sediment Texture Analysis as the geologic basis for determining aquifer properties for the 10-layer CVHM (**Figure B-1**). The layering for CVHM matches that used for the USGS Sediment Texture Analysis; therefore, the aquifer properties derived from USGS Sediment Texture Analysis were incorporated into CVHM (Faunt et al., 2009; Faunt, 2009). The aquifer properties were updated during calibration, and the final parameters used are documented in USGS publications (Faunt et al., 2009). The method for developing the aquifer properties from the USGS Sediment Texture Analysis is described more fully in the CVHM model documentation (Faunt et al., 2009). In summary, the assumptions used to develop the aquifer properties for CVHM include:

- The horizontal hydraulic conductivity is calculated as the weighted arithmetic mean of the percentage of coarse- and fine-grained sediments defined by the sediment texture analysis multiplied by the assigned hydraulic conductivities for each texture. For the San Joaquin Valley,

[1] Hydraulic conductivity (K) is a coefficient of proportionality that describes the rate at which water can move through a permeable medium.

the coarse-grained hydraulic conductivity is 2.4×10^{-1} feet per day, and fine-grained hydraulic conductivity is $3.3\times10^{+3}$ feet per day.

- Vertical hydraulic conductivity between layers is calculated as a weighted power mean of the percentage of coarse- and fine-grained sediment textures between the midpoints of adjacent 50-foot layers multiplied by the assigned hydraulic conductivities for each texture.
- Specific yield was calculated using a linear relation based on the percentage of coarse-grained deposits. Where there were no coarse-grained deposits, the specific yield was 0.09. Where the deposits are all coarse-grained, the specific yield was 0.40. The median and average values are 0.23 and 0.24, respectively, well within previously estimated values of specific yield (Faunt et al., 2009).
- The specific storage is calculated by calculating the weighted arithmetic mean of the percentage of coarse- and fine-grained sediments multiplied by the assigned porosity for each texture. This value is then multiplied by the compressibility of water (1.4×10^{-6} per foot) to determine the specific storage.

This method for estimating aquifer properties using the USGS Sediment Texture Analysis approach has been applied successfully in previous groundwater-flow models in the San Joaquin Valley (Phillips and Belitz, 1991; Belitz et al, 1993; Burow et al., 2004; Phillips et al., 2007). The value of using the CVHM aquifer properties derived from the USGS Sediment Texture Analysis in the Superposition Model is that the aquifer properties are derived from a comprehensive regional analysis based on a consistent set of geologic data and developed by technically-credible methods.

B.2 SUPERPOSITION MODEL SETUP

The Superposition Model is derived from the CVHM, which covers the entire Central Valley. The CVHM was developed using the MODFLOW One-Water Hydrologic Flow Model (OWHM), which utilizes the MODFLOW-2005 Farm Process Package (FMP2) (Schmid and Hanson, 2009). The Superposition Model does not use FMP2, so the Superposition Model is setup to run in MODFLOW 2005 with the Groundwater Vistas version 6 MODFLOW interface. Length units in the Superposition Model were converted from meters, used in the CVHM, to feet for convenience of analysis.

B.2.1 Model Setup

The Superposition Model covers all of the Study Area as well as areas outside the Study Area. The eastern, southern and western boundaries are extended to natural basin boundaries where the alluvial sediments terminate against bedrock units. The northern boundary extends into portions of Kings and Tulare counties (**Figure B-2**). The final selection of the northern boundary was determined through an iterative process of evaluating initial model results so that the boundary was sufficiently far from Project-related actions to have minimal effect on the analysis of groundwater impacts (Todd Groundwater, 2017).

The Superposition Model was setup to run in MODFLOW 2005 using the model data processor Groundwater Vistas version 6 MODFLOW interface (ESI, 2011). Model grid dimensions, aquifer properties, and boundaries for the Superposition Model were derived directly from the CVHM (Faunt et al., 2009). For the conversion of the CVHM to the Superposition Model, the following changes were made:

- Length units, including all model dimensions and aquifer properties, used in the model were converted from meters used in the CVHM to feet for convenience for analysis.

- The model grid spacing was refined by a factor of four (4), from 5,280 feet to 1,320 feet, to improve the spatial resolution of the simulated groundwater level changes related to the Proposed Project. This results in a 16-fold increase in grid spacing compared to CVHM, with each new model cell 40 acres in size. This grid spacing increases the resolution for assessing drawdown and mounding during the model simulations.

B.2.2 Model Domain

The CVHM (Faunt, 2009) simulates groundwater flow over the entire Central Valley. For the Superposition Model, the model domain needed to cover the Study Area and sufficient areas beyond the Study Area so that boundary effects did not influence simulation results. For the western, southern and eastern boundaries of the Superposition Model , the model domain could be extended to the natural boundary of the Central Valley Aquifer that represents the transition from the alluvial sediments in the Central Valley to the bedrock units of the surrounding Coast Range, Tehachapi Mountains and Sierra Nevada. Using the natural boundaries is preferable because the model can simulate the natural boundary effects associated with the margin of the groundwater basin.

To the north and northwest, the CVHM extends hundreds of miles beyond the Study Area. To reduce the computational overhead of simulating areas unnecessary for this analysis, a standard modeling technique was applied for defining a constant head boundary at a distance sufficiently distant from the Study Area so that the constant head boundary would not influence groundwater simulations in the Study Area. Using the MODFLOW processor Groundwater Vistas (Version 6) (ESI, 2011), the Telescopic Mesh Refinement (TMR) feature was used to setup a more refined model within a subregion of the larger-scale model. The northern boundary of the Superposition Model was selected as shown on **Figure B-2**.

Using the TMR process, the model grid spacing was changed from 5,280 feet to 1,320 feet, reducing each model cell to 40 acres in size. This grid spacing increases the resolution for assessing drawdown and mounding during the Superposition Model simulations.

B.2.3 Model Layering

The CVHM characterizes the Central Valley aquifers with ten model layers (**Figure B-1**). Given the prevailing hydrostratigraphy within the Project Area and the objectives of the impact analysis, these ten layers were grouped together within the Superposition Model to form four model layers as follows to simplify the analysis and presentation of model results:

- Superposition Model Layer 1 groups together CVHM model layers 1, 2 and 3 to simulate the Shallow Aquifer above the local regional confining layers in Kern County.
- Superposition Model Layer 2 groups together CVHM model layers 4 and 5 to simulate an interval with increased clay layers, including the E-clay member of the Tulare Formation, the 300-foot clay, or the local equivalent, that locally can form an aquitard limiting vertical flow.
- Superposition Model Layer 3 groups together CVHM model layers 6 and 7 to simulate the main production zone for the Deep Aquifer in Kern County.
- Superposition Model Layer 4 groups together CVHM model layers 8, 9 and 10 to simulate the lower portions of the Deep Aquifer in Kern County that is generally below the primary production zone.

Following the process outlined by Reilly et al. (1987), Model Layer 1 was defined as the top of the groundwater surface: its initial value was set to zero so that calculations made with the model would

directly represent the change from the initial condition, consistent with the use of superposition methods. The thickness of the model layers represents the saturated thickness below the top of the groundwater surface.

The upper surface of the Superposition Model was defined as the water table prior to January 1997. The CVHM simulation results for December 1996 groundwater elevations were used to define the top of Model Layer 1. Areas along the margin of the groundwater basin where the 1997 water table was below the bottom of a Superposition Model layer were considered to be unsaturated and were converted to No Flow cells in the Superposition Model.

Also, following the process outlined by Reilly et al. (1987), the top surface of the Superposition Model was set to have a zero groundwater elevation. Therefore, the bottom elevations of the Superposition Model layers represent the saturated aquifer thicknesses as of December 1996. A spreadsheet process was used to calculate the depth of the appropriate CVHM model layer elevation below the upper surface of the Superposition Model.

B.2.4 Aquifer Properties

A key criterion of selecting CVHM as the Base Model was to take advantage of the comprehensive USGS Sediment Texture Analysis (Faunt et al., 2009) to develop the spatial distribution of aquifer properties. Accordingly, final aquifer properties were extracted from the CVHM and applied to the Superposition Model in a manner to preserve the hydraulic characteristics.

This step required that the aquifer properties from the 10-layer CVHM model be composited and mapped to the 4-layer Superposition Model using standard procedures for calculating the equivalent property values in a layered aquifer system (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978). The key aquifer properties extracted from CVHM include:

- Horizontal Hydraulic Conductivity (K_H) assumes groundwater flow is generally parallel to the geologic layering; therefore, the equivalent K_H was calculated using a thickness-weighted average following the above referenced standard procedures. As a result, the equivalent K_H was determined mainly by the layers with the highest K_H values.
- Vertical Hydraulic Conductivity (K_Z) assumes groundwater flow is generally perpendicular to the geologic layering; therefore, the equivalent K_Z was calculated using a harmonic mean following the above referenced standard procedures. As a result, the hydraulic resistances of the layers are additive, so that the equivalent K_Z was mainly determined by the layers with the lowest K_Z values.
- Specific Storage (S_S) assumes that the porosity remains nearly constant, therefore, the equivalent specific storage was calculated using a thickness-weighted average following the above referenced standard procedures.

For the Superposition Model, the aquifer properties of hydraulic conductivity and aquifer storage are derived directly from the CVHM. A key part of using CVHM is to take advantage of the USGS Sediment Texture Analysis (Faunt et al., 2009) used to develop the spatial distribution of aquifer properties from a comprehensive analysis of geologic data from well logs. The final aquifer properties used for the CVHM were extracted and applied to the Superposition Model in a manner to preserve the hydraulic characteristics. These aquifer properties include:

- Horizontal Hydraulic Conductivity (K_h)
- Vertical Hydraulic Conductivity (K_z)
- Specific Storage (S_s)

To correlate the aquifer properties from multiple CVHM model layers to the Superposition Model model layers, standard techniques were applied for calculating aquifer properties in layered aquifer systems. For determining the equivalent K_h for a layered aquifer, a weighted average based on layer thickness was applied (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978) using the following equation:

$$\mathrm{K_h} = \sum \frac{K_i \, d_i}{d} \qquad (B1)$$

where K_h = horizontal hydraulic conductivity of the multilayer system
K_i = horizontal hydraulic conductivity of an individual layer within the multilayer system
d_i = thickness of an individual layer within the multilayer system
d = thickness of the entire multilayer system.

Equation B1 states that the K_h of the multilayer system is equal to the sum of the product of the K_h times the percentage thickness of the layer to the total thickness of the multilayer system. In other words, the contribution of each layer to the composite K_h is the proportional to its thickness relative to the total thickness. This same process can also be used for calculating the composite values for the storage properties of S_y and S_s.

K_z requires use of a different equation. For determining the equivalent K_z for a layered aquifer, a harmonic mean is applied (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978) using the following equation:

$$K_z = \frac{d}{\sum {d_i}/{K_i}} \qquad (B2)$$

where K_z = vertical hydraulic conductivity of the multilayer system
K_i = vertical hydraulic conductivity of an individual layer within the multilayer system
d_i = thickness of an individual layer within the multilayer system
d = thickness of the entire multilayer system.

For the vertical groundwater flow, *Equation B2* calculates K_z as the total thickness of the multilayer system divided by the summation of the layer thickness divided by the K_i of the individual layer. In this manner, the K_z calculated by *Equation B2* is controlled by the most resistive layer to groundwater flow. In physical terms, a single continuous clay layer can strongly limit vertical groundwater flow and form a confining layer. Therefore, a single clay layer has a strong influence on determining the K_z. A high K_z would require a continuous vertical sequence of permeable sediments without intervening clay layers.

The equivalent aquifer properties were calculated for each model layer following the referenced standard procedures (Todd and Mays, 2004; Bear and Verruijt, 1987; Freeze and Cherry, 1979; Bouwer, 1978). The calculation was performed for the center point of each CVHM grid. A natural neighbor interpolation method was applied to distribute the aquifer properties from CVHM to the refined Superposition Model grid to preserve the CVHM aquifer properties. In CVHM, the aquifer properties from the USGS Sediment Texture Analysis were input into the MODFLOW Layer Property Flow Package and then modified using the MODFLOW Multiplier File, which applies multiplier arrays to modify aquifer properties during calibration. Therefore, the final aquifer properties were derived from the output files rather than the input files.

The aquifer properties and thicknesses from the appropriate CVHM model layers were tabulated, and the calculation for each aquifer property was done on a cell-by-cell basis. The thicknesses were calculated relative to the December 1996 groundwater surface to represent the saturated thickness. Only those portions of the aquifer below the December 1996 groundwater surface were included in the calculation. The average value for each of the primary aquifer properties by model layer used in the original Superposition Model based on the original CVHM values is listed in **Table B-1**.

Table B-1 Spatial Average of Aquifer Properties Derived from Original CVHM

Aquifer Property	Model Layer 1	Model Layer 2	Model Layer 3	Model Layer 4
Saturated Thickness (ft)	267	31	334	1,050
Horizontal Hydraulic Conductivity (ft/d)	180	0.8	56	33
Vertical Hydraulic Conductivity (ft/d)	0.20	0.0006	0.046	0.01
Specific Storage (1/ft)	3.4×10^{-04}	2.8×10^{-07}	3.7×10^{-07}	3.6×10^{-07}

B.2.5 Boundary Conditions

For the conversion of CVHM to the Superposition Model, "background" boundary conditions (i.e., inflows and outflows not associated with the Proposed Project) were removed (as per Reilly et al., 1987). This step is consistent with the principle of superposition in that the result of multiple stresses on an aquifer system is equal to the sum of the results of the individual stresses. Therefore, the boundary conditions for recharge, evapotranspiration, pumping wells, and farm processes present in the CVHM were not included in the Superposition Model since these parameters do not change as a result of the Proposed Project.

The superposition methodology requires that most of the existing CVHM boundary conditions be either removed from the simulation, set to an initial value of zero (representing no change at the beginning of the calculations) or otherwise modified such that the Proposed Project changes that are to be superimposed on the system are the only deterministic stresses that are placed upon the model. The exceptions are natural boundaries that may influence Project conditions. The boundary conditions used in the Superposition Model include the following:

- The constant head boundary placed along the northern model boundary represents the interaction with the Central Valley Aquifer to the north (**Figure B-2**). The constant head boundary was set to an elevation of zero, consistent with the superposition methodology.
- Streams, including the Kern, White and Tule rivers were converted from the Streamflow Routing Package to the Drain Package. The Drain Package allows groundwater to exit to the surface if groundwater levels rise to the level of the streambed but does not allow for induced recharge from the streams to the aquifer. Since changes to stream recharge from the Proposed Project are simulated using the MODFLOW Recharge Package, the use of a passive drain provides a means to allow groundwater discharge to the simulated rivers. The streambed elevations were modified to represent the relative height of the streambed above the top of the initial groundwater surface following the superposition methodology (Reilly et al., 1987).
- Geologic faults in the CVHM were remapped onto the finer grid of the Superposition Model, and the same aquifer properties were applied to the faults as in the original model.

- Initial conditions were taken directly from the CVHM simulation results for December 1996 to accommodate the initial month of the Study Period (January 1997).

Boundary conditions for remaining boundaries included in the CVHM (e.g., recharge, evapotranspiration, pumping wells, and farm processes) were removed from the Superposition Model. The assumption is that these conditions will remain the same during the Proposed Project; therefore, following the Principle of Superposition (Reilly et al., 1987), the Superposition Model does not include them in the simulation. Boundary conditions representing faults in the CVHM were remapped onto the finer grid of the Superposition Model. The same aquifer properties were used to define the fault flow properties. As noted above, a constant head boundary was placed at the northern boundary of the Superposition Model to simulate interactions of subsurface groundwater flow in the Central Valley outside of the Superposition Model.

Streams were simulated using the Streamflow Routing (SFR) Package in CVHM. In the Superposition Model domain, the CVHM simulated the Kern, White and Tule rivers. These rivers are generally situated above the top of the groundwater surface except at their westernmost extent; however, these rivers typically are not flowing across the valley. Therefore, the rivers were converted to the MODFLOW drain package. The drain package allows groundwater to exit from the aquifer to the streambed but does not allow for induced recharge from the streams to the aquifer. This is considered a realistic representation of actual river conditions across the valley and provides a conservative assessment of impacts to groundwater elevations. Following the process outlined by Reilly et al. (1987), the elevations of the drain package were modified to represent the vertical distance between the bottom of the riverbed and the top of the Superposition Model.

B.3 MODIFICATIONS FOR BVWSD PALMS MODEL

The Superposition Model was further modified to accommodate the requirements for simulating the Recovery Project (**Figure B-3**). The following describes the changes that were made.

For the Recovery Project the model grid in the vicinity of the Recovery Project was reduced 6-fold relative to the previous Superposition Model used for the KDWD SEIR (Todd Groundwater, 2017). The purpose of this change was to provide sufficient grid density, or calculation points, to define the drawdown from the combined Recovery Project wellfield. The grid size over the Palms Site was reduced from 1,320 feet to 220 feet (**Figure B-4)**. As shown on **Figure B-4**, the model grid was reduced in three stages from the areas with a 1,320-foot grid spacing to areas with 220-foot grid spacing. This represents a 24-fold increase in grid density compared to the original 5,280-foot grid spacing in the original CVHM (Faunt et al., 2009) version of the model. The purpose of this was to make the transition more gradual so as not to introduce model instability or unnecessarily long run times.

The Elk Hills are an area where older sedimentary rocks crop out at the surface. These older sedimentary rocks correlate to strata that occur significantly deeper below the Recovery Project site. Because of the original coarse grid size in the CVHM, the delineation of the Elk Hills was not highly accurate. However, for simulating the Recovery Project, this boundary needed a higher degree of accuracy. The area of inactive model cells in Model Layer 1 was remapped to match the change in topographic slope noted on satellite images of the Recovery Project area. The current boundary with the Elk Hills is shown in **Figure B-4**.

Based on the validation to the WKWD data set (see **Attachment C**), the horizontal and vertical hydraulic conductivity in Model Layer 1 was reduced by 80 percent over the western portion of Kern County essentially to the west of Interstate 5 (**Figure B-5**). The specific storage was increased by 34 percent over the same area. The basis for this change to the aquifer parameters is twofold. First, a similar type

of modification was made in the development of CVHM specific areas and layers to improve the model calibration (Faunt et al., 2009). This provided a mechanism to correct the texture model (Faunt, 2009) calculations which were limited due to a lack of data in the western areas of the Central Valley. Several similar examples of this type of approach was used in areas north of Kern County (Faunt et al., 2009). Second, it is assumed that a lack of calibration data in western Kern County was due to poor water quality limiting the number of wells. Therefore, the change in the Model Layer 1 horizontal hydraulic conductivity to better match drawdowns at the WKWD facility is warranted. Additional discussion of the validation scenarios used as the basis for making these modifications to the aquifer properties is provided in **Attachment C**.

B.4 REFERENCES

Bear, J. and A. Verruijt, 1987, Modeling Groundwater Flow and Pollution, D. Reidel Publishing Company, Boston, 414 p.

Belitz, Kenneth, Phillips, S.P., and Gronberg, J.M., 1993, Numerical simulation of ground-water flow in the central part of the Western San Joaquin Valley, California: U.S. Geological Survey Water-Supply Paper 2396, 69 p.

Burow, K.R., Shelton, J.L., Hevesi, J.A., and Weissmann, G.S., 2004, Hydrogeologic characterization of the Modesto area, San Joaquin Valley, California: U.S. Geological Survey Scientific-Investigations Report 2004–5232, 54 p.

Bouwer, H., 1978, Groundwater Hydrology, McGraw-Hill Book Company, New York, 480 p.

ESA, 2017, Kern River Water Allocation Plan Draft Supplemental Environmental Impact Report (SCH# 2011041082), prepared for Kern Delta Water District, August.

ESI, 2011, Guide to Using Groundwater Vistas: Version 6, Environmental Simulations, Inc., Reinholds, PA, 221p.

Faunt, C., ed, 2009, Groundwater Availability of the Central Valley, California, USGS Professional Paper 1766.

Faunt, C.C., R.T. Hanson, and K. Belitz, 2009, Development of a three-dimensional model of sedimentary texture in valley-fill deposits of Central Valley, California, USA, Hydrogeology Journal (2010) 18: 625–649.

Freeze, R.A. and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Page, R.W., 1986, Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections, Regional Aquifer System Analysis, USGS Professional Paper 1401-C.

Phillips, S.P., and Belitz, Kenneth, 1991, Calibration of a textured-based model of a ground-water flow system, western San Joaquin Valley, California: Ground Water, v. 29, no. 5, p. 702–715.

Phillips, S.P., Green, C.T., Burow, K.R., Shelton, J.L., and Rewis, D.L., 2007, Simulation of multistage ground-water flow in part of the Northeastern San Joaquin Valley, California: U.S. Geological Survey Scientific-Investigations Report 2007–5009, 43 p.

Reilly, T.E., O.L. Franke, and G.D. Bennett, 1987, The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6, 28p., http://pubs.usgs.gov/twri/twri3-b6/pdf/twri_3-B6_a.pdf.

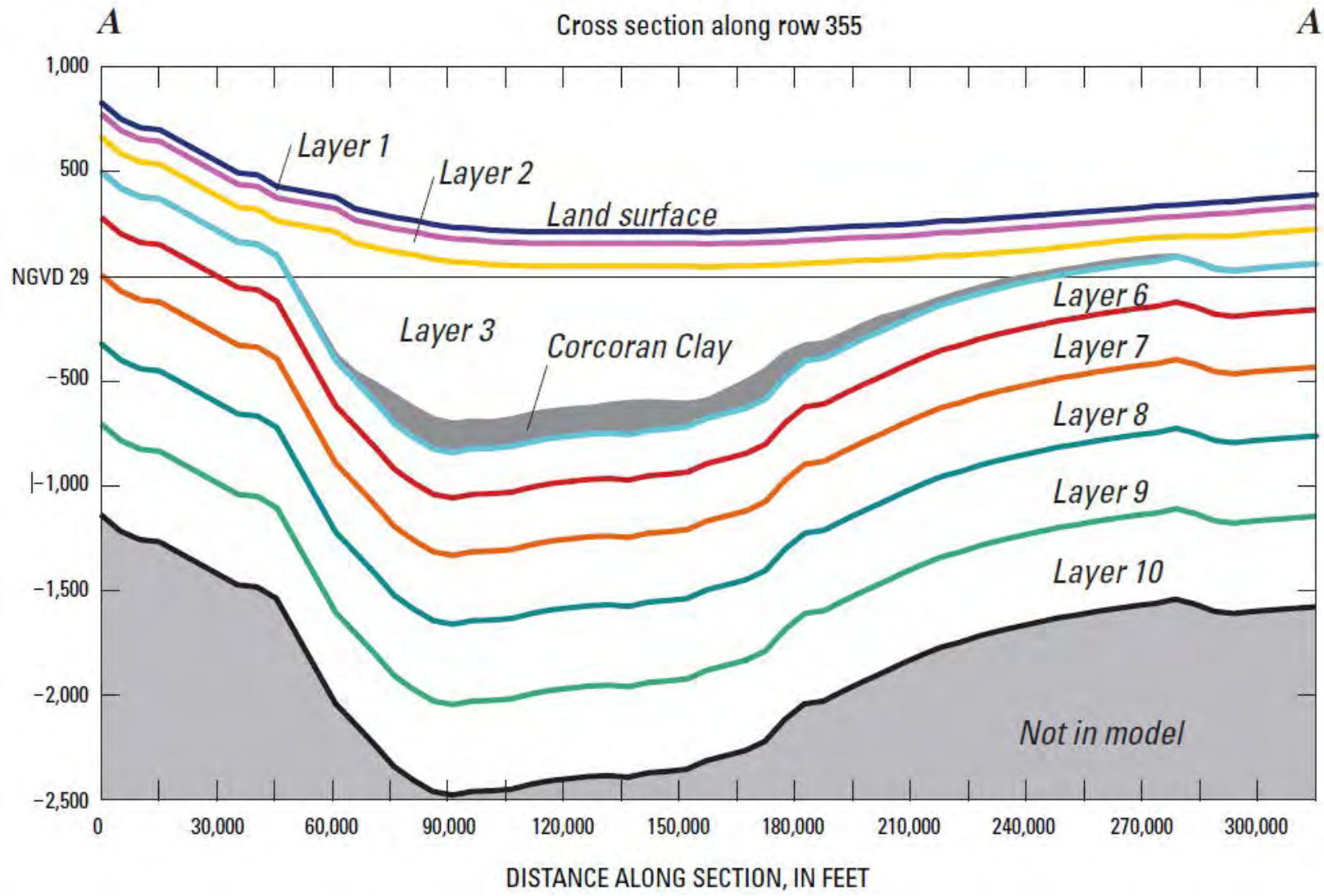
Schmid, Wolfgang, and Hanson, R.T., 2009, The Farm Process Version 2 (FMP2) for MODFLOW-2005—Modifications and Upgrades to FMP1: U.S. Geological Survey Techniques and Methods 6-A-32, 102 p.

Todd, D.K. and L.W. Mays, 2004, Groundwater Hydrology, (Third Edition): John Wiley and Sons, New York, 636 p.

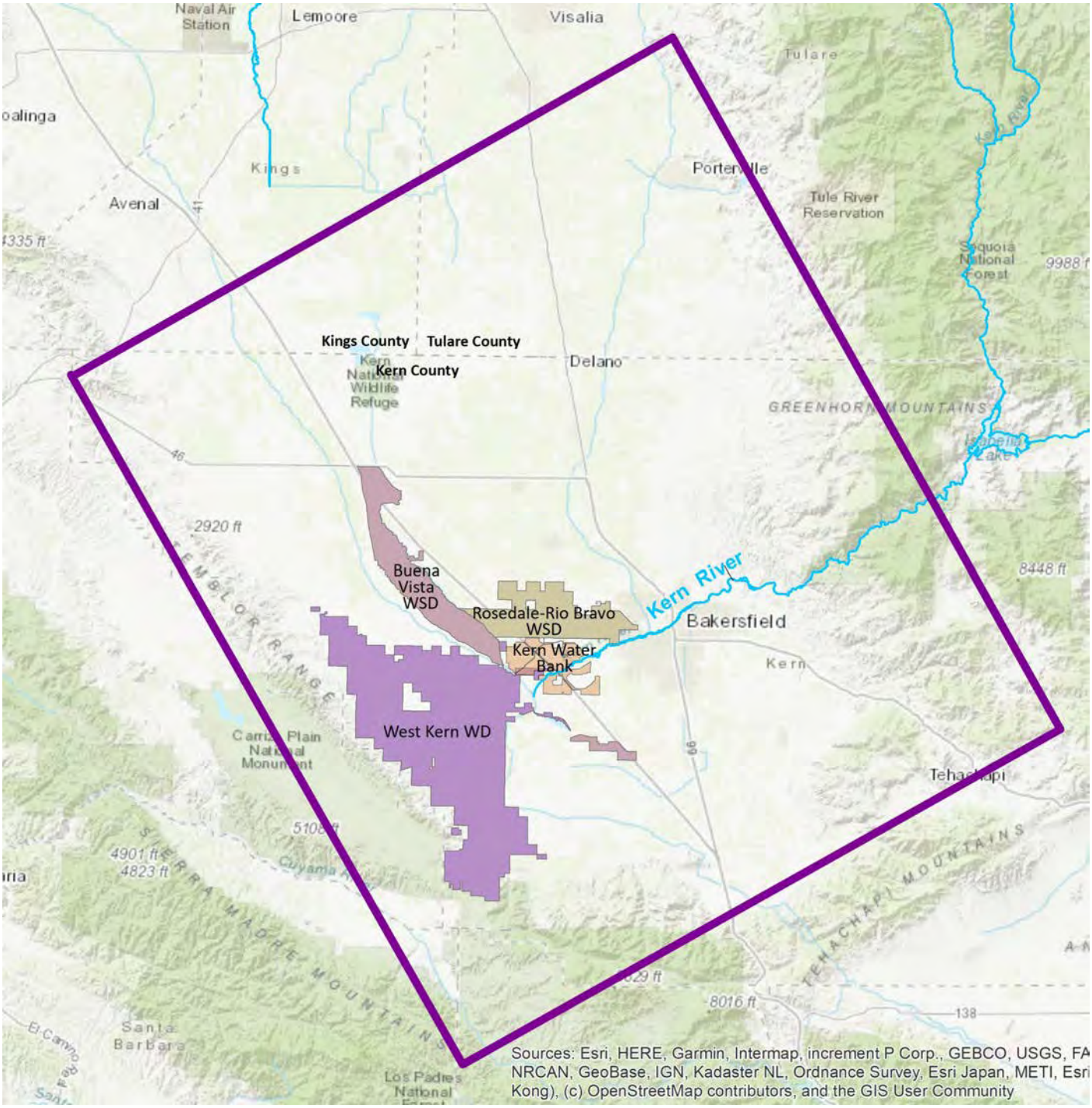
Todd Groundwater, 2017, Final Groundwater Impacts Assessment Report Kern River Water Allocation Plan, as Appendix D in Supplemental Environmental Impact Report for Kern River Water Allocation Plan, SCH# 2011041082, July, 1345 pp.

ATTACHMENT B

FIGURES



November 2020	Figure B-1 Conceptual Cross Section Showing Model Layers in USGS Central Valley Hydrologic Model
TODD GROUNDWATER	



N

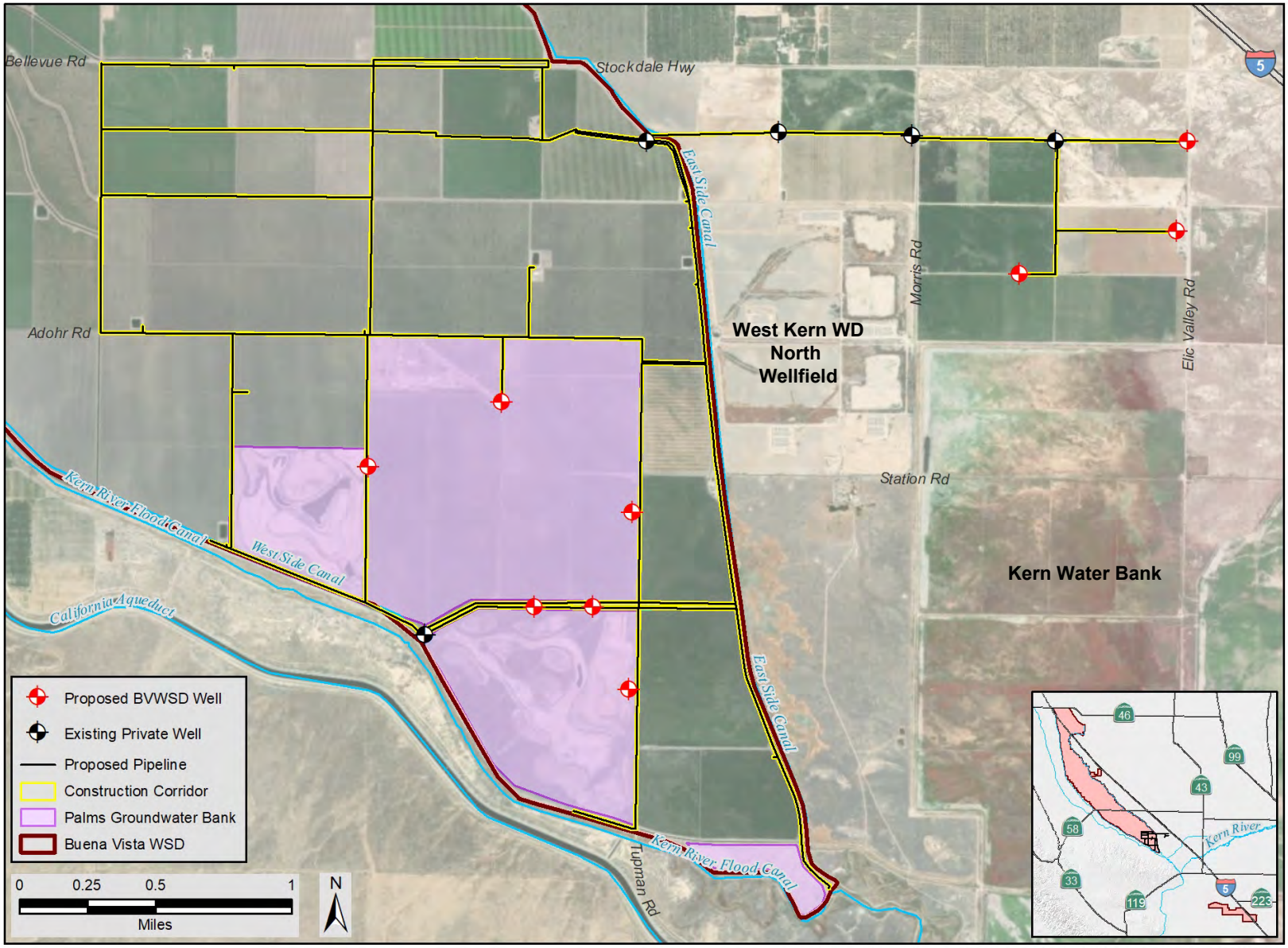
0 5 10

Scale: Miles

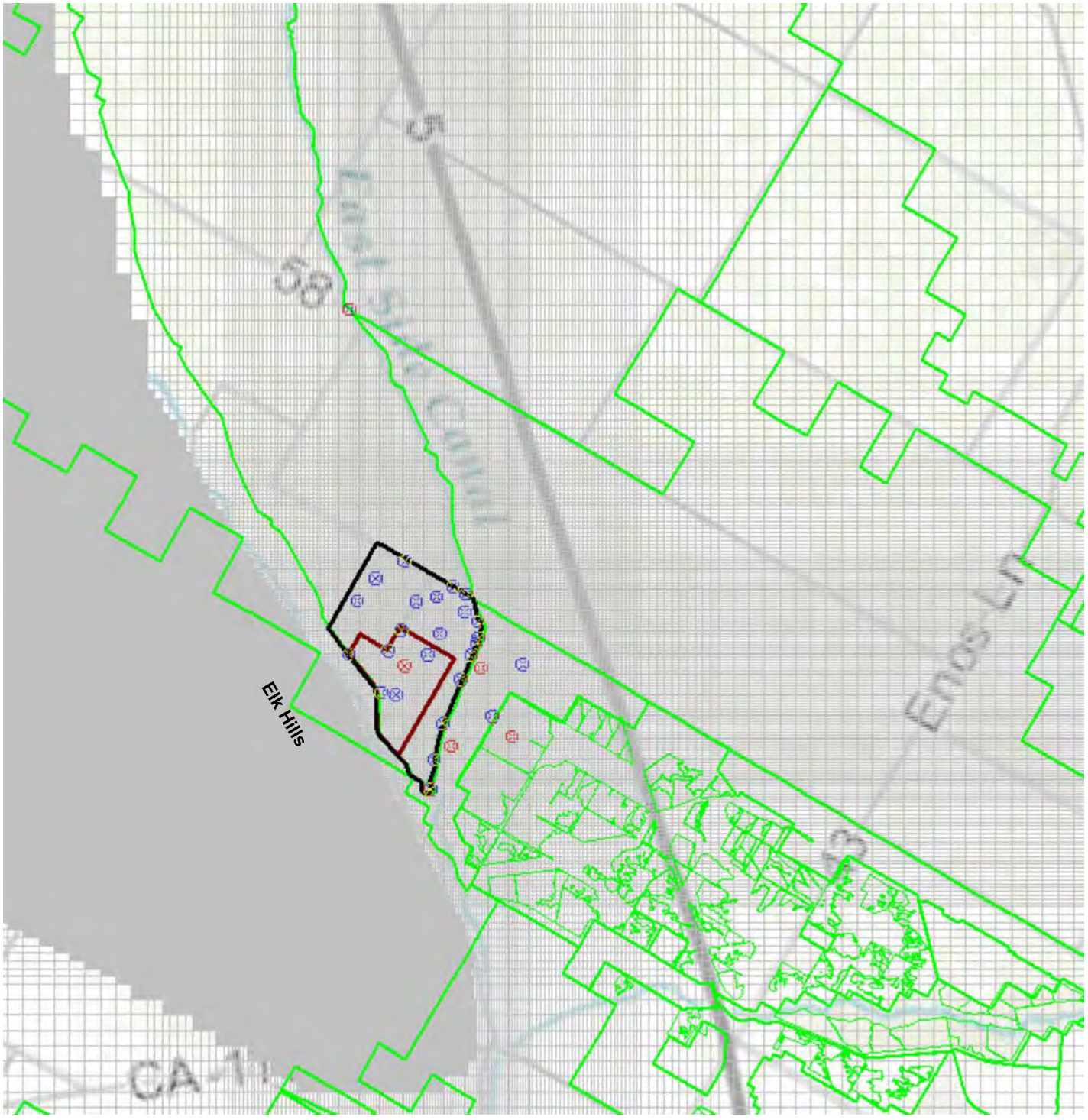
November 2020

TODD GROUNDWATER

Figure B-2
Kern County Superposition Model Domain



November 2020	Figure B-3 BVWSD Palms and Recovery Project Layouts
TODD GROUNDWATER	



0 1 2

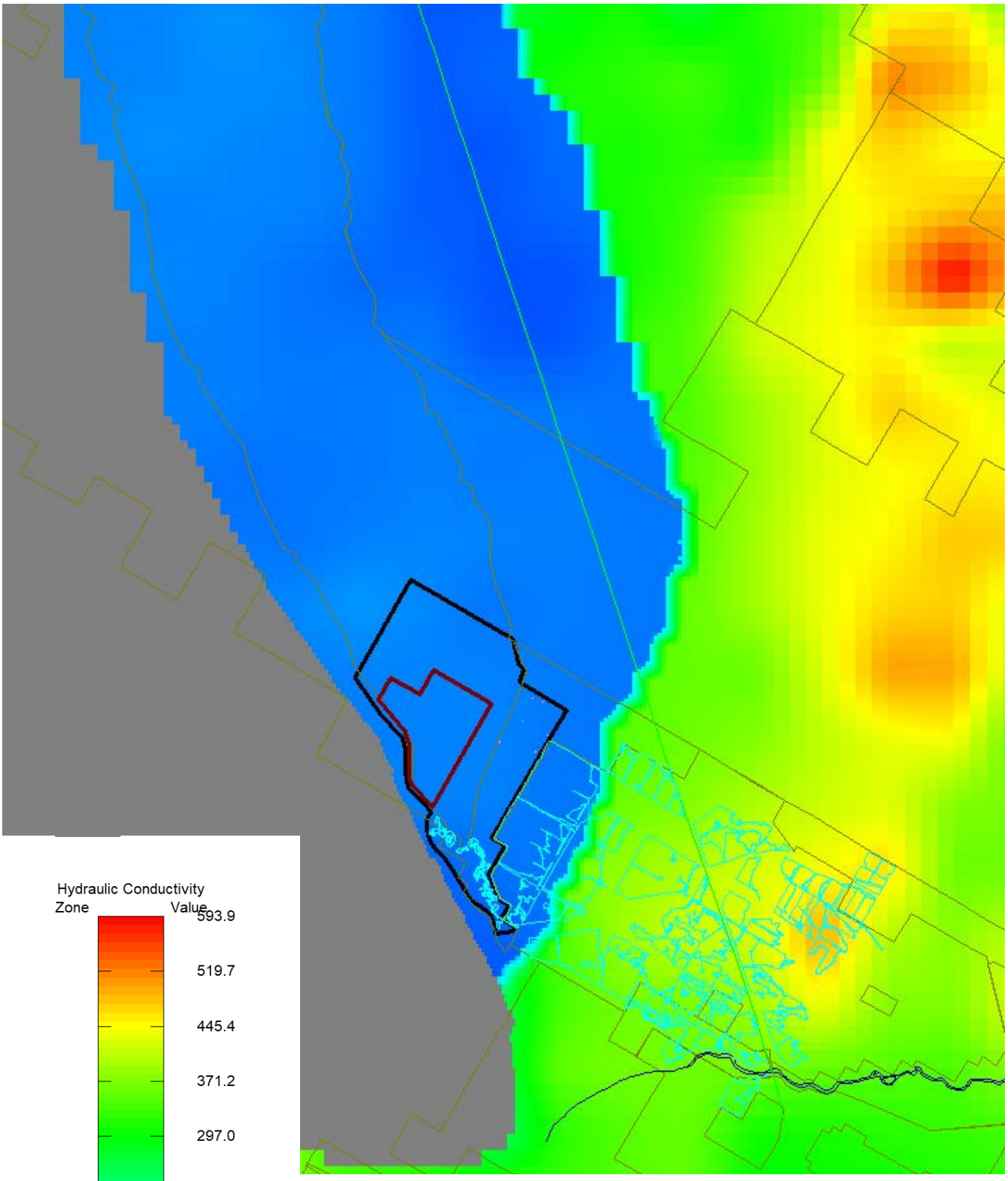
Scale: Miles

N

November 2020

TODD GROUNDWATER

Figure B-4
Superposition Model Grid and Active Simulation Area



November 2020

TODD GROUNDWATER

Figure B-5
Horizontal Hydraulic Conductivity in Model Layer 1

ATTACHMENT C

RECOVERY PROJECT MODEL VALIDATION

C. RECOVERY PROJECT MODEL VALIDATION

A validation analysis was performed for the Superposition Model by comparing simulations results to field measured groundwater level data and comparing those to a similar set of residuals from the Superposition Model. The validation analysis assesses of the relative uncertainty of the Superposition Model results for simulating observed changes in groundwater levels. The section documents the results of model validation analyses performed on the superposition model used for the Recovery Project.

C.1 MODEL VALIDATION APPROACH

Although the underlying CVHM Base Model was calibrated by the USGS to data obtained throughout the Central Valley – presumably using reasonable care in developing the geologic framework and determining aquifer properties – it is appropriate to demonstrate that the use of the Superposition Model built from the CVHM for the specific objectives of this impact analysis reasonably reproduces historical groundwater level changes. To achieve this, a series of validation scenarios were developed to test the ability of the Superposition Model to simulate changes in groundwater levels resulting from local groundwater pumping and recharge in the vicinity of the Recovery Project based on a comparison to field-measured groundwater level data.

The objective of the validation scenarios was to assess whether the CVHM was appropriately simulating changes in groundwater levels as a result of groundwater recharge or pumping in the vicinity of the Recovery Project. A validation analysis was performed for the Superposition Model by comparing field measured groundwater level data to simulated change in groundwater levels from the Superposition Model. The approach was to evaluate cases where a reasonably clear cause-and-effect relationship could be established of a change in groundwater levels in response to pumping or recharge without being overly influenced by other aquifer stresses. For this, three validation scenarios were developed and are discussed in more detail in the following sections:

1. WKWD Validation Scenario #1
2. WKWD Validation Scenario #2
3. Kern Water Bank (KWB) Validation Scenario.

The following section summarizes the validation scenario setup and results.

C.2 WEST KERN WATER DISTRICT (WKWD) VALIDATION SCENARIO

To validate the model to groundwater pumping in the area, a validation scenario was developed based on aquifer test data from the West Kern Water District (WKWD) North Wellfield that is located adjacent to the Recovery Project (**Figure C-1**). The overall approach was to assess the ability of the model to simulate these condition consistent with the application of a screening-level model assessment.

C.2.1 2011 WKWD Aquifer Tests Analysis

For the WKWD validation scenarios, aquifer testing data from five groundwater extraction wells in WKWD North Wellfield was used (**Figure C-1**). These include:

- NW-1 – screened at depth of 270 to 570 feet in upper aquifer (RCS, 2011a)
- NW-2 – screened at depth of 650 to 980 feet in lower aquifer (RCS, 2011b)
- NW-3 – screened at depth of 245 to 545 feet in upper aquifer (RCS, 2011c)
- NW-4 – screened at depth of 220 to 540 feet in upper aquifer (RCS, 2012), and
- NW-5 – screened at depth of 220 to 540 feet in upper aquifer (RCS, 2011d).

The four wells completed in the upper aquifer are screened in an equivalent zone to the proposed Recovery Project wells. The fifth well, NW-2, is completed in a deeper zone that is considered to be below a regional confining layer that separates the upper and lower aquifers in this area.

Following well installation, 24-hour aquifer tests were run on each well and the change in groundwater levels were monitored in the pumping well during the test. However, measurements from the pumping well are affected by well efficiency. Aquifer test data can be used to determine the specific capacity of the well for operational matters; however, the well efficiency makes for a higher uncertainty for defining aquifer properties. Response of the aquifer and definition of aquifer properties are best defined by monitoring the change in groundwater levels at a nearby monitoring well. For three of the aquifer tests, the change in groundwater level data was collected from other wells. The aquifer test results from the WKWD North Wellfield wells from non-pumping well is summarized in **Table C-1**.

Table C-1 - WKWD Aquifer Test Summary and Analytical Analysis

Pumping Well	Monitor Well	Distance	Trans-missivity	Storage Coefficient	Pumping Rate	Measured Drawdown - 24 hours	Calculated Drawdown - 24 hours	Calculated Drawdown - 6 months
		(feet)	(gpd/ft)	dimensionless	(gpm)	(feet)	(feet)	(feet)
NW-1	NW-5	2,348	264,400	1.10E-03	2,995	3.0	3.4	10.1
NW-3	NW-1	2,705	189,400	6.00E-04	2,500	5.3	3.9	11.7
NW-3	NW-5	2,351	189,400	6.00E-04	2,500	4.6	4.3	12.2
NW-4	NW-1	4,035	150,200	1.00E-03	2,536	1.8	2.3	12.0
NW-4	NW-3	1,582	150,200	1.00E-03	2,536	5.7	5.7	15.6
NW-4	NW-5	2,699	150,200	1.00E-03	2,536	2.5	3.7	13.6

The drawdown from a pumping well can be estimated using standard analytical equations. For this analysis, drawdown was calculated using the Theis equation for non-steady radial flow into a well from an aquifer of uniform thickness and infinite areal extent (Todd and Mays, 2004; Kruseman and de Ridder, 1994; Freeze and Cherry, 1979; Lohman, 1972). For this application, it is considered appropriate to use the confined solution of the Theis equation (Lohman, 1972). The Theis equation is stated as *Equation C1* below:

$$\Delta h = \frac{Q}{4\pi T} W(u) \qquad (C1)$$

where Δh is the change in groundwater levels or drawdown after a period of pumping from the pumping well, Q is the discharge rate from the aquifer into the well, T is the aquifer transmissivity, and $W(u)$ is the well function.

The well function $W(u)$ represents an integral that cannot be solved directly, but its value is given by the infinite series (Lohman, 1972; Kruseman and de Ridder, 1994) as shown in *Equation C2*:

$$W(u) = -0.577216 - ln(u) + u - \frac{u^2}{2 * 2!} + \frac{u^3}{3 * 3!} - \frac{u^4}{4 * 4!} + \cdots \qquad (C2)$$

The variable u in *Equation C2* is defined by *Equation C3* stated below (Lohman, 1972; Kruseman and de Ridder, 1994):

$$u = \frac{r^2 * S}{4Tt} \qquad (C3)$$

where r is the distance to an observation well, S is the storage coefficient, T is transmissivity and t is time since the start of pumping.

The calculation of the well function (*W(u)*) in *Equation C2* is needed to solve *Equation C1*. Determination of the variable *u* in the well function requires several input data parameters as shown in *Equation C3*. Most of these parameters can be taken directly from the provided data sets. For the change in groundwater levels, the change was calculated individually for each pair of pumping well to observation locations by applying *Equation C1*.

The aquifer tests were for 24 hours, so the calculated drawdown for 6 months is calculated (**Table C-1**) using the method described above. The calculated drawdown for 24 hours is provided to verify that the calculation is performing correctly (**Table C-1**). Differences between the measured and calculated drawdowns are related to variability associated with the curve-fitting aspects of applying the Theis equation. The 6-month drawdown was calculated to provide some guidance in understanding the expected drawdown from operating large groundwater recovery wells at the WKWD North Wellfield, due to its close proximity to the Recovery Project.

C.2.2 WKWD Validation Scenario #1

One method to validate a model is to compare an analytical calculation to the numerical model results. These represent different solutions to the same basic groundwater flow equation; however, the analytical method applies a uniform set of aquifer properties over an aquifer of infinite areal extent whereas the numerical model allows for the spatial variation of the aquifer properties and applied boundary conditions. As a result, the analytical method cannot fully represent the entire numerical model. Therefore, the comparison is performed where there is a clear cause-and-effect relationship. In this case, the analytical method was used to evaluate drawdown from pumping for a period of six months.

To validate the model to groundwater pumping in the area, the approach was to use the results of another model developed based on local aquifer tests for the WKWD Groundwater Banking Project (GEI, 2009) located just north of the Recovery Project. The overall approach was to be consistent with a nearby analysis as an initial screening-level assessment.

The GEI (2009) groundwater model simulation was conducted using the analytical computer model *WinFlow* (by Environmental Simulations, Inc.) to simulate recharge mounding and groundwater level drawdown effects caused by Project recharge and pumping, respectively. The model is based on local aquifer characteristics developed for the WKWD site. A hydraulic conductivity of 61 ft/day and a storage coefficient of 0.008 were used for the simulation. The scenario consisted of nine production water wells, each well pumping at a rate of 2,000 gallons per minute (gpm). For the proposed maximum annual recovery of 24,000 AFY this would require pumping for approximately 300 days (GEI, 2009). The resulting drawdown for this simulation is provided as the left panel on **Figure C-2**.

A comparable scenario was set up in the Superposition Model. The initial scenario produced significantly lower drawdowns for the simulated pumping as compared to the WKWD simulations. The horizontal hydraulic conductivity was modified over the Recovery Project area by a percentage applied to hydraulic conductivity from the original CVHM model. This approach is consistent with the aquifer parameter modifications made in the calibration of CVHM. The aquifer parameters were modified by a set percentage factor to improve the model calibration (Faunt, Hanson, and Belitz, 2009). These percentage factors were developed for several specific areas and layers. This was to provide a mechanism to correct the texture model calculations (Page, 1986; Burow et al., 2004) which were limited due to a lack of data in the western areas of the Central Valley. Several similar examples of this type of approach were used in areas north of Kern County (Faunt, Hanson, and Belitz, 2009).

The process was repeated until a reasonable match to the WKWD simulation results was produced. The right panel of **Figure C-2** shows the resulting comparison of WKWD simulations to the Superposition Model. There is a generally good agreement for the area of maximum drawdown of greater than 20 feet in the vicinity of the WKWD pumping wells. Likewise, there is relatively good agreement with the 15-foot drawdown contour. This indicates that the Superposition Model provides a reasonable simulation of drawdowns near the pumping wells. The Superposition Model 5- and 10-ft drawdown contours lie outside of the WKWD simulation results for those same contours. This indicates that the Superposition Model will provide a relatively conservative assessment of drawdowns in areas away from the pumping wells.

C.2.3 WKWD Validation Scenario #2

A second validation scenario was developed based on data provided by WKWD in June 2020. Based on these data, a validation scenario was developed from October 2012 through December 2014. The scenario consisted of the following:

- Monthly groundwater pumping volumes for the five WKWD North Wellfield wells from November 2012 through December 2014.
- Groundwater levels for the five WKWD North Wellfield wells and six monitoring wells from July 2012 through January 2020.

Developing an appropriate validation scenario is challenging in a heavily operated groundwater basin because validation requires simulating a set of historical groundwater stresses that show a clear cause and effect relationship. In reviewing the groundwater level data, it became clear that the groundwater level declines were greater than might be predicted based on the WKWD North Wellfield aquifer test data (**Table C-1**). The period from November 2012 through December 2014 was the beginning of a regional drought and groundwater banking operations to the east of the Recovery Project conducted extensive groundwater recovery operations. Therefore, as part of the validation scenario, groundwater banking recovery pumping from the following Kern County Subbasin banks from this period was added to the validation scenario:

- Kern Water Bank
- Rosedale-Rio Bravo
- Buena Vista Water Storage District
- West Kern Water District
- Semitropic Water Storage District
- Pioneer Project, and
- Berrenda Mesa project.

During the period from October 2012 through December 2014, a total of approximately 1.8 million AF of groundwater was pumped by the various Kern County Subbasin groundwater banking recovery operations. During that same period, groundwater pumping from the five WKWD North Wellfield wells was 18,728 AF, which is approximately 0.1 percent of the total groundwater pumping for that period.

The actual measured change in groundwater levels that occurred within the aquifer is observed from 454 groundwater level measurements collected from 5 pumping wells and six monitoring wells located in and around the WKWD North Wellfield. The measured change in groundwater levels is calculated as the difference of the measured groundwater elevation during the simulation period minus the groundwater elevation from October 2012, prior to pumping by the WKWD North Wellfield wells. For wells with data that did not extend back that far, an October 2012 groundwater level was interpolated based on the changes observed in other wells in WKWD and adjacent areas.

For each of these 11 locations, the simulated groundwater level change was compared to the calculated groundwater level change based on the measured data for that well. **Figures C-3** and **C-4** provide a representative set of hydrographs from four pumping wells and four monitoring wells screened in the upper aquifer. A comparison of simulated and measured groundwater level changes shows a reasonable agreement with the overall timing and magnitude of the groundwater level changes associated with the groundwater pumping at the WKWD North Wellfield wells and from the other groundwater bank recovery pumping occurring in the Kern County Subbasin.

In addition to visual comparisons such as presented in **Figure C-3 and C-4**, the difference between the measured and simulated change in groundwater levels at the monitoring locations (referred to as the residual) was evaluated using summary statistics similar to those commonly used to evaluate model calibration, as follows:

- The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The residual mean tests whether the model results are biased towards over- or underestimating groundwater levels. The residual mean for this validation scenario is -19 feet. The closer this value is to zero, the better the validation.
- The absolute residual mean is a measure of the overall error in the model. The absolute residual mean is computed by taking the square root of the square of the residuals and dividing that by the number of measurements. The absolute residual mean for this validation scenario is 27 feet.
- The ratio of the absolute residual mean divided by the range of observed groundwater elevations provides a means to assess the absolute residual mean in context with the scale of the simulation. The ratio for the validation scenario is 0.14 feet. Typically, a validation is considered good when this ratio is below 0.15 (ESI, 2011).

The statistical results provide an assessment of the relative uncertainty of the Superposition Model results for simulating observed changes in groundwater levels. Considering these results in context with the overall range of measurements of 198 feet, the residual mean of -19 feet represents a relative percentage difference of 9.5 percent. For the absolute residual mean of 27 feet, the average percentage difference is 14 percent. Much of the uncertainty is the highly variable groundwater levels from the pumping wells. By using monthly pumping volumes, the model does not have sufficient data to simulate the short-term drawdowns. In addition, the model does not simulate additional drawdown due to well efficiency. In spite of these limitations, the WKWD Validation Scenario #2 demonstrates that the Superposition Model, using the modified CVHM aquifer properties, is able to reasonably simulate the relative change in groundwater levels when the reported recharge volumes for the groundwater banking projects are used.

C.2.4 Model Modifications Resulting from WKWD Validation Scenarios

Validation scenarios #1 and #2 resulted in a change in aquifer hydraulic conductivity and specific storage in select areas of the model. Theis approach to modifying the model corresponds to the methodology used to make a similar modification in CVHM where specific areas and layers were modified by a set percentage factor to improve the model calibration (Faunt, Hanson and Belitz, 2009). This was used to provide a mechanism to correct the texture model (Faunt, 2009) calculations which were limited due to a lack of data in the western areas of the Central Valley. Several similar examples of this type of approach in areas north of Kern County (Faunt, Hanson and Belitz, 2009).

The modification of aquifer properties was applied over the western portion of Kern County essentially to the west of Interstate 5 (**Figure B-5**). It is assumed that a lack of calibration data in CVHM were

available from the western Kern County due to poor water quality limiting the number of wells that no similar correction was applied in Kern County as to areas to the north. Because of these factors, the change in the Model Layer 1 horizontal hydraulic conductivity to better match drawdowns at the WKWD facility is considered to be warranted.

As a result of the two validation scenarios using the WKWD data sets, Model Layer 1 hydraulic conductivity and specific storage were changed to better match drawdowns at the WKWD facility. Both the horizontal and vertical hydraulic conductivities in Model Layer 1 were reduced to 20 percent of the original value used in CVHM. The specific storage was increased by 33 percent% of the original value used in CVHM. The modified aquifer properties resulting from the validation analysis are generally consistent with the aquifer test results presented in **Table C-1**.

C.3 KERN WATER BANK (KWB) VALIDATION SCENARIO

To test the ability of the Superposition Model to evaluate regional groundwater impacts, a validation scenario was constructed to evaluate groundwater level changes resulting from recharge operations at the Kern Water Bank (KWB) from 1993 to 1998. The KWB validation scenario was initially used in the Supplemental EIR for the Kern Delta Water District Water Allocation Plan (Todd Groundwater, 2017). It was constructed to evaluate groundwater level changes resulting from recharge operations at the Kern Water Bank from 1993 to 1998. This period represents the initial recharge operations at the Kern Water Bank and other nearby recharge facilities prior to significant recovery activities. This validation scenario was setup to evaluate the ability of the Superposition Model to simulate the effects of major changes in groundwater levels as a result of managed aquifer recharge.

C.3.1 KWB Validation Setup

The KWB validation scenario evaluated the capability of the Superposition Model to simulate the effects of major changes in groundwater levels as a result of managed aquifer recharge. The KWB Validation Scenario was rerun using the modified hydraulic conductivities from the WKWD validation scenarios.

Detailed records of the volume of groundwater recharged is available for the various groundwater banking operations in and around the Kern Water Bank (**Figure C-5**). Unpublished groundwater banking data used for the validation scenario was provided directly by Kern County Water Agency, Kern Water Bank Authority and neighboring agencies for the following facilities:

- Kern Water Bank
- Pioneer Project
- COB 2800 project
- Rosedale-Rio Bravo recharge facilities
- Buena Vista Water Storage District recharge facilities
- Berrenda Mesa project, and
- Kern River channel recharge.

During the period from 1993 to 1998, nearly 3.1 million AF of water was recharged in the Kern Water Bank and other nearby recharge facilities. In response to these large recharge events groundwater levels increased from 50 to 200 feet across the banking areas as documented by numerous local monitoring wells. Therefore, a clear quantification of the volume of recharge over this period is available. These volumes were applied monthly in the Superposition Model at the appropriate facility using the MODFLOW Recharge Package to Model Layer 1 in a manner analogous to that which is also being used to simulate the Palms Project.

By comparison, the maximum 6-year change in recharge water for the Palms Project is 0.1 million AF, which is about 6 percent of the Kern Water Bank recharge volume of 3.1 million AF. Therefore, the validation scenario incorporates larger changes than would be imposed by the Palms Project indicating that the validation scenario simulates larger scale change than those being considered for the Palms Project, which is an appropriate and standard procedure for validation in scientific and engineering investigations (Reilly et al., 1987) because if the Superposition Model is shown to perform well under the more extreme Kern Water Bank recharge scenario, it can be confidently concluded that the model will perform well simulating the more moderate conditions for the Palms Project.

C.3.2 KWB Validation Scenario Results

The actual measured change in groundwater levels is observed from 1,495 groundwater level measurements collected from 26 monitoring wells located in and around the Kern Water Bank between 1993 and 1998. The measured change in groundwater levels is calculated as the difference of the measured groundwater elevation during the simulation period minus the groundwater elevation from late 1992, prior to large recharge events. Monitoring wells with insufficient data (i.e., the last four months of 1992) were excluded from the data set.

For each of these 26 monitoring wells, the simulated groundwater level change was compared to the calculated groundwater level change based on the measured data for that well. **Figure C-6** provides a representative set of hydrographs from four monitoring wells located in different areas of the Kern Water Bank. A comparison of simulated and measured groundwater level changes indicates a strong agreement with the overall timing and magnitude of the groundwater level changes associated with these recharge events.

In addition to visual comparisons such as presented in **Figure C-6**, the difference between the measured and simulated change in groundwater levels (referred to as the residual) at the monitoring locations was evaluated. **Table C-2** provides a well-by-well summary of the calibration statistics for the 26 monitoring wells used to assess the results of the validation scenario.

The KWB Validation Scenario demonstrates that the level of accuracy of the Superposition Model is suitable to simulate future groundwater level changes on the scale of the Palms Project. A summary of summary statistics commonly used to evaluate model calibration are as follows:

- The correlation coefficient ranges from 0 to 1 and is a measure of the closeness of fit of the data to a 1 to 1 correlation. A correlation of 1 is a perfect correlation. The correlation coefficient of 0.84 for the validation scenario indicates a strong correlation between simulated and observed groundwater level change.
- The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The residual mean tests whether the model results are biased towards over- or underestimating groundwater levels. The closer this value is to zero, the better the validation. The residual mean for this validation scenario of -3.8 feet is considered minor. A negative value indicates this minor bias is towards overestimating the change in groundwater levels in the Superposition Model.
- The residual standard deviation evaluates the scatter of the data. A lower standard deviation indicates a closer fit between the simulated and observed data. The standard deviation for the validation scenario is 25.3 feet.
- The absolute residual mean is a measure of the overall error in the model. The absolute residual mean is computed by taking the square root of the square of the residuals and dividing that by

the number of measurements. The absolute residual mean for this validation scenario is 19.8 feet.

- The ratio of the absolute residual mean divided by the range of observed groundwater elevations provides a means to assess the absolute residual mean in context with the scale of the simulation. The ratio for the validation scenario is 0.097 feet. Typically, a validation is considered good when this ratio is below 0.15 (ESI, 2011).

Considering these results in context with the overall range of measurements of 204 feet, the residual mean of -3.8 feet represents a relative percentage difference of about 2 percent. For the absolute residual mean of 19.8 feet, the average percentage difference is 9.7 percent and the median percentage difference is 15 percent (**Table C-2**). Based on these results, this validation scenario demonstrates that the Superposition Model, using the modified CVHM aquifer properties determined by the WKWD

Table C-2 - KWB Validation Scenario Statistical Results by Monitoring Well

Well	Residual Mean	Residual Standard Deviation	Absolute Residual Mean	Groundwater Elevation Range	Percentage Variation
	(feet)	(feet)	(feet)	(feet)	(%)
29S/26E-31H01	-5.42	17.30	15.11	119.7	13%
29S/26E-31H02	-22.99	16.90	24.46	116.9	21%
29S/26E-35H01	-24.48	11.68	24.48	86.0	28%
29S/26E-35H03	-14.88	10.34	15.00	80.3	19%
29S/26E-35H04	-11.78	9.03	12.36	83.5	15%
30S/24E-13D01	-17.27	13.03	17.27	110.5	16%
30S/24E-13D02	-18.85	12.48	18.85	105.4	18%
30S/24E-13D03	-18.44	13.45	18.46	99.9	18%
30S/25E-04J02	2.37	26.97	22.72	153.1	15%
30S/25E-04J03	-0.03	22.85	18.61	150.1	12%
30S/25E-04J04	17.12	29.23	24.01	148.5	16%
30S/25E-07A02	-15.95	13.68	16.87	123.9	14%
30S/25E-07A03	-14.98	11.62	15.45	118.8	13%
30S/25E-07A04	-5.98	10.04	8.86	116.0	8%
30S/25E-14C02	6.75	35.89	32.09	154.4	21%
30S/25E-16L01	6.39	28.93	21.94	165.7	13%
30S/25E-16L02	-3.52	18.88	15.55	149.3	10%
30S/25E-16L03	4.26	26.64	21.24	150.4	14%
30S/25E-21G02	12.80	33.42	25.07	146.7	17%
30S/25E-21G03	10.46	26.74	20.07	147.2	14%
30S/25E-22R02	1.26	9.71	7.57	90.6	8%
30S/25E-22R03	-3.86	10.03	8.37	89.7	9%
30S/26E-04J02	26.63	25.69	33.11	178.3	19%
30S/26E-04J03	34.14	26.66	36.62	155.8	24%
30S/26E-25A02	-22.50	8.77	22.55	64.8	35%
30S/26E-25A03	-21.14	9.20	21.26	57.5	37%
Composite	-3.83	25.29	19.86	204.4	10%

validation scenarios, is able to simulate the relative change in groundwater levels when the reported recharge volumes for the groundwater banking projects are used.

C.3.3 Superposition Model Uncertainty Assessment

Because the recharge rates and groundwater pumping volumes in the WKWD and KWB validation scenarios are comparable or exceed on a local scale to those produced by the either the Palms or Recovery Project, the simulation results of the Recovery Project Scenarios should have a similar relative percentage difference as that determined for the KWB validation scenario. Based on the validation scenario results, the uncertainty is in the range of +/- 15 percent. Therefore, for example, if simulation results for the Recovery Project scenarios produce a change in groundwater levels of 10 feet, then relative accuracy of the simulation would be approximately +/- 1.5 feet based on the median percentage difference. Therefore, using the example of a simulated 10-foot change in groundwater levels, the range of groundwater level changes that would likely occur would be 8.5 to 11.5 feet, which is a reasonable accuracy range for Project-related impacts. This validation scenario demonstrates that the level of accuracy of the Superposition Model is suitable to simulate potential-future groundwater level changes on the scale of the Recovery Project.

C.4 REFERENCES

Burow, K.R., Shelton, J.L., Hevesi, J.A., and Weissmann, G.S., 2004, Hydrogeologic characterization of the Modesto area, San Joaquin Valley, California: U.S. Geological Survey Scientific-Investigations Report 2004–5232, 54 p.

ESI, 2011, Guide to Using Groundwater Vistas: Version 6, Environmental Simulations, Inc., Reinholds, PA, 221p.

Faunt, C.C., R.T. Hanson, and K. Belitz, 2009, Development of a three-dimensional model of sedimentary texture in valley-fill deposits of Central Valley, California, USA, Hydrogeology Journal (2010) 18: 625–649.

Faunt, C., ed, 2009, Groundwater Availability of the Central Valley, California, USGS Professional Paper 1766.

Freeze, R.A. and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

GEI Consultants (GEI), 2009, Evaluation of Well and Recharge Impacts of the Proposed West Kern Water District Groundwater Banking Project Kern County, California, November 2009.

Kruseman, G.P. and N.A. de Ridder, 1994, Analysis and Evaluation of Pumping Test Data (2nd ed.), Publication 47, Intern. Inst. for Land Reclamation and Improvement, Wageningen, The Netherlands, 370 p.

Lohman, S.W., 1972, Ground-Water Hydraulics, USGS Professional Paper 708.

Page, R.W., 1986, Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections, USGS Professional Paper 1401-C.

Reilly, T.E., O.L. Franke, and G.D. Bennett, 1987, The Principle of Superposition and Its Application in Ground-Water Hydraulics, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 3, Chapter B6, 28p., http://pubs.usgs.gov/twri/twri3-b6/pdf/twri_3-B6_a.pdf.

Richard C. Slade & Associates (RCS), 2011a, Summary of Well Construction Operations Well No. NW-1, North Recharge and Recovery Project, technical report to the West Kern Water District, December.

Richard C. Slade & Associates (RCS), 2011b, Summary of Well Construction Operations Well No. NW-2, North Recharge and Recovery Project, technical report to the West Kern Water District, December.

Richard C. Slade & Associates (RCS), 2011c, Summary of Well Construction Operations Well No. NW-3, North Recharge and Recovery Project, technical report to the West Kern Water District, December.

Richard C. Slade & Associates (RCS), 2011d, Summary of Well Construction Operations Well No. NW-5, North Recharge and Recovery Project, technical report to the West Kern Water District, November.

Richard C. Slade & Associates (RCS), 2012, Summary of Well Construction Operations Well No. NW-4, North Recharge and Recovery Project, technical report to the West Kern Water District, January.

Todd, D.K. and L.W. Mays, 2004, Groundwater Hydrology, (Third Edition), John Wiley and Sons, New York, 636 p.

Todd Groundwater, 2017, Final Groundwater Impacts Assessment Report Kern River Water Allocation Plan, as Appendix D in Supplemental Environmental Impact Report for Kern River Water Allocation Plan, SCH# 2011041082, July, 1,345 pp.

ATTACHMENT C

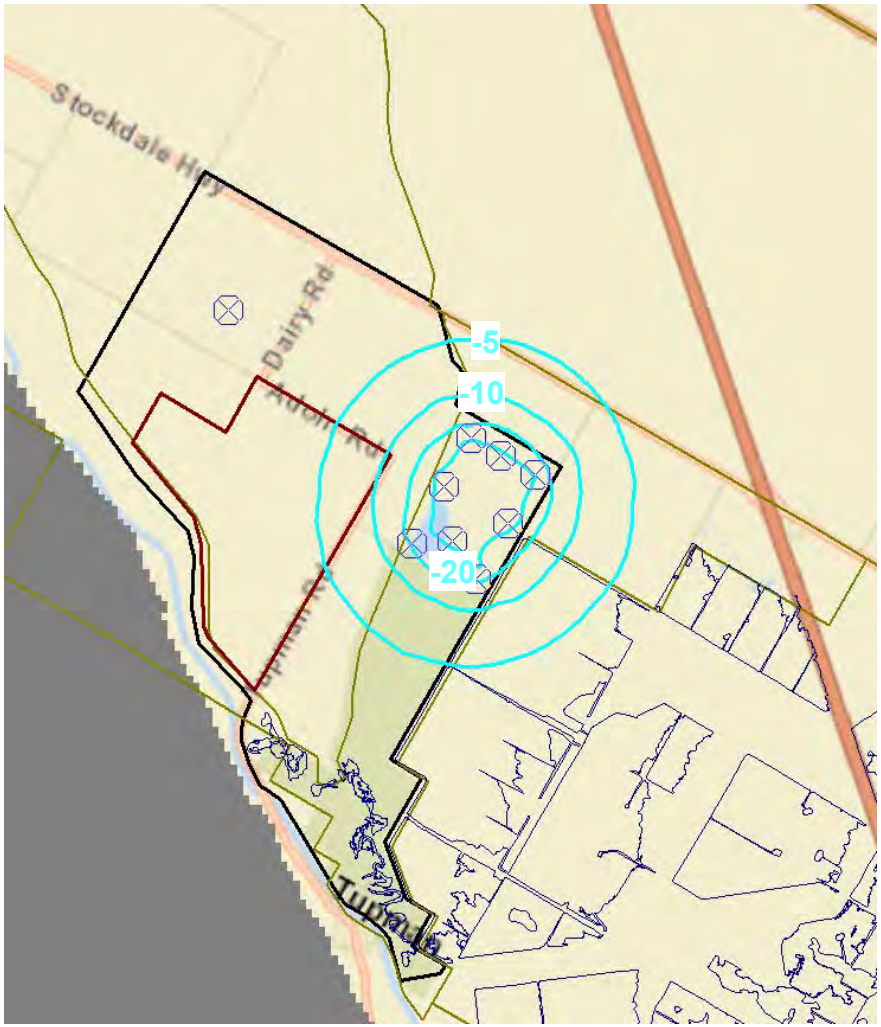
FIGURES

November 2020

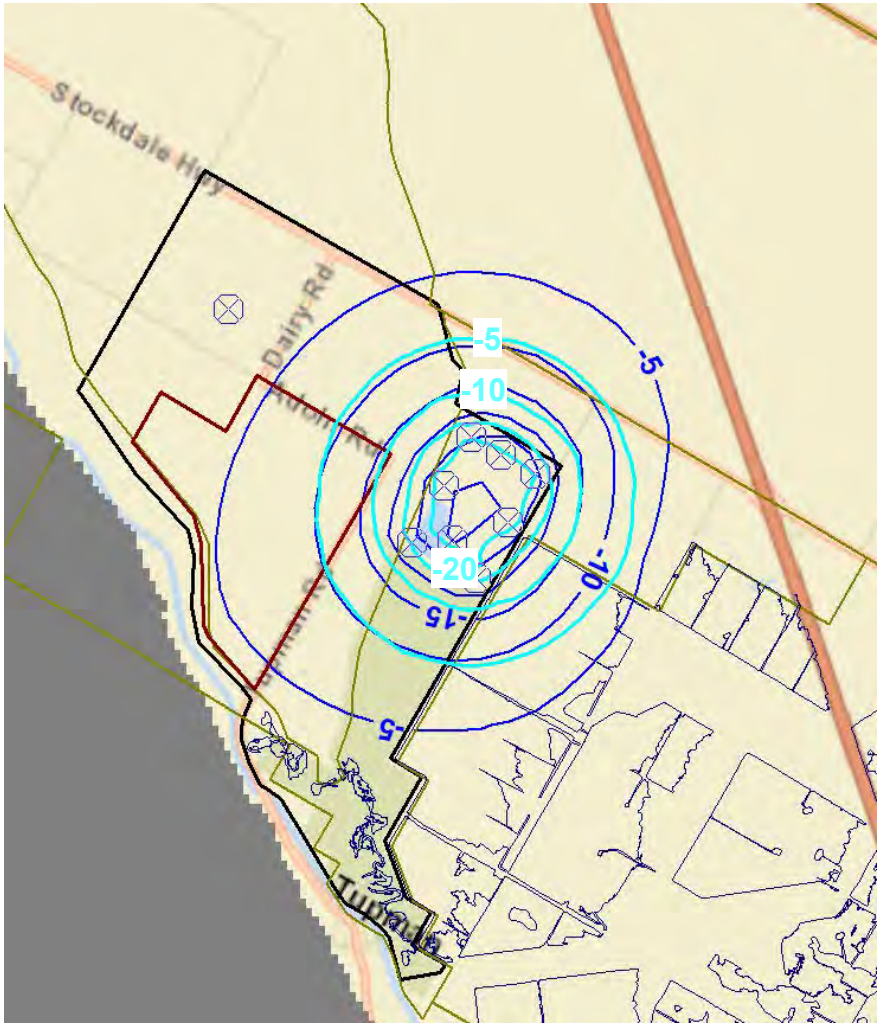
TODD GROUNDWATER

Figure C-1
West Kern Water District
North Wellfield
Well Location Map

Calculated Drawdown (GEI, 2009)



Simulated Drawdown Overlay



Legend

-5 **GEI 2009 Calculated Drawdown (feet)**

-5 **Validation Scenario Simulated Drawdown (feet)**

N

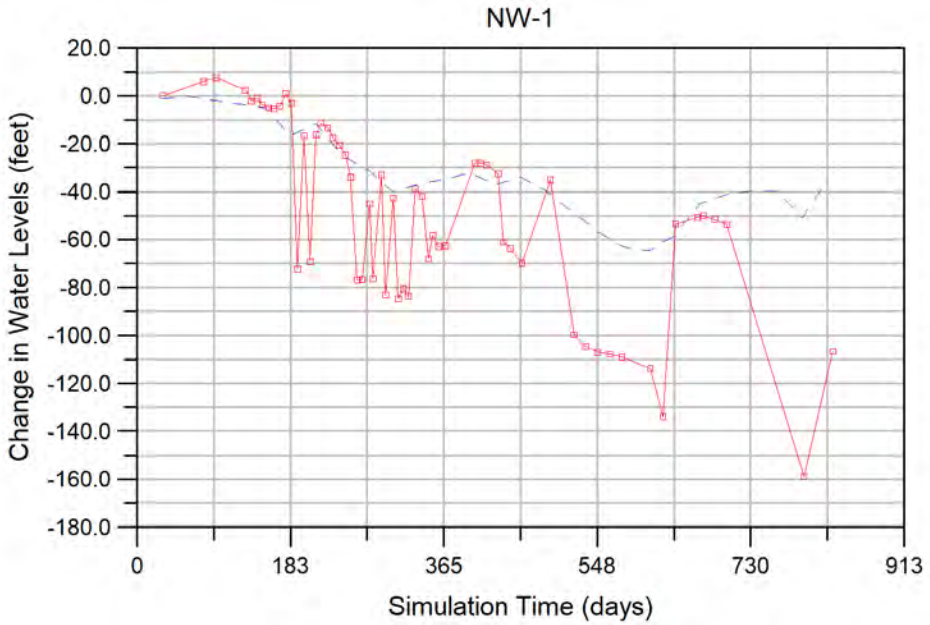
0 1 2

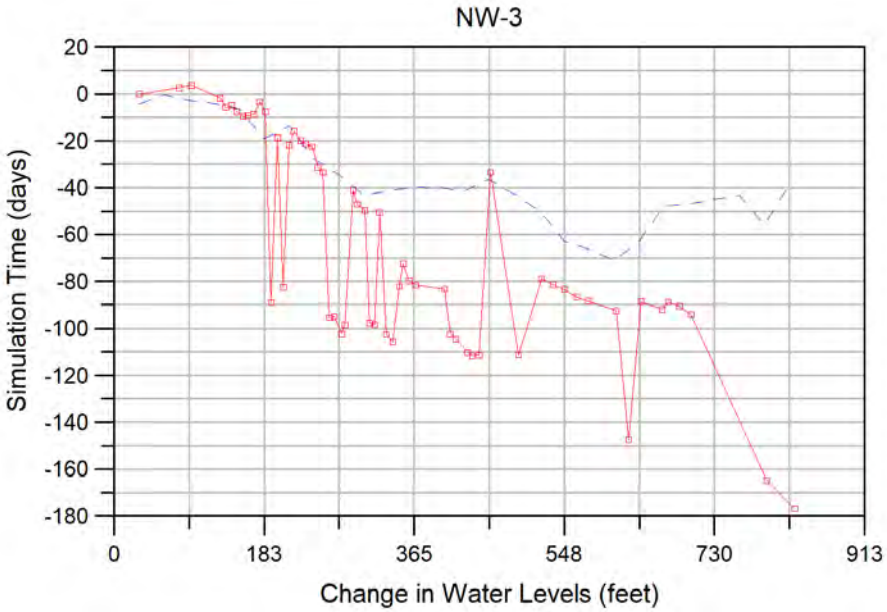
Scale: Miles

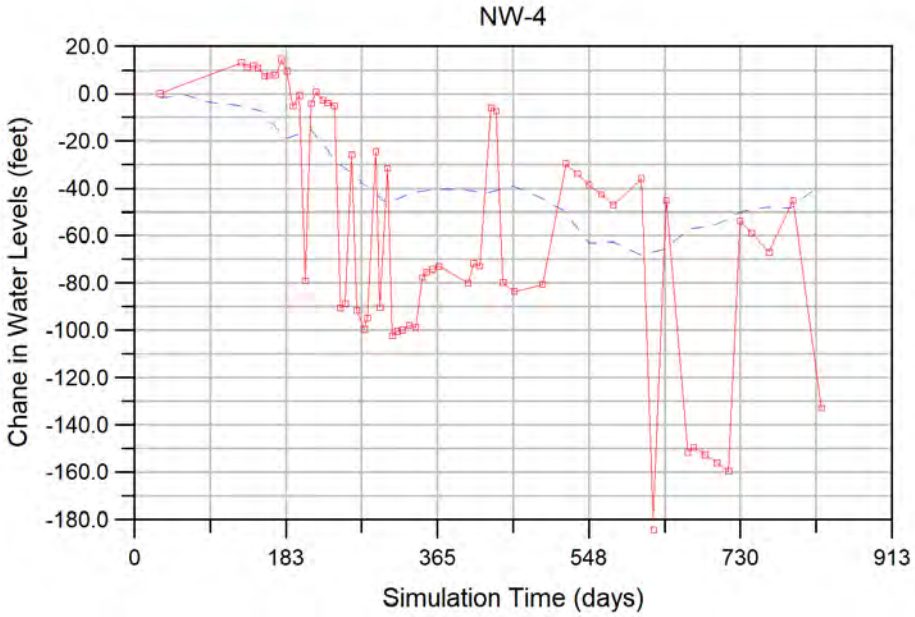
November 2020

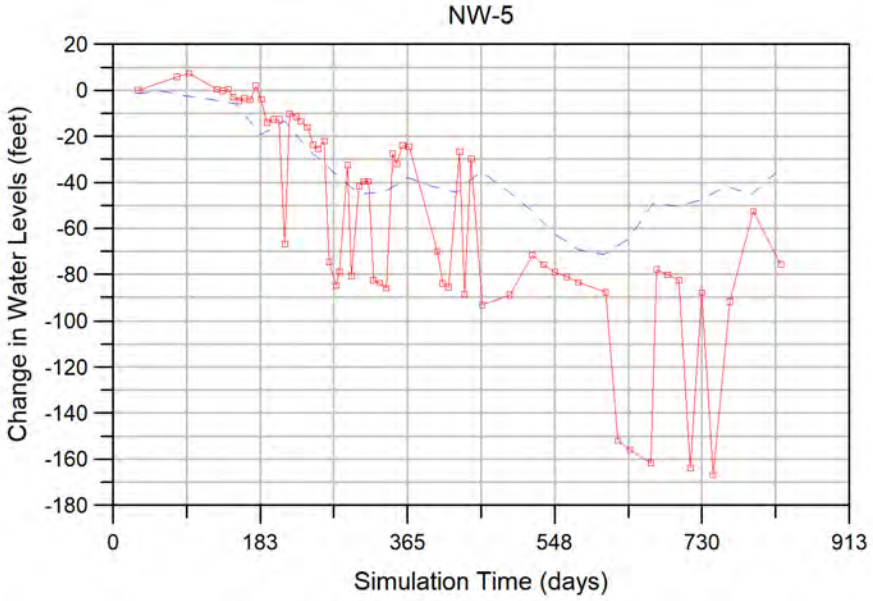
TODD GROUNDWATER

Figure C-2
Simulated vs. Measured Groundwater Level Change for WKWD Validation Scenario





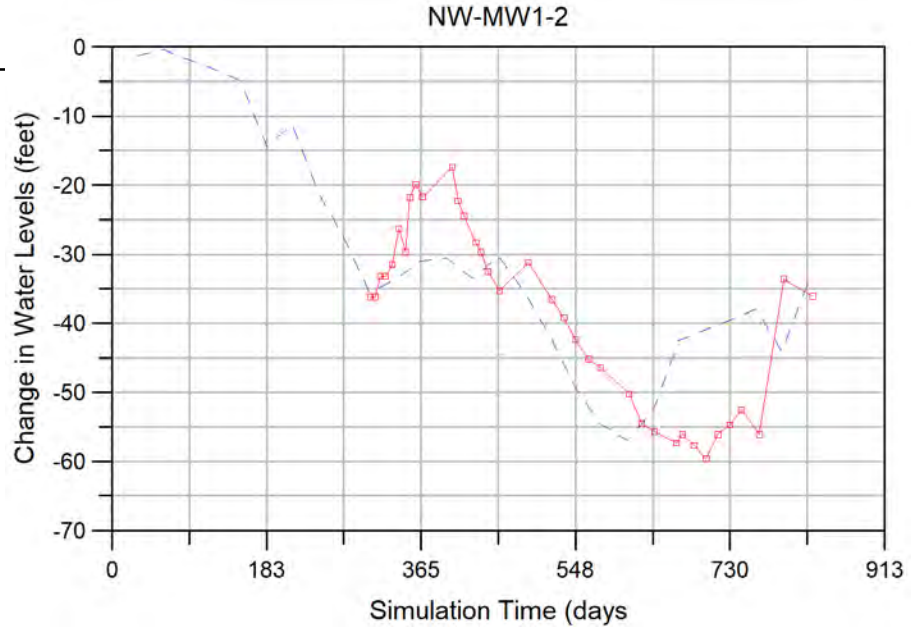


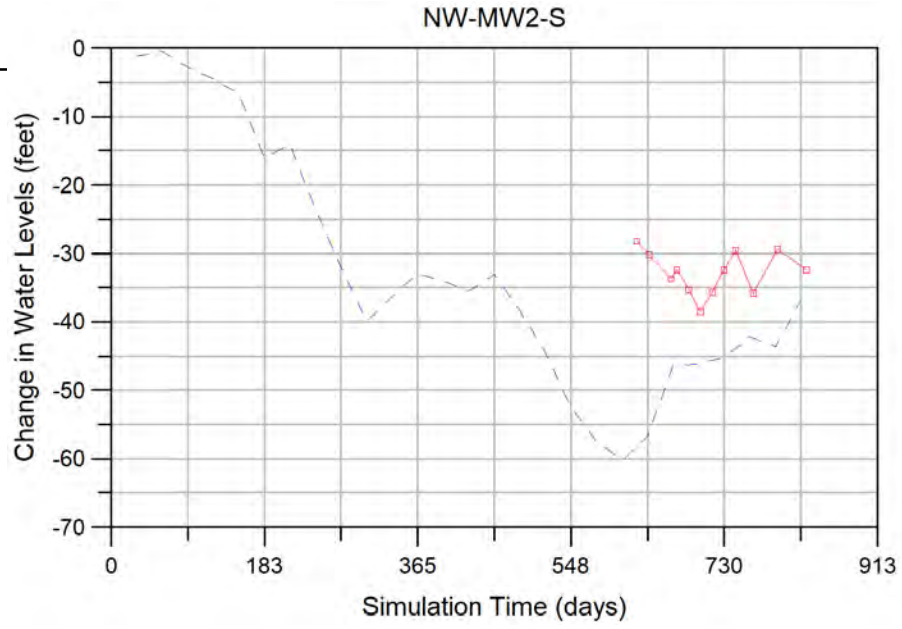


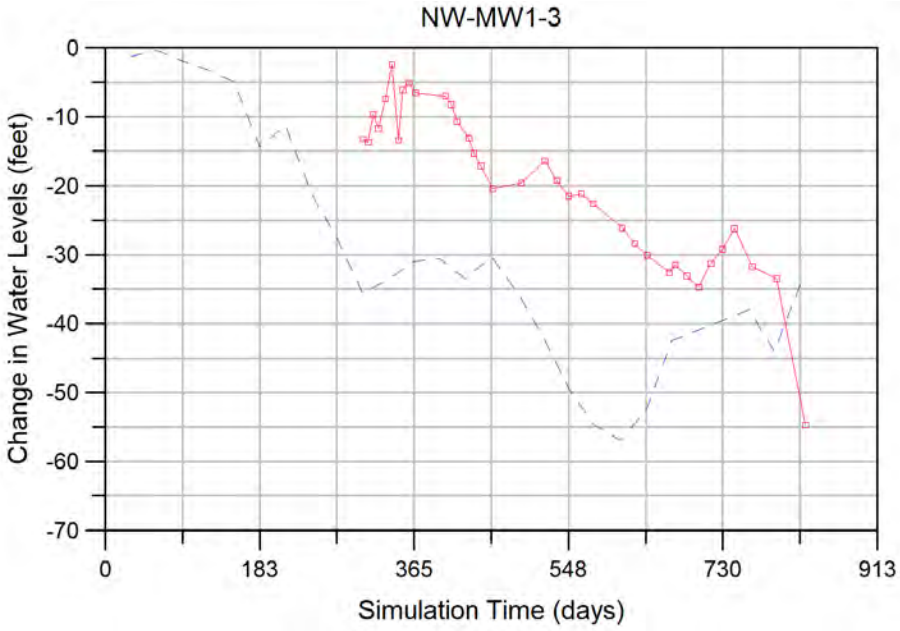
Observed

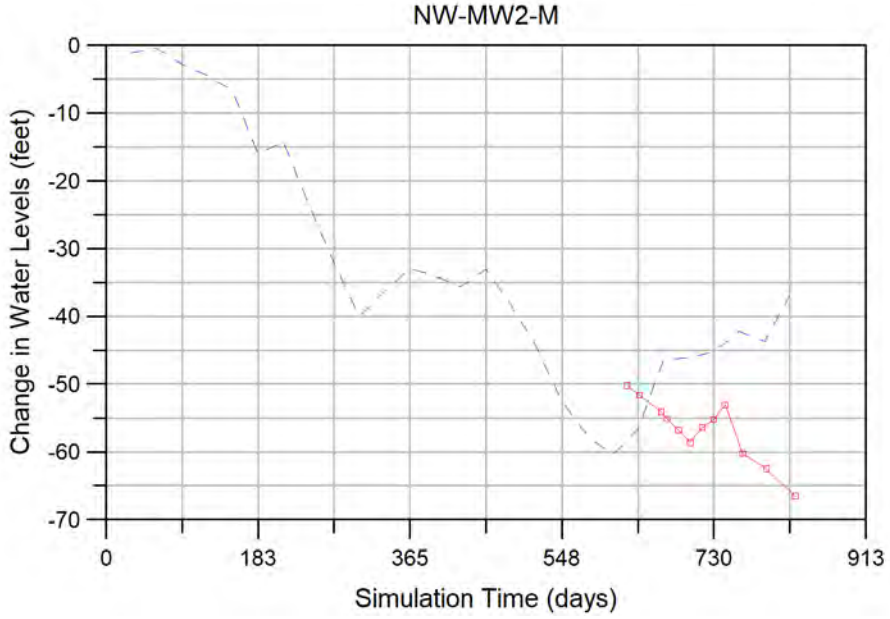
Computed

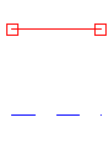
November 2020	Figure C-3 Simulated vs. Measured Change in Groundwater Levels for WKWD Validation Scenario
TODD GROUNDWATER	



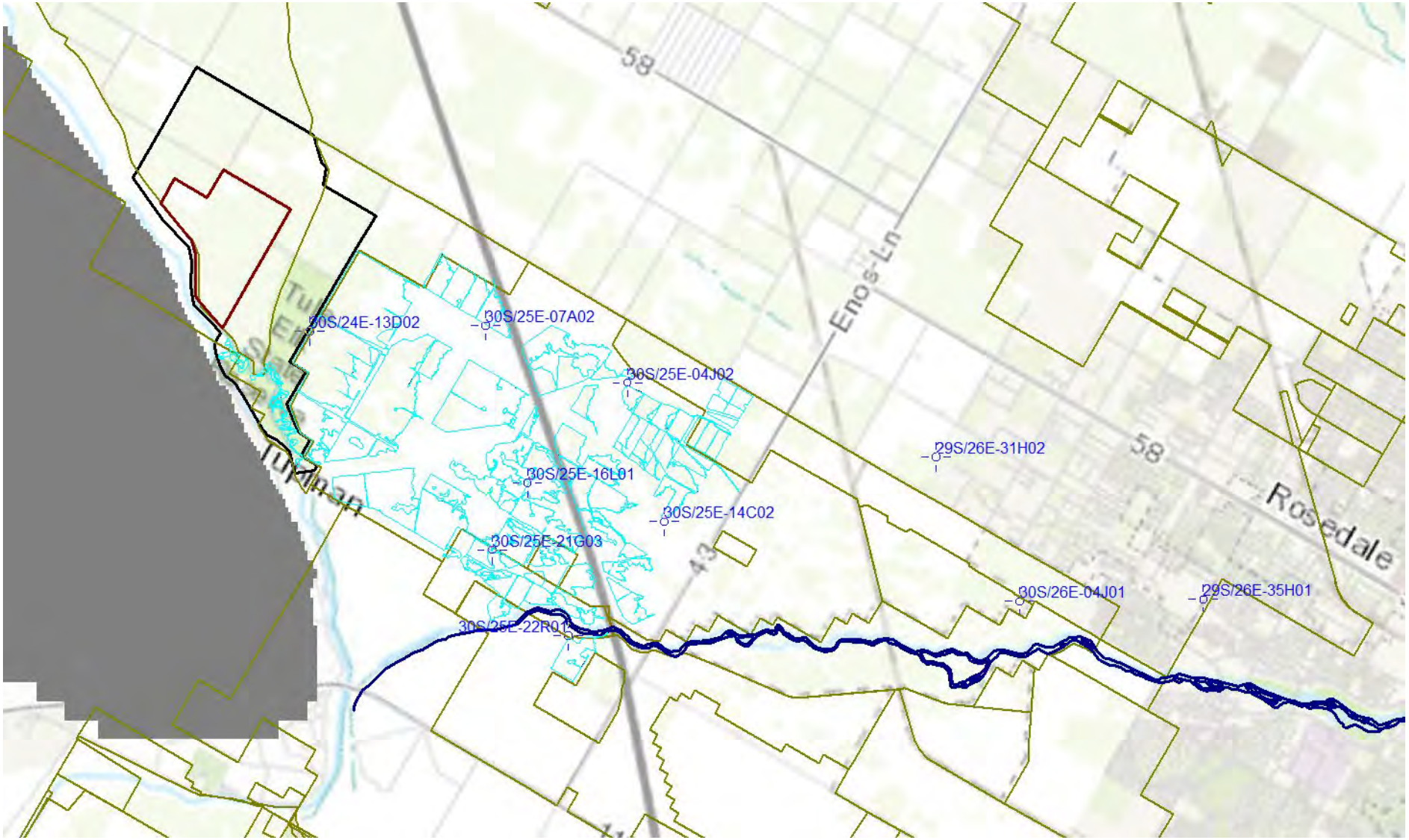




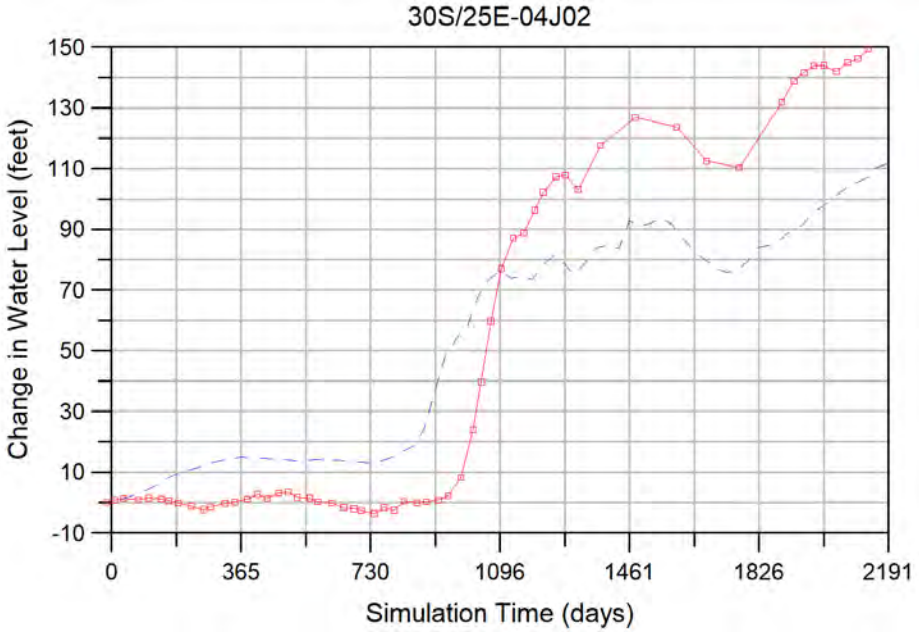


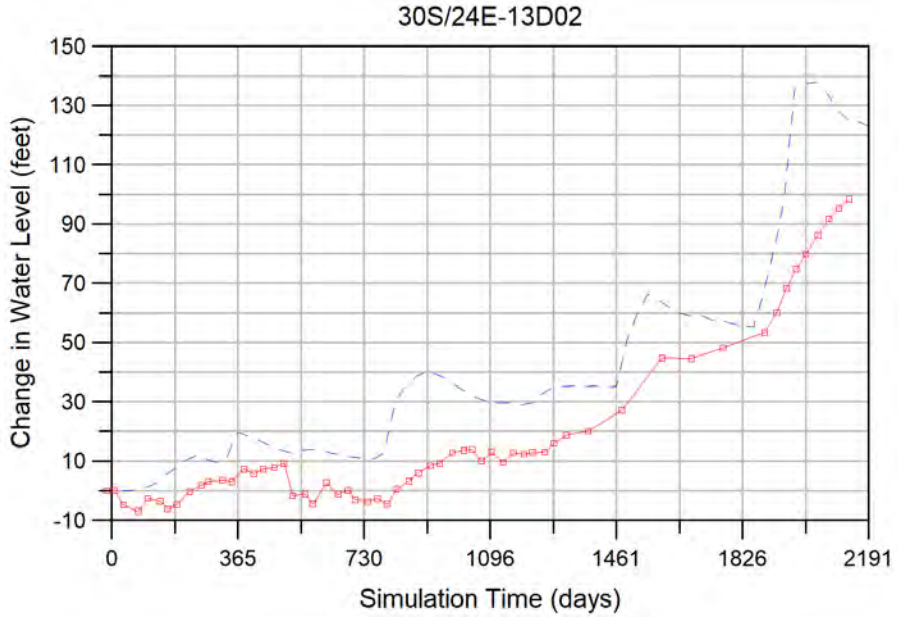


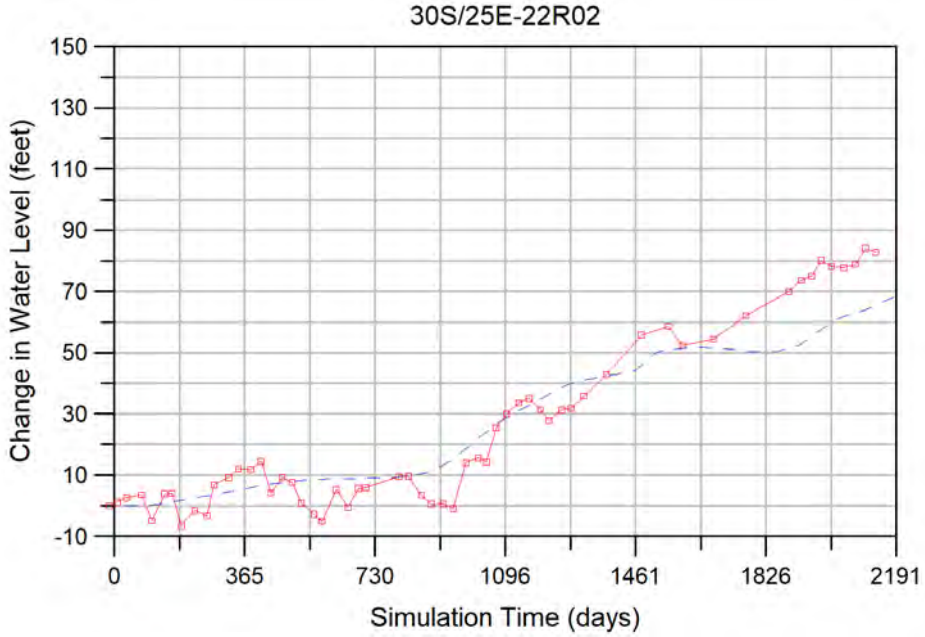
November 2020	Figure C-4 Simulated vs. Measured Change in Groundwater Levels for WKWD Validation Scenario
TODD GROUNDWATER	

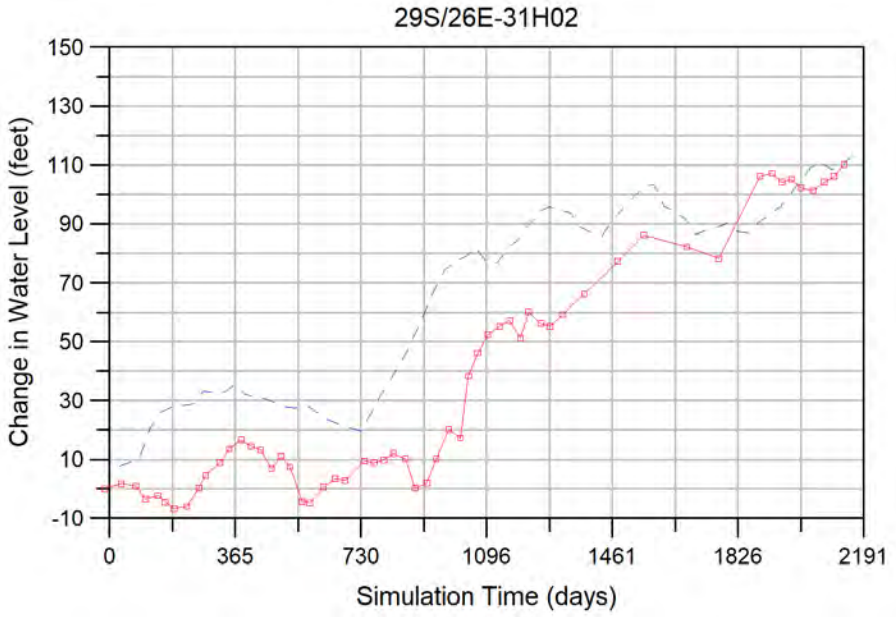


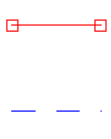
November 2020	Figure C-5 Location of Monitoring Locations Used for KWB Validation Scenario
TODD GROUNDWATER	











November 2020	Figure C-6 Simulated vs. Measured Change in Groundwater Levels for KWB Validation Scenario
TODD GROUNDWATER	

ATTACHMENT D

Recovery Project Cumulative Scenario Project Lists

D. RECOVERY PROJECTS CUMULATIVE SCENARIO PROJECT LISTS

The Kern County Subbasin Coordination Agreement refers to the local groundwater-surface water model (C2VSimFG-Kern) as the agreed upon method for generating coordinated water budgets for the Kern County Subbasin. Appendices 2 and 4 of the Kern County Subbasin Coordination Agreement include a technical report (Maley and Brush, 2020) on the development and application of C2VSimFG-Kern for these purposes including the setup and results of the Projected-Future Baseline with SGMA Projects Scenario.

The projects descriptions included in this **Appendix D** are excerpts taken from their respective GSPs and describe the projects included in the Projected-Future Baseline with SGMA Projects Scenario that was included in the 2020 Kern County Subbasin GSPs as listed below:

- Kern Groundwater Authority Groundwater Sustainability Plan, January 2020
- Final Groundwater Sustainability Plan (GSP), Kern River Groundwater Sustainability Agency (KRGSA), January 2020
- Henry Miller Water District Groundwater Sustainability Plan, Kern County Subbasin, January 2019

KERN GROUNDWATER AUTHORITY GSA

Groundwater Sustainability Plan

SGMA Project and Management Actions

January 2020

4 Projects and Management Actions

4.1 Proposed Projects and Management Actions

Projects and management actions for the KGA have been developed at the management area level. Table 4-1 (provided at the end of this section) provides a summary list of all projects and management actions being considered for implementation by each member agency, including the project title, implementation status, a brief description of the project, and benefits associated with the project. The details of each proposed project and management action can be found in each member agency's management area plan.

In addition to the projects and management actions that are proposed by the KGA members, the KGA has identified projects and management actions that it will implemented to further the coordination of groundwater management in the Subbasin. Table 4-2 list these proposed projects and management actions. These efforts will be managed by the KGA and will be cost-share through agreements with KGA members and other GSAs in the Subbasin, as appropriate.

Table 4-2: Kern Groundwater Authority Projects and Management Actions

Project Name	Project Description
Subsidence Monitoring (basin-wide)	Improve the understanding of the causes and impacts of subsidence in the Subbasin. Implementation Period: 2020 to 2025
Groundwater Modeling (basin-wide)	Improve the understanding of groundwater reactions to the implementation of projects and management actions, relationship to minimum thresholds and measurable objectives, determination of the native yield of the Subbasin, and subsurface flow within and out of the Subbasin. Implementation Period: 2020 to 2025
Study of Native Yield of the Subbasin	Studies to refine the understanding and allocation of the available native groundwater yield within the Subbasin. Implementation Period: 2020 to 2025
Basin-wide Coordination	Continuation of the Kern Subbasin Managers Group to coordinate water management activities in the Subbasin, including technical analysis, project management and coordination, identification of joint management opportunities and coordination of SGMA reporting requirements to DWR. Implementation Period: 2020 to ongoing
Annual Reporting	Coordination and facilitation of annual SGMA reporting requirements. Implementation Period: 2020 to ongoing

The Subbasin includes a complex environment of various local and imported surface water supplies; variable access to groundwater supplies based on quantity and quality; water management authorities; extent and capacity of water management infrastructure; and fiscal relationship with local landowners for participation in water management programs. Each of the member agencies within the KGA has identified projects and management actions best suited to meet the conditions of sustainability within their respective management areas within the water

management and authorities of its entity. Collectively these projects and management actions are designed to maintain or achieve sustainability and the avoidance of undesirable results, first within the management area and then collaboratively throughout the Subbasin. The KGA, the KGA/GSA Managers Group and the Kern SGMA Coordination Committee will monitor the progress of project and management action implementation against reported groundwater conditions and performance to measurable objectives and interim milestones. Through this coordination effort opportunities will be explored for collaboration in implementing projects and management actions, as has been historically accomplished in the Subbasin, for joint conveyance as well as recharge and banking projects, as an example.

Table 4-1 list more than 150 projects and management actions. This includes management projects ranging from expansion of local and regional conveyance and recharge facilities to take advantage of surplus supplies; new conveyance and recharge projects; and participation in the California Water Fix or other thru-Delta improvement projects. Management actions range from implementing district level fee structures to incentive reduced groundwater pumping; participation in local, regional, and state-wide water markets; and setting allocation for groundwater use by landowner, based on the sustainable yield of the management area.

Table 4-1 also demonstrates the tremendous capacity of the entities in the Subbasin to implement projects and management actions to manage the Subbasin sustainably. As the KGA and the other Subbasin GSAs progress to 2040, the implementation of projects and management actions will be adaptively managed to ensure that the proper mix of projects or management actions are developed to avoid undesirable results. Each management area plan as developed its own adaptive management strategy, which often entails some level of groundwater pumping reductions if proposed project or management action are not realized or are not as effective as anticipated.

4.2 Projected Future Water Budgets with SGMA Implementation

Projected water budgets with implementation of the projects and management actions described in the previous section were developed using the C2VSimFG-Kern to evaluate the performance with respect to achieving groundwater sustainability. Proposed projects and management actions were simulated under Baseline conditions, 2030 Climate Conditions and 2070 Climate Conditions using the C2VSimFG-Kern. Detailed description of proposed SGMA projects, and management actions are provided in *Attachment H: Historical and Projected Future Water Budget Development with C2VSimFG-Kern*.

4.2.1 Future Baseline Water Budget with SGMA Implementation

The Baseline Scenario with Projects simulates the implementation of proposed projects and management actions applied to the Baseline Scenario. No other changes were made except for the addition of the projects to provide a direct comparison of the relative benefits of the over 400,000 AFY of proposed SGMA projects and management actions. The change in groundwater storage for projected future baseline with SGMA Projects improves by about 409,904 AFY. This change results in a net gain in groundwater in aquifer storage over the WY2041 to WY2070 sustainability period of about 85,578 AFY.

Figure 4-1 shows the comparison of the average annual water budget components for the two different Baseline Scenarios. Over this period, the average groundwater pumping of 1,354,000 AFY for the Baseline Scenario with SGMA Projects (which includes agricultural pumping, urban pumping and exported water) is over 270,000 AFY less than the Baseline Scenario.

4.2.2 2030 Climate Change Water Budget with SGMA Implementation

The 2030 Climate Scenario with SGMA Projects simulates the implementation of proposed projects and management actions applied to the 2030 climate change conditions. No other changes were made to this scenario. A comparison of the average annual water budget components for the two 2030 Climate Scenarios is presented in Figure 4-2. The change in groundwater storage for projected 2030 Climate Scenarios condition with SGMA Projects improves by about 418,949 AFY. This change results in a net deficit in groundwater in aquifer storage over the WY2041 to WY2070 sustainability period of about 46,829 AFY. Over this period, the average groundwater pumping of 1,444,300 AFY for the 2030 Climate Scenario with SGMA Projects, which includes agricultural pumping, urban pumping and exported water, is over 290,000 AFY less than the 2030 Climate Scenario without SGMA Projects.

4.2.3 2070 Climate Change Water Budget with SGMA Implementation

The 2070 Climate Scenario with SGMA Projects simulates the implementation of proposed projects and management actions applied to the 2070 climate change conditions. No other changes were made to this scenario. A comparison of the average annual water budget components for the two different 2070 Climate Scenarios is presented in Figure 4-3. The change in groundwater storage for projected 2070 Climate Scenarios condition with SGMA Projects improves by about 426,367 AFY. This change results in a net deficit in groundwater in aquifer storage over the WY2041 to WY2070 sustainability period of about 45,969 AFY. Over this period, the average groundwater pumping of 1,559,000 AFY for the 2070 Climate Scenario with SGMA Projects, which includes agricultural pumping, urban pumping and exported water, is over 307,000 AFY less than the 2070 Climate Scenario without SGMA Projects.

A comparison of the annual change in groundwater storage over the 50-year hydrologic period for the baseline conditions, 2030 and 2070 climate condition for with and without projects is presented in Figure 4-4. The time series shows that change in groundwater storage has stabilized to slightly increasing over the period from WY2041 to WY2070 for with Projects condition.

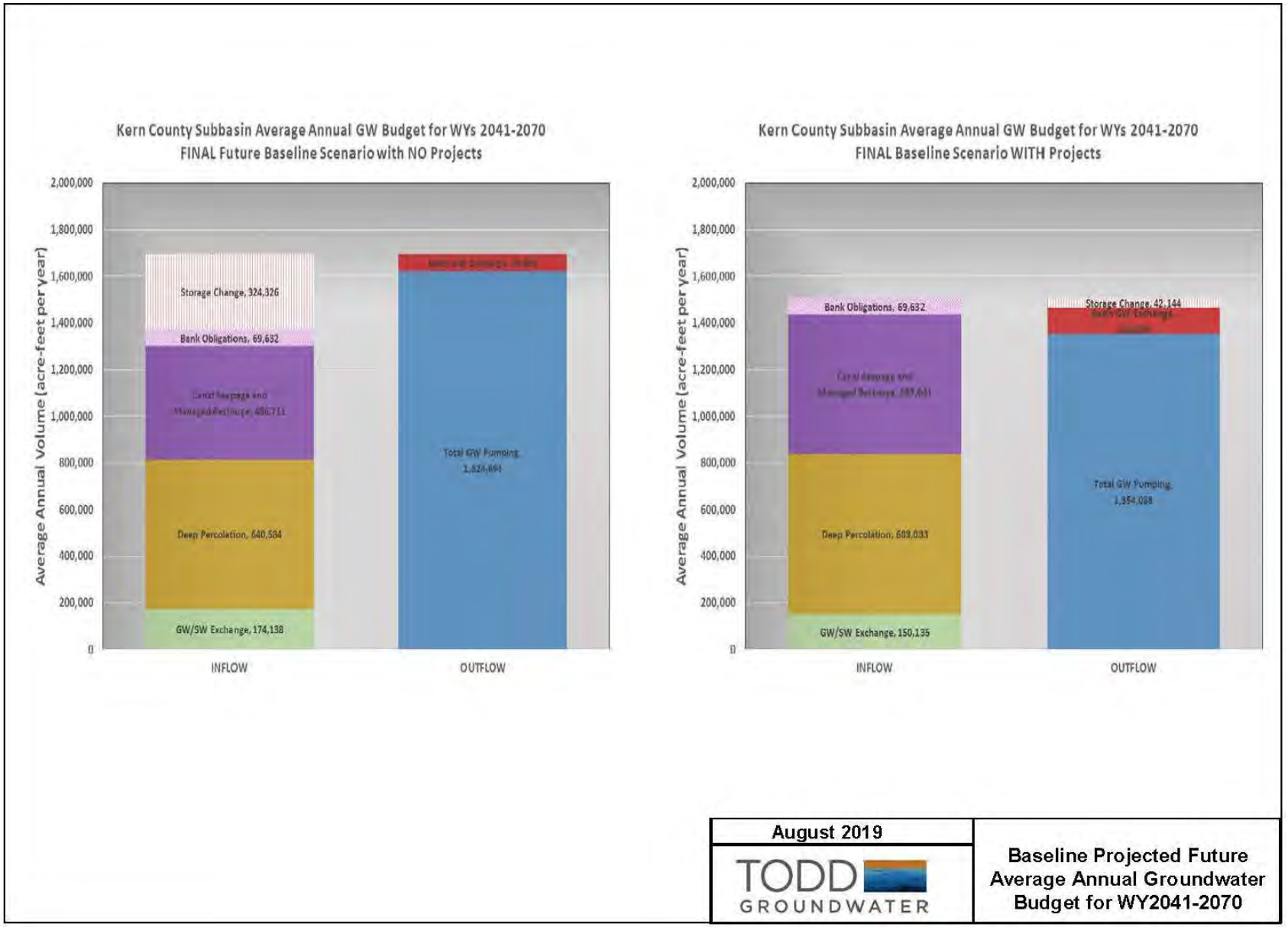


Figure 4-1. Baseline Projected Future Average Annual Groundwater Budget for WY2041-2070

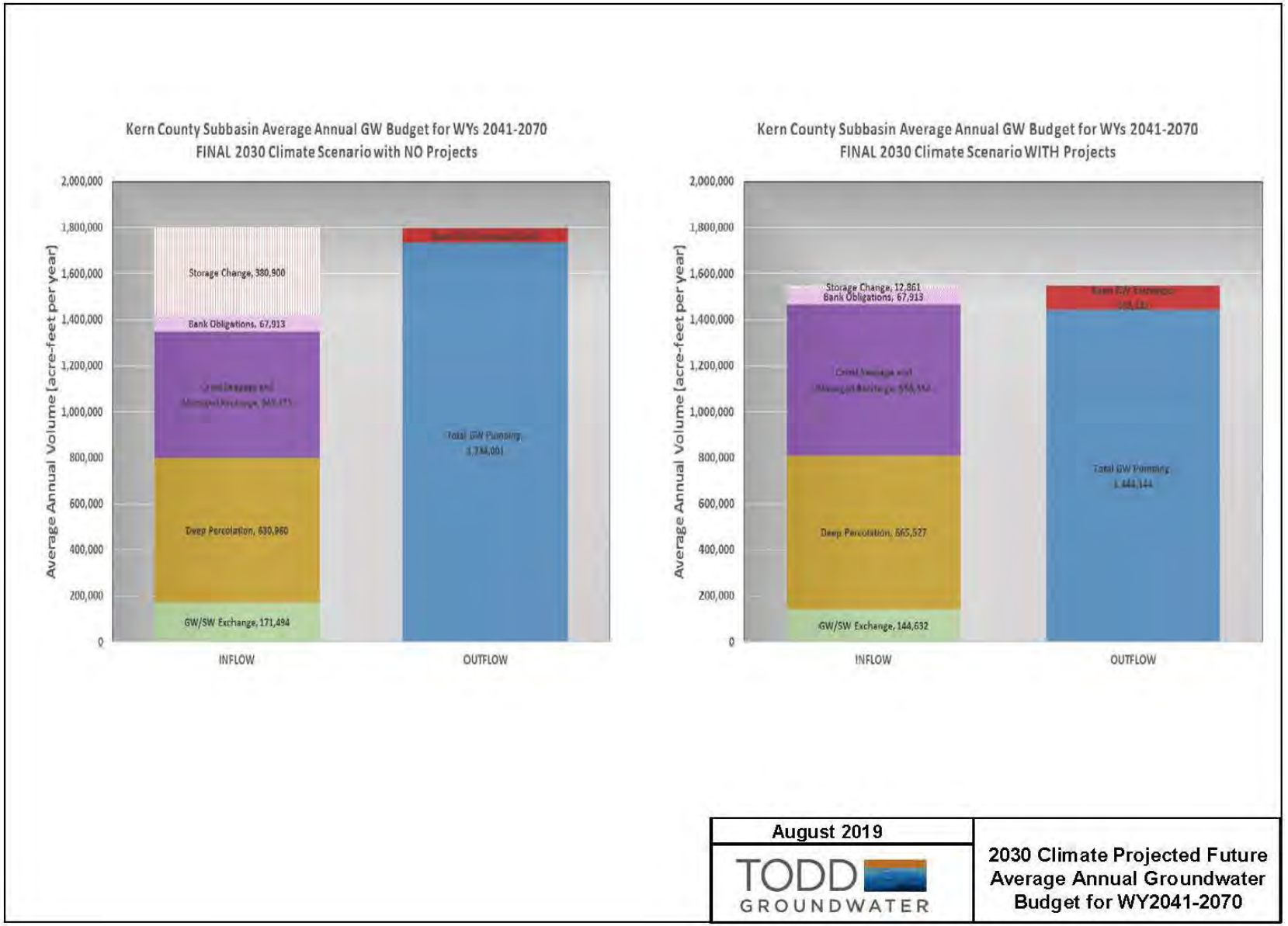


Figure 4-2. 2030 Climate Projected Future Average Annual Groundwater Budget for WY2041-2070

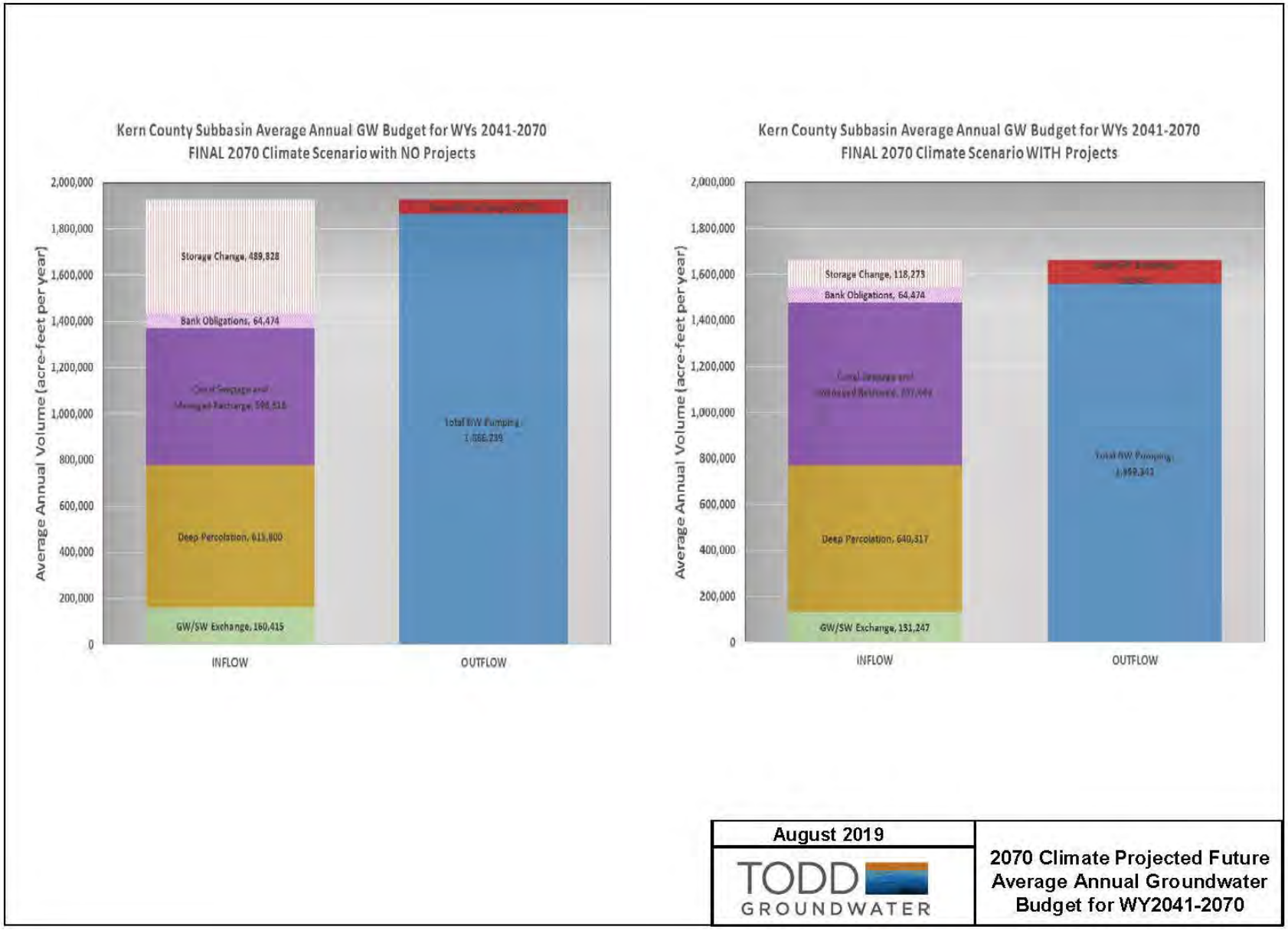


Figure 4-3. 2070 Climate Projected Future Average Annual Groundwater Budget for WY2041-2070

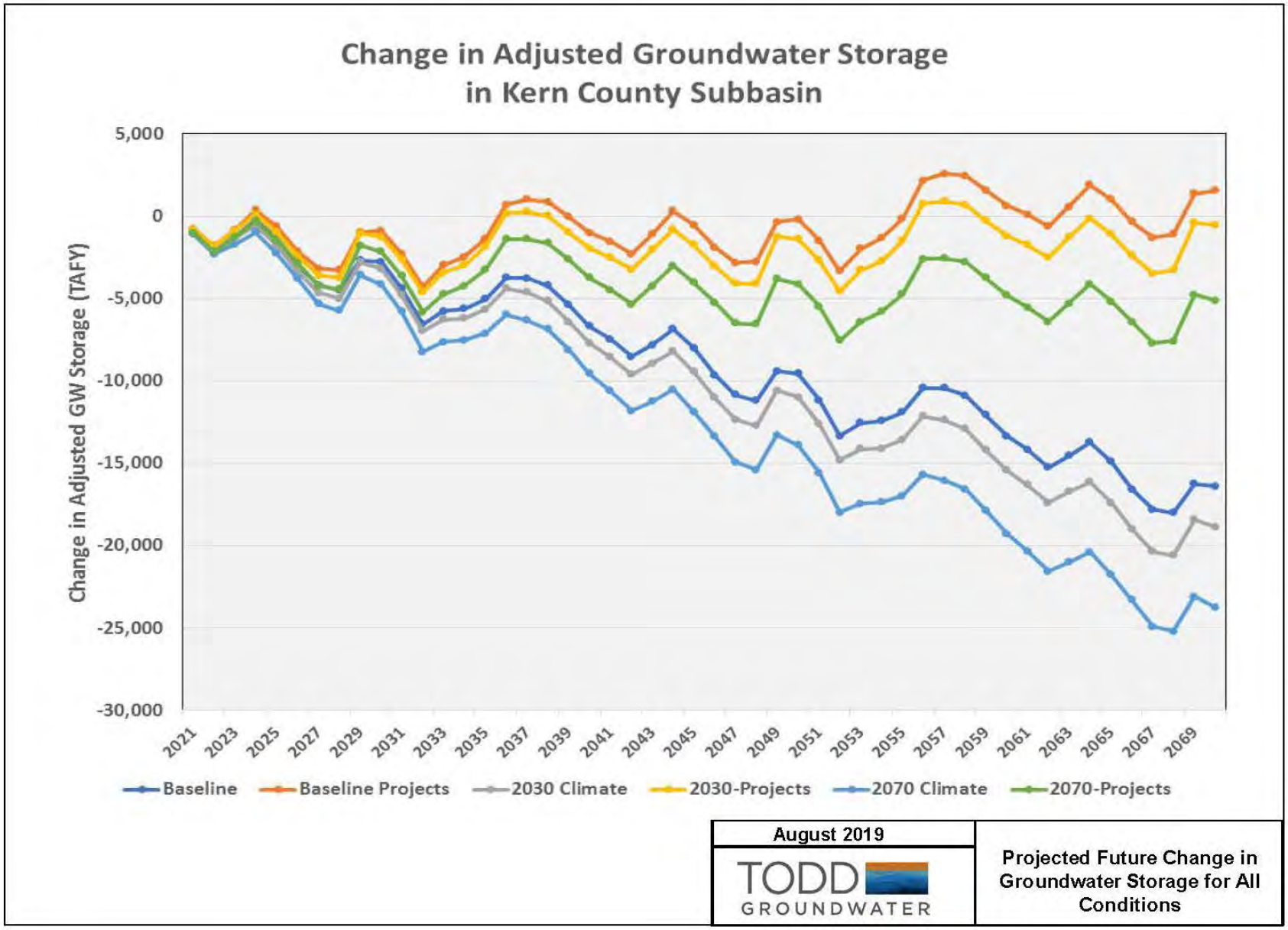


Figure 4-4. Projected Future Change in Groundwater Storage for all Conditions.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
Arvin-Edison Water Storage District				
AEWSD	AEWSD Sunset Spreading Works	Land acquisitions has been completed. To be implemented upon adoptions of AEWSD GSP Chapter and grant funding acquisition.	The Sunset Spreading Works, approximately 150 acres, is located on the boundary between AEWSDand KDWD, adjacent to KDWD's Eastside Canal. The Project will take surface water (Federal CVP,State Water Project, or local supplies) diverted through KDWD's Eastside Canal and recharge thesurface supplies as part of AEWSD's and KDWD's joint water management programs. The Project will include the construction of exterior and interior dikes for a direct recharge facility, a new turnout and pump station from the KDWD Eastside Canal, and interbasin structures.	Project enhances recharge relevant to groundwater levels, storage, and quality. Primary benefits include water supply augmentation of 2,000-3,000 AFY of recharge and a water demand reduction of 410 AFY.
AEWSD	Private and Caltrans Basin Connections	Not yet initiated. Implementation upon receipt of grant funding.	This project involves the construction of pipelines to connect several on-farm private basins and Caltrans sumps near AEWSD to utilize for groundwater recharge.	Project enhances recharge relevant to groundwater levels and storage. Primary benefits include water supply augmentation of 50-500 AFY of recharge.
AEWSD	Sycamore Creek Detention & Sedimentation Basin	Not yet initiated. Implementation upon receipt of grant funding.	The proposed basin would serve to intercept sediment from Sycamore creek flows to prevent constriction where sediment deposits downstream, reduce the peak outflow, and prevent the likelihood of a canal and spreading basing breach. Detained water could be recirculated for irrigation demands or recharged for groundwater supply augmentation.	Project enhances recharge relevant to groundwater levels, storage, and quality. Primary benefits include water supply augmentation of 200-300 AFY of stormwater capture.
AEWSD	AEWSD South Canal Flood Study / Improvements	Study to be initiated upon GSP adoption and grant funding acquisition.	The South Canal Flood Study would review and possibly revise the FEMA floodplain in this area in order to increase the height of the canal bank to provide additional operational freeboard and accordingly reduce the potential for canal spills and subsequent flooding.The additional canal storage could allow for the caputure and use of additional floodwater in-lieu of groundwater pumping.	Project enhances recharge relevant to groundwater levels and storage. Primary benefits include water supply augmentation of 100-200 AF of increased storage capacity and stormwater capture.
AEWSD	Stormwater Management and Flood Control Improvements	To be decided upon available funding. Excessive flooding or further damages may expedite intiation.	Potential construction of new sedimentation/detention basins, flood ditch erosion protection, Spillway Basin expansion, lengthening the South Canal's siphon under David Road or extension of the South Canal liner through designated floodplain reaches.	Project enhances recharge relevant to groundwater levels, storage, and quality.
AEWSD	On-Farm Recharge	Underway	The program will encourage individual growers to perform on-farm recharge for individual and aggregated benefits. Water may be recharged on-farm in private basins and/or distributed through irrigation systems across irrigated acreage in excess of current crop ET.	Project enhances recharge relevant to groundwater levels and storage.
AEWSD	Caliente Creek Habitat Mitigation and Gorundwater Recharge	Not yet initiated. Implementation upon receipt of grant funding.	Restoration of agricultural lands to native vegetation to provide flood mitigation. Two alternatives are being considered, of which Alternative 1 is partial agricultural and 2 is non-agricultural.	Project provides immediate flood control benefits of local stormwwater.
AEWSD	AEWSD Intake Canal / KDWD Buena Vista Canal Intertie	Not yet initiated. Implementation to be decided.	Improvement of existing and/or construction of new interties between AEWSD Intake Canal and KDWD's Buena Vista Canal to facilitate water exchanges between the two districts and Kern County partners.	Project to increase surface storage capacity and delivery flexibility in relation to groundwater levels and storage. Primary benefits include water supply augmentation of 8,000 AFY increased transfer and exchange potential.
AEWSD	AEWSD Intake Canal / KDWD Farmer's Canal Intertie	Not yet initiated. Implementation to be decided.	Improvement of existing and/or construction of new interties between AEWSD Intake Canal and KDWD's Farmer's Canal to facilitate water exchanges between the two districts and Kern County partners.	Project to increase surface storage capacity and delivery flexibility. Primary benefits include water supply augmentation of 4,000 AFY increased transfer and exchange potential.
AEWSD	AEWSD Wasteway Basin Improvements	Project to be implemented upon FEMA grant approval.	The primary use of the existing AEWSD Wasteway Basin is to provide emergency water storage in the event of power failure. Additionally, it works as a detention facility for the City of Bakersfield stormwater. This project would include construction of a HDPE liner along the levees, installation of recirculation pumps, and basin grading. These improvements would allow the basin to serve as a location to divert and clarify sediment.	Project to increase surface storage capacity and delivery flexibility in relation to groundwater levels and storage. Primary benefits include water supply augmentation of 1,550 AFY of stormwater capture.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
AEWSD	Forrest Frick Pipeline / KDWD Eastside Canal Intertie	Not yet initiated. Implementation upon receipt of grant funding.	This project would connect the Forrest Frick Pipeline to the KDWD Eastside Canal to send AEWSD SW supplies through KDWD to serve portions of the AEWSD GWSA with temporary water contracts, utilizing existing infrastructure (turnouts, pipelines that are both District and landowner owned). With the District's new 9(d) contract, certain provisions of Reclamation law are no longer applicable and all lands within the service area can now be served with federal water supplies.	Primary benefits include water supply augmentation of 10 AFY of recharge, 3 AFY/ac of land served.
AEWSD	AEWSD North Canal Balancing Reservoir Expansion & Discharge Pipelines	To be initiated upon completion of feasibilty	The proposed project will consist of the installation of a pipeline system that will convey flows from the four (4) wells within the AEWSD Balancing Reservoir directly to the basin discharge structure and no longer through the basin low flow channels. Infiltration and evaporation losses on well discharge flows will be eliminated and power efficiency for the wells (kwh/af) will be significantly enhanced since all water pumped will be discharged into the North Canal.	Primary benefits include water supply augmentation of 16 AF of increased storage capacity and 100 AFY of recharge. In addition, water demand is expected to be reduced by 50 AFY in evaporative losses.
AEWSD	AEWSD Lateral Capacity Improvement Projects	Not yet initiated.	Increase delivery capacity of the AEWSD N-55 lateral system. Some examples of the actions considered for this project are: replacement of lateral system and landowner pipelines, renovation of storage tanks, construction of pump stations, etc.	Primary benefits include water supply augmentation of 2,000 AFY of of increased delivery capacity.
AEWSD	Conversion of Granite Quarry to Sycamore Reservoir	Study to be initiated upon GSP adoption and grant funding acquisition.	The Granite Co. quarry, located upstream of the Sycamore Spreading Basins, is approaching the end of its operational life and could be converted into a balancing / detention / spreading reservoir. Excess flows in the North Canal could be pumped into the quarry reservoir, so the detained water could be recirculated for irrigation demands in-lieu of groundwater pumping and/or recharged.	Primary benefits include water supply augmentation of 3,000-6,000 AFY of recharge and an additional 2,500 AF increased storage capacity.
AEWSD	AEWSD South Canal Balancing Reservoir	Not yet intiated.	Creation of a reservoir to allow water storage for flow mismatches in the AEWSD canal system during operation or emergencies. Depending on the location, this reservoir would increase storage capacity by ~500 AF.	Primary benefits include water supply augmentation of 500 AF increased storage capacity.
AEWSD	Frick Unit In-Lieu Project	Not yet intiated. To be implemented upon grant funding.	This project would increase the ability of the District to provide surface water supplies to the Groundwater Service Area (GWSA) to help meet crop irrigation requirements. With the Project, the District will supply surface water when available through new facilities to the GWSA to meet crop irrigation requirements with the intent of reducing District wide groundwater use.	Primary benefits include water supply augmentation of 3,500 AFY of increased surface water deliveries.
AEWSD	DiGiorgio Unit In-Lieu Project	Completed Phase I. Future phases intiated upon grant funding.	The District will supply SW when available through new facilities to the GWSA to meet its water requirements with the intent of reducing District-wide GW use. However, when SW is in short supply and under agreement, the landowners could recover and return GW from their own wells to the District canal system through new pipelines once they have satisfied their own water needs.	Primary benefits include water supply augmentation of 4,250 AFY in increased surface water deliveries.
AEWSD	General In-Lieu Banking Program	Not yet initiated. To be implemented upon grant funding.	The In-Lieu Banking Program consists of suppling surface water to landowners that previously relied only on groundwater (GWSA). New infrastructure would have to be built to facilitate the implementation of this program.	Primary benefits include water supply augmentation of 2.75 AFY/ac increased surface water deliveries every 2.5 years.
AEWSD	Reclamation of Oilfield Produced Water	To be implemented upon adoptions of AEWSD GSP Chapter and agreement with partnering oil field.	Reclaiming water from oil production facilities for irrigation purposes is currently an untapped water source in AEWSD. After treatment and cooling, produced water could be pumped into AEWSD facilities to serve irrigation demands in-lieu of groundwater pumping.	The primary expected benefit is water supply augmentation.
AEWSD	Wastewater Reclamation with City of Arvin & Bakersfield	To be implemented upon adoptions of AEWSD GSP Chapter and agreement with City of Arvin and City of Bakersfield.	Reclaiming water from Cities of Arvin and Bakersfield wastewater treatment facilities for irrigation purposes is currently an untapped water source in AEWSD. After wastewater treatment, the effluent could be pumped into AEWSD facilities to serve irrigation demands in-lieu of groundwater pumping.	The primary expected benefit is water supply augmentation of 10,000 AFY.
AEWSD	Incentives for Land Conversion	To be implemented upon adoptions of AEWSD GSP Chapter.	The District would provide subsidies to incentivize groundwater users to convert land to alternative land uses (e.g. solar farms) and reduce groundwater extractions. The District may consider a subsidy structure study to determine which subsidies would result in the greatest expected annual benefit in acre-feet per year.	The primary expected benefit is water demand reduction of 2.75 AFY/ac of land converted.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
AEWSD	On-farm Water Conservation	To be implemented upon stakeholder interest and acuisition of grant funding.	The NRCS is offering landowner incentive programs to assist in implementing various conservation activities, including but not limited to: irrigation system improvements, water/nutrient/pest management, and pump engine replacement. Interested landowners can call (661) 336-0967 or visit the website (www.ca.nrcs.usda.gov) for more information.	The primary expected benefit is water demand reduction of 50 - 500 AFY.
AEWSD	Groundwater Fee Increase	Contingent on the Frick Unit In-Lieu Project, Digorgio Unit In-Lieu Project, and General In-Lieu Banking Program.	Increase GWSA costs to incentivize groundwater users to reduce groundwater extractions and take surface water when available. The District may consider modifying its fee structure study to determine the best strategy for curbing groundwater overdraft without causing inequitable economic impact.	The primary expected benefit is water demand reduction.
AEWSD	Groundwater Extraction Quantification Method	To be implemented upon adoptions of AEWSD GSP Chapter.	Application of a new policy to specify an approved method to quantify the individual and aggregated groundwater extractions for the required SGMA annual reporting. Some methods to consider (or a combination of them) are the following: (1) Irrigated Acreage determined by aerial imagery; (2) Irrigated area hybrid determined by annual crop survey alongside aerial imagery; (3) Calibrated energy records; (4) Volumetric flow measurement; (5) Remote sensing of vapotranspiration; (6) Other.	This Project is expected to improve water management flexibility and efficiency as well as data gap filling and monitoring.
AEWSD	Groundwater Allocation per Acre	To be implemented upon adoptions of AEWSD GSP Chapter and initiated as needed to meet milestones if other new supplies are not developed as anticipated.	This program would provide a finite groundwater allocation on a per acre basis. The policy would identify and forecast the demands associated with existing water rights, domestic and environmental uses. The sustainable yield and ultimate groundwater allocation would take into consideration the applicable beneficial uses and users of groundwater. Once an individual groundwater allocation is determined, the District may adopt a policy which provides a gradual "ramp-down" wherein an allocation would decrease over time to arrive at the actual roundwater allocation to allow growers time to adjust to the concept of an allocation and, for some growers, a reduction in groundwater use. The policy would detail the number of years and amount of reduction each year.	The primary expected benefit is water demand reduction.
AEWSD	Groundwater Marketing & Trading	Contingent on Management Actions; Groundwater Extraction Quanitification Method and Groundwater Allocation per Acre.	Contingent on the GW extraction quantification and allocation programs, the District would pursue a groundwater market and trading program to provide uses and beneficial users more flexibility in utilizing a groundwater allocation. The District may adopt a policy to define a groundwater trading program, acknowledging that many complexities and considerations required to successfully initiate and manage a trading program may arise. Therefore the District should discuss any other water bank/credit systems in existence. The District may adopt a groundwater trading structure and consider a variety of structures including: (1) Bilateral contracts or "coffee shop" markets; (2) Brokerage; (3) Bulletin boards; (4) Auctions and reverse auctions; (5) Electronic clearing-houses or "smart markets" ; (6) Other trade structures.	This Project is expected to improve water management flexibility and efficiency.
AEWSD	Education of Groundwater Use per Acre	To be implemented upon adoptions of AEWSD GSP Chapter.	This program would provide groundwater users an expected groundwater volume, as an education tool, prior to enforcement actions on groundwater allocations, with the goal of providing awarness of overdraft conditions. This information would be provided in an annual letter, along with average crop demand, GSA average extraction, GW overdraft, and reminders of GSA powers and authorities.	The primary expected benefit is water demand reduction of 100 AFY.
AEWSD	ACSD Emergency 1,2,3-TCP Treatment at Well No. 13	Implementation is underway.	The project involves the installation of emergency 1,2,3-TCP treatment at the well head. The work will include installation of a skid mounted treatment system with two granular activated carbon media vessels for removal of 1,2,3-TCP, connection to the existing well discharge piping, installation of below ground and above ground influent and effluent piping and appurtenances, electrical and controls, and modifications to the existing well site PLC programming.	This Project is expected to imrpove water quality.
AEWSD	ACSD Arsenic Mitigation Project - Phase II	Implementation is underway.	The purpose of the project is to bring the ACSD water system into compliance for Arsenic. All five of the ACSD active wells exceed the maximum contaminant level (MCL) of 10 ppb for Arsenic. The project was separated into two phases. Phase II involves drilling three new wells, constructing a 1.0 MG storage tank and booster pumping plant, and connecting the facilities to the existing distribution system. The original five (5) water wells will then be abandoned and destroyed in accordance with Kern County Standards.	This Project is expected to imrpove water quality.
Cawelo Water Storage District				
CWD	Voluntary Land Conversion	2020 to 2040 Implementation	The Cawelo GSA will develop a program to incentivize landowners to reduce their total crop demand by converting farmed land to groundwater recharge areas. This would reduce demands and the increased recharge capability could increase supplies. It could also reduce the potential of currently fallow land being used for future crops. This Management Action could be implemented conjunctively with Project #2: Increase GW Recharge and Banking Capacity	Range of annual benefit is 2,000 AFY with an average annual benefit at 2040 of 2,000 AFY.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
CWD	Crop Conversion and Irrigation Efficiency	2020 to 2040 Implementation	The Cawelo GSA will evaluate potential programs to incentivize growers to convert from relatively high water demands crops to crops that require less water and to improve the efficiency of irrigation practices. The Cawelo GSA will partner with Federal, State and local organizations such as the California Department of Food and Agriculture, U.S. Department of Agriculture, and Natural Resources Conservation Service to provide landowners information and access to conservation programs. The programs would educate the landowners on the potential economic savings from conversion to lower water demand crops and increased irrigation efficiencies and incentivize them to seek improved economically viable agricultural operations.	Range of annual benefit is less than 2,000 AFY with an average annual benefit at 2040 of 3,8000 AFY.
CWD	Land Acquisition	2020 to 2040 Implementation	The Cawelo GSA will evaluate and potentially implement a program to acquire land that is actively farmed to reduce irrigated acreages within the Cawelo GSA. This would directly eliminate demands and free up the associated water supplies to meet other demands. This could be a very long-term program seeking to acquire appropriate land when available or to reduce the financial burden. Another method for pot ential conservation programs will be developed that could place certain easements on land that would minimize potential future increased water demands. These programs could also be implemented by contracts or other types of agreements.	Range of annual benefi is 2,500 AFY with an average annual benefit at 2040 of 2,400 AFY.
CWD	New Water Supply Purchases	Begin program in 2020.	The Cawelo GSA would implement programs that will acquire long term new water purchase contracts and/or establish a water purchase fund if contracts are difficult to secure because of high demand and competition and resulting high costs. The main goal would be to secure long term new water contracts but compliance with SGMA will impact future water management practices and could make the availability of new long term contracts scarce. If long term contracts can't be secured then a new water fund would be established to build funding reserves for water purchases. These purchases could occur during favorable times such as hydrologically wet years when water will be more readily available at lower costs. While the Cawelo GSA would likely not need this water in wet years, these types of purchases could be in the form of banked water that the Cawelo GSA could request at a future date. Alternatively, the funds could be used to make annual water purchases and the revenue for the fund would be consistent from year to year regardless of the hydrological conditions. Therefore, during wet or average hydrologic years the water would cost less and reserves would be built up for more costly water purchases during the drier years. It is estimated that an additional 5,000 AFY to 23,000 AFY of water could be imported into the Cawelo GSA area through new long term contracts or establishing a new water purchase fund or both.	Securing new long term contracts or establishing a water purchase fund or both could result in an additional 5,000 AFY to 23,000 AFY of water that could be imported into the Cawelo GSA area. This additional water would increase the amount of water in the basin and decrease overdraft.
CWD	Increase Groundwater Recharge and Banking Capacity	Target 2030 Implementation	The Cawelo GSA will implement projects or programs to increase recharge capacity to capture and recharge additional wet year high flow waters to store for future use. The Cawelo GSA has limited groundwater recharge facilities and has not been able to capture and recharge all available water under wet hydrological conditions. This project would entail building additional Cawelo GSA owned recharge facilities and/or improve the distribution system to increase the capacity to capture more water, especially during wet hydrologic events. Some facilities could be strategically located to capture storm runoff that may otherwise leave the Cawelo GSA area. It is estimated that approximately 200 to 570 acres of new recharge and banking facilities could be developed. Additionally, the Cawelo GSA will consider implementing a program to incentivize landowners to use their land for recharge. This could provide an opportunity for landowners to bank their privately owned water for future recovery and possibly allow the Cawelo GSA access to their lands for additional recharge. This program would not only increase recharge capacities during wet years but could also reduce water demand by replacing crops with recharge facilities. The privately owned water could be purchased under Project #1, New Water Supply Purchases, described above.	There are significant regions within the Cawelo GSA with soil properties that could achieve percolation rates of up to 0.5 AF per day. Assuming an average percolation rate of 0.35 AF/day and approximately 200 to 570 acres of potential new recharge and banking land, about an average of 500 AFY to 1,500 AFY of new water could be recharged for future recovery. It is not clear what magnitude landowner owned recharge facilities would have on importing additional waters into the Cawelo GSA area. It could be anywhere between an average of 50 AFY to 500 AFY.
CWD	New Cawelo GSA Banking Partners	Begin program in 2020.	The Cawelo Water District benefits from a banking program partnership with the Zone 7 Water Agency. Located in the Livermore Amador Valley, which is outside of the Kern County Subbasin. The District stores water for Zone 7 and keeps half of the water that it stores. For example, for every 2 AF feet of water delivered to District recharge facilities, the District is obligated to only return 1 AF. The currently banking program with Zone 7 could be modified to increase the amount of water stored for Zone 7 and/or a new banking programs and partners could be considered to fund the construction of new facilities and/or to improve existing facilities. It is estimated this could increase the annual average water supply up to 500 AFY.	The expansion of the existing banking contract with Zone 7 and/or the development of additional banking partners would be a beneficial way the Cawelo GSA could increase its groundwater supply by the portion of water each partner agrees to essentially leave in the Cawelo GSA area. Zone 7 has agreed to leave 50 percent of all that is spread. It is estimated that this program would generate about 500 AFY.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
CWD	Water Treatment Facilities	Begin program in 2020.	The Cawelo GSA is currently evaluating projects to install water treatment facilities that will allow the Cawelo GSA to acquire wastewater and treat it to a level that is safe for crop irrigation. Wastewater is exempt from SGMA regulation and the treated wastewater would be considered new water. There is a substantial volume of oilfield produced water (OPW), a byproduct of oil production, available in the vicinity of the Cawelo GSA. The salinity of OPW can range from moderate to high, although even the best quality still requires some level of blending with fresh water before it can be used on crops. Reverse osmosis or distillation would generally be needed to remove enough salts to make the OPW usable for irrigation. Near the Cawelo GSA, approximately 20,000 AFY of wastewater is injected into exempt groundwater aquifers well below the base of fresh water. The Cawelo GSA is evaluating potential projects to treat anywhere from 7,500 AFY to 20,000 AFY of OPW.	The treated OPW would be a new source of about 7,500 AFY to 20,000 AFY of water for irrigation.
CWD	Friant Pipeline Project	Construction in 2019.	The Cawelo GSA is currently developing the Friant Pipeline Project that would increase water importation capacity into the Cawelo GSA area. Currently, the amount of imported water that the Cawelo GSA can import into the area is limited by conveyance capacity, not by irrigation demand or recharge basin capacities. The Friant Pipeline Project would increase the total capacity by 100 cubic feet per second (cfs) and connect Cawelo's Famoso Recharge Basins directly to the Friant Kern Canal. The increased capacity would allow greater access to high flow water and support banking programs with Friant Contractors. The Friant Pipeline Project would result in an additional 1,500 AFY to 2,500 AFY of water brought into the Cawelo GSA area on an average annual basis.	The Friant Pipeline Project would increase the total capacity into the Cawelo GSA by 100 cfs and increase access to CVP high flow waters and allow for banking programs with Friant Contractors. It would result in an additional 1,500 AFY to 2,500 AFY of water brought into the Cawelo GSA area on an average annual basis.
CWD	Poso Creek Flood Water Capture	Target 2030 Implementation	The CWD has appropriative rights to divert water from Poso Creek, an ephemeral stream, when there are flows into the Cawelo GSA area. Additionally, there are downstream districts that also have subsequent appropriative rights and certain adjacent landowners that exercise their riparian rights. CWD also has additional diversion rights to divert supplementary water when high flows occur. The Poso Creek Flood Water Capture Project would consist of the construction of additional facilities to take advantage of those additional rights and divert supplementary water from the creek during times of high flow. In addition to making more water available to the Cawelo GSA, this capture of additional high flows could reduce potential downstream flooding impacts. Participation from downstream right holders would be needed due to potential water right impacts. The estimated net water gain is up to 150 AFY on average.	The Poso Creek Flood Water Capture Project would provide up to 150 AFY on average of additional water and could reduce potential downstream flooding impacts.
CWD	Surface Water Storage	Target 2030 Implementation	The Cawelo GSA has several existing reservoirs with a combined storage capacity of 800 AF. This project would consist of constructing a new 5,000 AF reservoir within the Cawelo GSA boundary. This would provide additional storage capacity to bring more water into the Cawelo GSA area during wet years. It is estimated that this new reservoir would provide approximately 500 AFY on average. This program would likely only be implemented conjunctively with other water management programs.	A new reservoir would provide approximately 500 AFY on average.
CWD	Out of Cawelo GSA Banking	Begin program in 2020.	The Cawelo GSA will evaluate groundwater banking projects that are outside the Cawelo GSA but within the Kern County Subbasin and also groundwater banking projects outside of the Kern County Subbasin. Potential banking projects outside of the Cawelo GSA are likely to have multiple participants and therefore offer a limited share of project benefits.	This Project could yield an average annual benefit of 500 AFY to 4,000 AFY through out of Cawelo GSA banking programs.
Eastside Water Management Area				
EWMA	Project-1	Not yet initiated; Timetable TBD.	Development of oilfield produced-water supplies to potentially reduce groundwater demand.	Potential additional external source of water for the basin (annual volume TBD).
EWMA	Project-2	Not yet initiated; Timetable TBD.	Investigation of groundwater quality by compilation and analysis of (a) available water quality data, and (b) borehole geophysical data.	Improved HCM and understanding of 3-D distribution of TDS in specific aquifers or regions.
EWMA	Project-3	Not yet initiated; Timetable TBD.	Improved estimation of local (EWMA) native yield by use of additional field-collected data and analysis.	Improved HCM and understanding of groundwater recharge in specific aquifers or regions.
EWMA	Project-4	Not yet initiated; Timetable TBD.	Construction of aquifer-specific monitoring wells in locations with data gaps, to better understand hydraulic heads and gradients.	Improved ability to monitor groundwater conditions in specific aquifers or areas.
EWMA	Project-5	Not yet initiated; Timetable TBD.	Installation of pressure transducers in selected wells of the monitoring network, to collect high-resolution cost-effective data.	Improved ability to monitor groundwater conditions in EWMA.
EWMA	Project-6	Not yet initiated; Timetable TBD.	Surface runoff capture and enhanced infiltration in impoundments.	Reduced groundwater pumping (annual volume TBD) to meet sustainability goals, as needed.
EWMA	Management Action-7	Not yet initiated; Timetable TBD.	Reduction of irrigated acreage, or modification of irrigation techniques or crop types to reduce water usage.	Reduced groundwater pumping (annual volume TBD) to meet sustainability goals, as needed.
EWMA	Management Action-8	Not yet initiated; Timetable TBD.	Assess fees for groundwater use to encourage reduced pumping or curtailment.	Reduced groundwater pumping (annual volume TBD) to meet sustainability goals, as needed.
EWMA	Management Action-9	Not yet initiated; Timetable TBD.	Establish a system of transferrable water credits.	Reduced groundwater pumping (annual volume TBD) to meet sustainability goals, as needed.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
EWMA	Management Action-10	Not yet initiated; Timetable TBD.	Legal and administrative review: effects of CEQA and water law on joint management of native yield.	Clarification of constraints on sustainable groundwater management in EWMA.
Kern Water Bank Authority				
KWB	Temporary Lowering of Groundwater Levels	Ongoing	KWB operations can cause a temporary lowering of groundwater levels in adjacent areas toward the end of extended droughts. In order to mitigate the potential impacts that might arise from those temporary changes, DWR has developed mitigation measures for the project, which have now been coordinated with other adjacent water banking projects and incorporated into a Joint Operations Plan. The Joint Operations Plan designates measures to prevent, eliminate or mitigate significant adverse impacts resulting from project recovery operations.	
KWB	Reduction of Groundwater Storage	Ongoing	KWBA cannot recover water beyond those volumes previously stored less appropriate losses. When storage accounts reach zero, recovery pumping will stop. Given due consideration to this mitigation measure, no other management actions are necessary	
KWB	Degraded Water Quality	Ongoing	Groundwater monitoring from 1994 through 2018 indicates groundwater quality is not being degraded by KWB water banking activities, and in fact the removal of salts is benefitting the aquifer. DWR developed mitigation measures to ensure that continued KWB operations do not degrade groundwater quality.	
KWB	Subsidence	Ongoing	Subsidence has not occurred in over twenty years of KWB operations. DWR has also concluded that subsidence is not likely to occur as the result of future operations. Monitoring will continue, and if subsidence begins to develop appropriate mitigation measures will be developed.	
KWB	Project	Not yet initiated.	KWBA intends to construct an additional 1,025 acres of recharge basins.	Project will allow KWBA capture more water in the future, furthering the conservation goals of SGMA.
Kern Tulare Water District				
KTWD	Action 1: Modify District Pricing Structure	ction 1 could be executed during the first 5 years of implementing the Plan (2020-2025).	The most affordable way to reduce groundwater pumping is to provide a pricing mechanism that causes groundwater to cost more than surface water. This could be accomplished by implementing a “groundwater charge” for every acre-foot pumped. Water Code §35533 provides the District the authority to collect groundwater charges. Revenue from the groundwater charge could be used to implement management actions or to reduce the cost to deliver surface water from the District.	5,580 AF/yr reduction in groundwater pumping.
KTWD	Action 2: CRC Pipeline Project - Produced Water Project	The District and CRC are in the process of acquiring permits, preparing an anti-degradation analysis and acquiring a WDR from the Regional Board. Project pipelines have been designed and plan and profile drawings have been prepared. The District is negotiating an agreement with CRC and obtaining rights-of-way. The pipeline construction is expected to be completed prior to 2025.	The District has historically accepted produced water to provide surface water to the District and is in the process of obtaining an additional source of produced water from California Resources Corporation (CRC). Produced water from CRC will be transported through 12 miles of 15-inch pipeline to the Guzman Reservoir. From the Guzman Reservoir, water will be transported through 1.8 miles of 30-inch pipeline to the District’s existing Big 4 Reservoir, from which it will be blended with water from the Friant-Kern Canal and distributed in existing facilities to existing irrigated agriculture located within the District.	3,000 AF/yr of additional surface supplies (results in a reduction of 1,440 AF/yr in groundwater pumping).
KTWD	Action 3: In-District Surface Storage	The project is still in the preliminary design phase and will require additional steps before construction. The District has selected two potential reservoir sites, completed exploratory borings, and conducted a geotechnical evaluation of the two potential sites. The District has yet to acquire land and rights of way, permits, environmental documentation, or project financing. It is estimated that these facilities will be constructed between 2025 and 2030 if they are determined to be feasible and found to be necessary.	There are times when affordable water supplies are available, but the District has little to no irrigation demand and no available spreading capacity in its existing out-of-district banking programs. Construction of off-stream surface storage will allow the District to acquire water when it is available and store it to meet future irrigation demands. The District has selected two potential reservoir sites with a total capacity of 8,000 AF to capture wet year water. The sites are located to the east of the District in both the north and south portions. A location map of facilities and detailed description is not provided due to the confidential nature of the property and rights of way acquisition.	Based upon annual water supply modeling herein, the project yields only 530 AF/yr. However, a monthly analysis will need to be conducted to provide a better estimate of project yield, which could be as much as 2,000 AF/yr (assumes the reservoirs are used once every 4 years).
North Kern Water District & Shafter-Wasco Irrigation District				
NKWSD	Calloway Canal Improvements: Lining Snow Rd. to 7th Standard Rd.	Calloway Canal Lining is an ongoing project. NKWSD is in the process of acquiring adequate funding to complete the next one-mile lining of the project. The proposed project schedule includes a start date of October 2019 and completion within 36-months.	Calloway Canal Improvements is part of NKWSD’s continued effort of the recently completed 1.1-mile long canal lining. The first phase of this project consists of concrete lining approximately 2,200 LF of currently unlined portion of the Calloway Canal to increase surface water reliability and prevent seepage.. Phase two of this project includes water delivery improvements (WDI) that consist of installing magnetic flowmeters (or magmeters) at a total of 50 of the District owned production wells. Each magmeter will include a totalizer capable of measuring the volume of groundwater pumped through the wells. Further, water level sensors will also be installed in each of the 50 production wells and four additional monitoring wells to quantify the depth-to-water data. Additionally, the District proposes to implement telemetry upgrades at each of the production well sites, each of the monitoring well sites, and 14 remote Terminal Unity (RTUs-used to measure canal levels) sites. The final part of the water delivery improvements integrating these sites with NKWSD’s Supervisory Control and Data Acquisition (SCADA) setup.	Lining the canal will reduce the irrecoverable losses that result when high quality surface water seeps to poor quality groundwater, which cannot be recovered for later use without substantial treatment. Reducing these losses enhances NKWSD’s capability to deliver increased volumes of water from the Kern River to irrigators for existing demand. The integration of the telemetry system with the SCADA setup will enable the District to control well operation and access their groundwater pumping data remotely. Water conserved by lining the canal and implementing WDI is estimated at 1,576 AFY.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
NKWSD	Expanded Water Banking Program	This program is an expansion of the District's ongoing groundwater banking program. Environmental documents are being prepared to carry out the program in a timely manner.	Due to historically low groundwater levels, requirements under SGMA, and potential reductions in its historical water supplies, NKWSD is proposing a new program to increase its existing conjunctive use (or water banking) facilities and subsequently expand these facilities. Phase I of this program would primarily rely on unused capacity in existing facilities which is available from time to time (with some additional conveyance) and would seek to increase the utilization of the District's proven recharge and recovery assets. Phase II would involve the construction of additional direct recharge and recovery facilities to further expand water banking in the District. Both the District and District landowners will receive water supply benefits from this program.	Implementation of this program would bring additional water supplies that would help offset potential losses of the District's historical supplies, support the District's mission of maintaining economic pumping lifts for its landowners, and maintain supplies to be used for municipal and industrial purposes by the city of Shafter. Quantitative benefits include 50,000 AFY (Phase I) and 72,000 AFY (Phase II) for a total of 122,000 AFY of water for the District.
NKWSD	Groundwater Banking Conveyance Improvements to NKWSD Recharge and Recovery	NKWSD is in the process of acquiring adequate funding to complete this project. The proposed project schedule includes a start date of October 2019 and completion by the end of 2021.	The proposed project involves the drilling and equipping of three replacement wells and connecting two other deeps wells (five total) to NKWSD's existing network to improve return capacity of recharged water for the District's neighbors. Proposed project is to construct the necessary pipelines to connect five deep wells to the District's recovery network system that improves the capacity to return water supplies multiple districts in the region during dry years.	Implementation of this project is anticipated to return previously stored water into the FKC and NKWSD's conveyance system at a rate of approximately 27 cfs. This equates to a total estimated average of 1,660 acre-feet per month, or an annual capacity of 9,961 acre-feet per year for the seasonal use of the wells (six months in a year) to improve the return capacity for the Poso Creek IRWM CVP Contractors to meet irrigation demands during a critically dry year. Two of the five wells will discharge into the District's canals and the remaining three will connect to the District's manifold pipeline, which ultimately discharges to the FKC.
NKWSD	Beneficial Reuse of Oilfield Produced Water	This is an ongoing project. NKWSD is interested in expanding the amount of oilfield produced water being brought into the district; however, no decision has been made at this time.	Since 2015, NKWSD has made beneficial reuse of oilfield produced water by blending produced water with other surface supplies for irrigation use. The California Resources Corporation (CRC) discharges 58 acre-feet per day of produced water from CRC's Kern Front Oil Field to NKWSD. The blended water is used directly for irrigation or is discharged to spreading basins in NKWSD for groundwater recharge.	Currently, this project has an important beneficial impact on water resources in the local area. One impact of the project is the annual recycling of up to 11,000 AF of oilfield produced water to the District. This flow is blended with other water sources and used for irrigation and groundwater recharge. Produced water increases the District's water supply and partially replaces groundwater that would otherwise be pumped. During the winter season, produced water is discharged to the Rosedale Spreading Basins along with any available Kern River water to recharge groundwater supplies. This has the added benefit of decreasing the rate of groundwater decline and lowering pumping costs.
NKWSD	SCADA Automation and Evapotranspiration Measurement Improvements	This is an ongoing project. The District is in the process of switching from SCADA to Wonderware Software and plans to implement upon approval from Reclamation.	The proposed project includes the installation of Supervisory Control and Data Acquisition (SCADA) Automation software along with Evapo-transpiration (ET) measurement stations. This project is divided into two components, the purpose of the first component is to remotely monitor and control the District owned and operated groundwater wells and Canal level transmitters. The second component of this project is to install evapo-transpiration (ET) stations in strategic locations within the District. The District anticipates that the crop specific ET measurements will help the District and its growers to correlate the ET and the applied water with the crop yield.	With these modernization efforts, the District can automatically record the instantaneous groundwater pumping rate, depth to groundwater, canal level, water quality parameters, and ET data.
NKWSD	Poso Creek Weir	Currently, this project is in preliminary stages. This project is part of the projects planned to meet the sustainability goal of the District by 2040. NKWSD may implement this at any time over the planning horizon to reach its sustainability goal.	NKWSD plans to construct a weir on the Poso Creek Flood channel to divert water into their facilities. The District currently has an earthen plug that works to divert water; however, the plug is not reliable and has proven to be inefficient for the District. Implementation of this project will provide a more reliable management of flows, allow water to be measured as it is diverted, and reduce the velocity and sediment loading prior to diversion. Diverted water will be used to increase groundwater banking activities in NKWSD to help prevent further lowering of groundwater levels.	Construction of a weir will provide the ability to drop out sediment prior to flood water entering the District's distribution system or direct spreading facility. By slowing the velocity and allowing sediment to drop out, higher water quality is diverted into the district.
NKWSD	Spreading Pond Facility	No Data	No Data	No Data
RRID	Expanded Recharge	Project is in the conceptual phase; however, the pre-existing conveyance pipeline allows for swift project implementation if needed.	RRID will expand their recharge to include on-farm spreading to maximize recharge capability. To ensure adequate delivery of supplies, water delivery infrastructure improvements will be included in this project. Improvements to the CRC pipeline will be made before on-farm recharge occurs.	An estimated 6,000 AFY would be added to the already 5,000 AFY provided by CRC for the purposes of beneficial reuse.
RRID	Allocation of Available NKWSD Supplies	This project is ongoing as NKWSD already allocates produced water to their facility; however, water spread in the Rosedale facility will now exclusively benefit RRID.	Oilfield produced water will be allocated to North Kern's Rosedale spreading facility for RRID's exclusive benefit.	
SWID	Diltz Intertie Lateral Piping and WMI	Design plan specifications have been completed for the proposed later improvements coinciding with the Diltz Intertie mainline design. Project is in its pre-construction phase and will be fully implemented in 2020.	The proposed project includes installing pressurized pipe laterals to connect the Diltz Intertie mainline to serve 380 acres of irrigated land. Project will consist of a 1.5-mile long, 30 cfs, 36- inch diameter, bi-directional, intertie pipeline, which will allow for the efficient conveyance of surface water supplies to spreading ground facilities located in SWID.	Component 1 is expected to decrease groundwater pumping in the SWID by providing growers with pressurized surface water deliveries at a greater capacity and frequency. Decreased groundwater pumping in SWID will all for the recovery of groundwater elevations. This project will save 1,927 AFY of water following project completion.
SWID	Bell Recharge Project	Project is currently in planning phase and still requires final pipeline alignment selection to begin other project components such as easement acquisition, final design, and bidding.	Implementation of this project includes the construction of a 12 cfs conveyance improvement along SWID's existing distribution system that will allow CVP-Friant supply to be delivered from the FKC to the Bell Recharge site. Bell project will allow for delivery of surface water to the new Bell Recharge facilities form the CVP, for increased water storage.	Proposed Bell Project pipeline connection is anticipated to convey CVP wet period water into SWSD at a rate of 12 CFS with estimated annual benefits of 1,728 AFY.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
SWID	Kimberlina Recharge Project	Already being implemented. To be completed by 2022.	Construction of a 285-acre recharge site for CVP surface water.	Water suuply augmentation of approximately 19,000 AFY
SWID	Leonard Avenue Conveyance Improvement Project	Project is currently in planning phase and still requires final pipeline alignment selection to begin other project components such as easement acquisition, final design, and bidding.	This project involves the construction of 1.5 miles of pipeline to connect SWID with Semitropic Water Storage District (SWSD). Implementation of a new pipeline will provide SWID with the operational flexibility to absorb surface water when it is available for delivery to SWSD's distribution system, connecting the supply to in-lieu and direct recharge facilities in SWSD, generally during wet periods, so that water delivered can later be recovered for irrigation in peak demand months, or dry periods.	When implemented, this project will provide added capacity to absorb surplus water from the CVP during wet periods. It is estimated that this project will capture 2,880 AFY of surface supply, predominately from the CVP surface floodwater conveyed via the FKC, through SWID and into SWSD. Additional water absorbed into the groundwater basin will be split 50/50 between SWID and SWSD. The total average annual water saving to SWID is 1,440 AFY. Captured water will directly offset SWID's reliance on San Joaquin River supplies to the Bay-Delta and help conserve local groundwater supplies.
SWID	Improved Water Level Measurement of District Recharge Facility	This project is in the planning phase. Implementation of this project may begin as soon as 2020.	Proposed project includes the construction of a 400 to 500-feet deep, 8-inch diameter PVC monitoring well and the conversion of an existing older well to an 800-feet deep, 6-inch diameter monitoring well both equipped with both water-level sensors and located within the District's recharge facility. Both monitoring wells will help manage and collection information on groundwater levels which can be used to document site performance as well as monitor the effects on the groundwater aquifer levels.	Implementation of this project will contribute to improving the district's drought resiliency and preserving groundwater levels by monitoring groundwater levels in the facility and improving efficiency of recharge operations.
NKWSD	Refinement of Water Budget Components	Ongoing	Improvement of monitoring and measurements to refine the accuracy of measurement or calculation of inflow and outflow components of district level water budget. Will also refine Subbasin Model and water budget.	This management action is conceptual; a volume of water associated with this management action has not been calculated.
NKWSD/SWID	"Surface Water First" Incentive Program	This Management Action is in the preliminary stages of consideration by the districts. It has not been formally adopted but is under consideration.	Both NKWSD and SWID have access to imported surface water to supply their respective jurisdictional areas. However, there instances in which growers have historically opted to pump groundwater, rather than receiving deliveries of surface water from the district which services their properties. When this occurs, the district must either use that water for groundwater recharge or enter into exchanges with other districts (either in the KCS or in another basin). While this may be an economic decision for the grower, it has the potential to cause local impacts to groundwater in the district over the long-term. To prevent local impacts to groundwater due to the use of groundwater over available surface water, the districts may explore a fee structure in which growers with access to surface water may be assessed for the use of groundwater when surface water is available for use. The fees collected for such activities would be applied to the expansion of existing recharge projects or the development of new recharge projects to accommodate the additional surface water that would be brought into the district to replace the additional groundwater pumped.	A reduction of groundwater extraction would result from the implementation of this incentive program. The fees collected in this incentive program have not been quantified but would also provide a source of funding for the expansion of existing recharge or the development of new recharge projects within the districts.
NKWSD/SWID	On-Farm Efficiency/Deficit Irrigation Practices Incentive Program	The provisions of the conservation laws are being complied with by both NKWSD and SWID. Ag water management plans, as required by SB 7, are being regularly updated by these districts for submittal to DWR. Plans will be updated to include the applicable requirements of AB 1668 and SB 606.	As agricultural water service providers, both NKWSD and SWID comply with all provisions of SB 7 (amending Division 6, Part 2.55 of the Water Code) passed into law in November 2009 regarding agricultural water conservation and management. Efficient management practices in the law, related to SGMA objectives, include volumetric water pricing, incentives for conjunctive use and increased groundwater recharge, and development of an overall water budget. AB 1668 and SB 606 passed in 2018 did not materially add to these objectives, save for those districts serving between 10,000 and 25,000 acres who must now prepare water management plans under the newer laws.	There are no direct benefits to be derived and quantified from compliance with the aforementioned agricultural conservation laws at the present time. The districts will continue to divert for beneficial use all local and imported water supplies to which it is entitled. Should agricultural demands for irrigation water diminish as a result of some of the conservation provisions, a larger portion of diverted supplies will be devoted to groundwater recharge in the future.
NKWSD/SWID	On-Farm Recharge Activities Incentive Program	This Management Action is in the preliminary stages of consideration by the districts. It has not been formally adopted but is under consideration.	In wet years, when the districts have utilized the full capacity of their respective recharge basins and spreading grounds, it may be necessary for the districts to seek other locations for the application of available surface water for groundwater recharge. The districts will develop an incentive program to encourage landowners to take delivery of available water that is in excess of customer demand and the districts' capacity for recharge projects for application to fallow land and/or over-irrigation of crops to facilitate further groundwater recharge. Landowners will receive a groundwater credit in exchange for participation in this program, for their use within the district which has provided the water for on-farm recharge activities.	A increase of groundwater recharge would result from theimplementation of this incentive program.
NKWSD/SWID	Subsurface Recharge Feasibility Study	This Management Action is in the preliminary stages of consideration by the districts. It has not been formally adopted but is under consideration.	Both NKWSD and SWID have been approached by landowners within their respective districts about the efficacy and use of subsurface recharge methods. While subsurface recharge is being tested in neighboring districts, neither NKWSD nor SWID have taken an official position on the use of such methods. Before the implementation of any program which would supply water to landowners for use in subsurface recharge practices, the districts will conduct a feasibility study to evaluate whether or not these practices are appropriate for the hydrogeologic conditions and/or land uses within their respective jurisdictions. The scope of the feasibility study is yet to be determined, but it will include an evaluation of subsurface recharge methods, the soil types located within each district, the effectiveness of subsurface recharge compared to other recharge methods, and its compatibility with existing land uses.	No benefits have been quantified for this Management Action at this time. Potential benefits gained through the use of subsurface recharge will be determined as a result of this Management Action.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
NKWSD/SWID	Land Conversion from Agricultural Use to Urban Use	The conversion of land use from agricultural to urban is an ongoing process, the pace of which is determined by external factors such as the demand for land based on each city's growth and need for additional housing and/or property to support business, industrial, or municipal use. The projected growth for each city is based upon the current General Plans and may be subject to change when the cities update their respective plans.	As described in the General Plans for the cities of Shafter and Wasco, anticipated population growth is expected to lead to changes in land use within the limits of each city and in the Sphere of Influence for each city. The conversion of land use from agricultural to urban use generally leads to an overall reduction in groundwater use due to the decreased demand, in terms of volume per unit area.	For NKWSD's jurisdiction, there is an anticipated reduction of water by 2030, based on the conversion of land use as the city of Shafter expands. In SWID's jurisdiction, the anticipated reduction of water by 2030 reflects the anticipated growth of both Shafter and Wasco.
NKWSD/SWID	Urban Water Conservation Program	The cities of Shafter and Wasco are currently evaluating their respective compliance measures for indoor use and are awaiting additional information and guidelines concerning regional outdoor and landscape compliance measures. The cities presently are complying with the 2020 mandates contained in SB 7X-7 and as embodied in their respective UWMPs. As the SWRCB establishes its compliance deadlines for both indoor and outdoor usage, anticipated to occur by 2025, the municipal KGA Members will have a clearer picture of an implementation schedule.	As referenced in the Umbrella Basin Setting (Chapter 2), urban water usage in the future is expected to comply with the conservation mandates contained in SB 606 and AB 1668, both bills signed into law in May 2018. Based on that legislation, indoor residential use is to be capped at 55 gpcd in 2019 and ramp down to 50 gpcd by 2030, and outdoor residential use is to be capped in the future based on local climate and size of landscaped areas. Standards for outdoor usage are to be defined in a SWRCB rule-making process to be completed by June 2022.	Given the early implementation stages of AB 1668 and SB 606, its benefits in terms of reduced groundwater pumping by Shafter and Wasco can only be roughly approximated. The Pacific Institute, in its 2014 report "Urban Water Conservation and Efficiency Potential in Calif." estimated that indoor usage could be reduced by 33-40 gpcd, and that outdoor/landscape usage could be reduced by 20-50 gpcd. These values are on a statewide basis and likely unrealistic in some regions; however, the report postulates that total urban water usage could be reduced by as much as 30-60%. Savings of this magnitude would represent a significant reduction in groundwater pumping by both cities. The Measurable Objectives to be partially met with additional urban conservation include groundwater level stabilization and, by proxy, groundwater storage stabilization.
SWID	Mitigation Program for Potential Impacts to Domestic Wells	Upon implementation of the law.	In coordination with other KGA members, develop a mitigation program to offer financial assistance for the replacement of domestic wells which are impacted by groundwater management to the proposed SMCs. Coordinate development of eligibility criteria for participation in mitigation program.	Since this management action is conceptual, a volume of water associated with this management action has not been calculated.
NKWSD/SWID	In-District Allocation Structure	This Management Action is in the conceptual stages, having been discussed with various stakeholder groups. However, an actual structures and fee schedules have yet to be devised for either district.	At the time of this draft of the GSP, neither NKWSD nor SWID have an established allocation structure and fee schedule for groundwater extraction. As SGMA is implemented throughout the KCS, the districts are required to manage to the Sustainable Management Criteria (SMCs). One of the ways to manage for the SMCs is to allocate the Sustainable Yield for their respective districts to the landowners within their districts. While the specifics of such an allocation structure may vary between the districts, a baseline groundwater extraction volume would be allocated to each parcel based on its size and the Sustainable Yield for the district. If a landowner were to extract more water than the baseline volume for that parcel or for the aggregate of all of their parcels within the district, they would be required to pay an extraction fee which would be applied toward projects and programs implemented by the district to reach and/or maintain sustainability.	The benefits to sustainable groundwater management have not been quantified at this time. However, the development and implementation of an allocation structure for each district would allow for the districts to utilize their Sustainable Yield as a management tool for reaching and maintaining their SMCs.
NKWSD/SWID	Voluntary Land Fallowing	At this time, this Management Action is conceptual. The districts will develop their respective fallowing programs during the SGMA implementation period.	In the event of a drought, the districts may not be able to entirely meet in-district demand by increasing the volume of imported water. The combination of decreased availability in surface water to supply to the district and decreased recharge from other sources in the subbasin has the potential to lead to violations of SMCs at the Representative Monitoring Sites, in the absence of decreased demand. To facilitate the districts' ability to maintain sustainability at their respective monitoring sites, the districts will develop and implement their own voluntary land fallowing programs for their jurisdictions.	The decrease in water demand will be dependent upon the land being fallowed and its existing land use at the time of fallowing. Agricultural demand for water is generally estimated to be 3 AF/acre. Fallowing or land retirement would reduce the demand to zero for the lands participating in the program.
NKWSD/SWID	Pumping Restrictions	At this time, this Management Action is conceptual. The districts will develop their respective processes to implement pumping restrictions within their jurisdictions.	In the event that the districts or the entire subbasin are nearing a condition where they are at risk of triggering an Undesirable Result, even with the implementation of the projects and management actions described in this Plan, it may be necessary for the districts to limit groundwater pumping. The volume of groundwater extraction permitted under this Management Action would be determined by the districts based on the Sustainable Yield for the district and the SMCs at the Representative Monitoring Sites.	Pumping restrictions based on the Sustainable Yield of the district, could decrease groundwater demand if applied to NKWSD. If applied to SWID, pumping restrictions could decrease groundwater demand.
Pioneer Groundwater Sustainability Agency				
Pioneer	Project 1: Participation in California WaterFix	Participation in California WaterFix is within the authority of KCWA as an SWP contractor and its decision to fully, partially or not participate would require coordination with its Member Units.	California WaterFix may be implemented by DWR in partnership with the Delta Conveyance Design and Construction Joint Powers Authority (JPA) to increase the amount of water that can safely be diverted from the Delta by constructing a diversion in the upper Delta and conveying it through a tunnel(s) to the existing SWP and CVP pump stations. Under current operations, the SWP and CVP are unable to consistently deliver full contract amounts of water because of environmental and water quality concerns. Diverting a portion of Delta supplies at a point further upstream and further from the ocean would reduce water quality issues because the source water is high quality, and is less likely to cause seawater intrusion in the lower Delta. It will also help reduce diversion-specific impacts on the environment by reducing direct impacts of pumping on aquatic species, such as reversal of Delta flow and entrapment in screens on the diversion pumps (CNRA, 2018).	The new monitoring well cluster will address an identified data gap in the Pioneer GSA Area. The monitoring well cluster will also help Pioneer GSA evaluate maintenance of its sustainability goals and monitor groundwater conditions in that portion of the Pioneer GSA Area.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
Pioneer	Project 2: Install Monitoring Well in North Pioneer	Implementation of this project entails planning, permitting, design and currently, construction of the monitoring well cluster. KCWA and/or its consultants will secure necessary permits and plan, design and construct the wells. KCWA will monitor the wells as part of normal Pioneer Project operations.	A data gap for groundwater monitoring north of the Kern River was identified during development of this Chapter GSP, and a monitoring well cluster is being constructed in the northwest triangle-shaped parcel of the Pioneer Project (i.e., the area of the GSA north of Kern River). The triangle shaped parcel is in the northwest portion of the North Pioneer Area, and does not include a recharge pond. This area is in the southeast quarter of section 6, T 30S/R26E. The monitoring well cluster will allow groundwater monitoring at multiple depths using three separate boreholes.	The new monitoring well cluster will address an identified data gap in the Pioneer GSA Area. The monitoring well cluster will also help Pioneer GSA evaluate maintenance of its sustainability goals and monitor groundwater conditions in that portion of the Pioneer GSA Area.
Pioneer	Management Action 1: Continued Balanced Pumping and Recharge	This management action would be accomplished through continuation of existing groundwater recharge and recovery operations. Surplus water would be banked either for overdraft recovery or future use. Banked groundwater would be used to supplement water supplies in dry years or during years of shortages	Continued balanced pumping and recharge is the standard operating procedure for the Pioneer GSA. Under this management action, long-term pumping would be balanced by long-term recharge activities in the Pioneer GSA Area. Pioneer GSA would continue to closely monitor water that is pumped from the Subbasin and water that recharges the Subbasin with the goal of a balanced groundwater budget over the long term.	The Pioneer Project is operated in a manner that results in more water being recharged than recovered from the Subbasin in the Pioneer GSA Area. Therefore, continuing operation of the Pioneer Project in the same manner would provide a net positive increase of groundwater volume in the Pioneer GSA Area. Full benefits of this management action would be evaluated through accounting of water recharge volumes compared to groundwater pumping.
Pioneer	Management Action 2: Continued Participation in Basin-Wide Coordination with other GSAs	This management action would be accomplished through continued attendance at KGA coordination meetings and by arranging periodic coordination meetings with the Kern River GSA, the Henry Miller GSA, the WKWD GSA and the Buena Vista GSA. Meetings would be attended by one or more representatives of Pioneer GSA and may include the GSA manager or their designated staff. Decisions made in coordination meetings would not be binding until approved by the appropriate authority, such as the Pioneer GSA manager or by KCWA's Board of Directors.	Pioneer GSA is one of 11 GSAs in the Subbasin. Sustainable management of the Subbasin as a whole requires coordination among GSAs and their respective GSPs. During development of the GSPs in the Subbasin, GSAs have been discussing sustainability thresholds, potential projects and management actions and specific issues and concerns. The KGA is a JPA composed of member agencies that was established in 2014 to develop and implement a groundwater management plan in the Subbasin and the neighboring Tulare Lake Groundwater Basin (KGA, 2017). This management action would involve attending monthly KGA manager and coordination meetings, as well as KGA stakeholder meetings, which are held as needed. Quarterly coordination meetings would be held with the Kern River GSA, and annual coordination meetings would be held with the Henry Miller GSA, the WKWD GSA and the Buena Vista GSA.	This management action would continue existing coordination activities between GSA managers, and help to build and maintain relationships with neighboring GSAs. Through coordination activities and ongoing communication, potential conflicts among GSAs regarding groundwater management would be mitigated because GSAs would better understand the challenges facing each other and how these challenges are being addressed. It will also provide an opportunity for GSAs to inform each other of potential issues that may require intra-Subbasin coordination, and to inform neighboring GSAs of management actions and projects under way that may affect decisions of other GSAs.
Pioneer	Adaptive Management Strategy: Increase Surface Spreading Losses from 6 to 10 Percent	Coordination would be initiated by KCWA with the Pioneer Project Participants.	Under the *Pioneer Project Participation Agreement* , all surface water diverted to the Pioneer Project for spreading is assessed a 6 percent loss factor. All losses assessed are non-recoverable. This provision was set up to "prevent, eliminate or mitigate significant adverse impacts" resulting from project recovery operations. The intent of losses assessed is to assist in mitigating impacts to adjoining entities. This adaptive management strategy would explore feasibility of increasing the fixed loss rate from 6 percent to a fixed loss rate of 10 percent.	This adaptive management strategy would provide KCWA and the Pioneer Project Participants an understanding of the feasibility of increasing lossess assessed to diverted surface water. If increasing losses is deemed feasible, it would provide the Pioneer Project and the opportunity to mitigate and avoid undersirable results and support the for sustainability indicators relevant to the Pioneer GSA as follows: chronic lowering of groundwater levels (direct), reduction of groundwater storage (proxy), degraded water quality (proxy), and subsidence (proxy).
Rosedale Rio Bravo Management Area				
RRBMA	West Basin Improvements	RRBWSD purchased the properties in 2009 2015. Project construction was completed in 2016	The improvement of existing recharge ponds and development of an additional 50 acre project west of Bakersfield designed to recharge, store and recover water to provide a cost effective and reliable water supply for landowners within the RRBWSD.	This project has the potential to recharge up to 5,000 AF of water in wet years. This could provide the RRBWSD with up to 1,000 AFY.
RRBMA	Stockdale East Groundwater Storage and Recovery Project	RRBWSD purchased the property in 2010. Project is 90% complete, it will be operational by 2020.	Project is a developed 200 acre project west of Bakersfield designed to recharge, store and recover water to provide a cost effective and reliable water supply for landowners within the RRBWSD.	This project has the potential to recharge up to 25,000 AF of water in wet years. This could provide the RRBWSD with up to 4,000 AF per year on average.
RRBMA	Pilot Projects	These continued GRAT projects could be on-line as early as 2025.	In 2017 the RRBWSD developed four pilot recharge projects under which it leased properties for temporary recharge activities. Since that time the District has invested in a Groundwater Recharge Assessment Tool (GRAT) in order to identify similar projet sites in the future.	Approximately 10,000 AF was recharged during that year of implementation in these four projects. The GRAT implementation could provide RRBWSD up to 2,000 AF per year.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
RRBMA	Onyx Ranch	The project is currently undergoing a feasibility and environmental analysis. The project could be on line as early as 2025.	The RRBWSD owns several parcels of land and the associated water rights for the Onyx Ranch and the Smith Ranch. These parcels are located along the South Fork of the Kern River in the Kern River Valley, in and around the communities of Weldon and Onyx, in an unincorporated area of northeastern Kern County. These parcels together comprise the 4,109.18 acre project site. The RRBWSD is currently conducting an analysis of a proposed change in the point of diversion and place of use of the water rights associated with these parcels so that the water can be delivered in the RRBWSD service area on the San Joaquin Valley floor and used for irrigation and groundwater recharge. The project would reduce the diversion of water on the project site and convert the irrigated fields to lower water use crops, or allow the fields to return to their native vegetative state. With the proposed project, RRBWSD would allow the water that would have been diverted on the project site to remain in the South Fork of the Kern River and flow downstream. This could result in a net increase in flows within the South Fork of the Kern River, and the Isabella Reservoir where the water would be released through the Isabella Dam and flow downstream in the lower Kern River until the water is diverted at the RRBWSD diversion point. From there, the RRBWSD would deliver the water to recharge basins and channels within and near its service area west of the City of Bakersfield (City) in unincorporated Kern County within the San Joaquin Valley.	The net increase in water supplies to the RRBWSD's service area as a result of the proposed project would help mitigate the shortages in RRBWSD's contracted State Water Project (SWP) water supply from the State of California, which has steadily reduced due to environmental constraints in the Sacramento/San Joaquin Delta. The proposed project would provide the RRBWSD with approximately 6,500 AF per year.
RRBMA	James Groundwater Storage and Recovery Project	Rosedale and Buena Vista Water Storage District jointly purchase the property in 2011. Current project status is feasibility and environmental analysis. This project could be online as early as 2025.	The James Groundwater Storage and Recovery Project is a proposed 2,070 acre project in southwest Bakersfield designed to recharge, store and recover water to provide a cost effective and reliable water supply for landowners within the RRBWSD (and elsewhere).	This project has the potential to recharge up to 150,000 AF of water in wet years. This could provide the RRBWSD with up to 3,000 AF per year.
RRBMA	Kern Fan Groundwater Storage Project.	Project status is feasibility analysis. This project could be on line as early as 2030.	The District has evaluated a conceptual Kern Fan Groundwater Storage Project (Kern Fan Project). This project would serve to develop a regional water bank in the Kern Fan to capture and store Article 21 water via the State Water Project (SWP) during conditions when surface water is abundant. A twophased approach would be taken to the development of the Kern Fan Project. The first phase would be to develop a project site, including the purchase of approximately 640 acres of land in the Kern Fan area. The first phase would also include constructing conveyance facilities, recharge facilities, and recovery facilities as necessary to develop a fully functioning water banking project. The second phase of the Kern Fan project would involve acquiring an additional 640 acres of land for expansion of the water banking facilities and developing the associated recharge and recovery facilities.	This could provide the RRBWSD with up to 10,000 AFY.
RRBMA	Western Rosedale In Lieu Service Area	Project status is shovel ready; feasibility and environmental analysis is complete. This project could be on line as early as 2035.	The Western Rosedale Lands In Lieu Service Area Project (the Project) includes construction and operation of up to ten miles of water conveyance pipelines, including appurtenant facilities (such as pumps and valves), and a joint service area agreement between RRBWSD and BVWSD in order to provide surface water to agricultural water users within the portion of RRBWSDs service area located westerly of Interstate 5 in close proximity to Buena Vista Water Storage Districts East Side Canal.	This could provide the RRBWSD with up to 1,000 AFY.
RRBMA	Ten Section Water Recharge Project	No implementation date is known at this time.	The owners of Ten Section located within the South of the River Monitoring Zone are currently studying the feasibility of a 200+ acre groundwater recharge, storage and recovery project.	It is estimated that approximately 2,200 AF/month could be recharged into the aquifer.
RRBMA	Water Charge Demand Reduction	This management action could be on line as early as 2025.	The Water Charge would be expected to result in demand reduction in the RRBWSD. For market reasons it is probable that landowners will opt to fallow ground in order to trade water supplies to other District landowners, as well as fallow lands (or limit double cropping) to avoid the Water Charge all together.	With an agricultural water consumptive use demand of about 84,000 AF per year we conservatively expect a 5% demand reduction as a result of the water charge which results in about 4,000 AFY of reduced demand
RRBMA	RRBWL (White Land) Water Supplies and Demand Imbalance Reduction	This management action could be on line as early as 2020.	White Lands (non RRBWSD lands) within the RRBMA that are not used for groundwater banking will correct the water supply imbalance on a linear basis over the planning period of 2020 2040. Like RRBWSD lands, the white lands will start with the native yield of 0.15 AF/acre. The total annual demand for white lands in the RRBMA is about 10,307 AFY with a water supply imbalance (or deficit) of 3,618 AFY. The average agricultural demand is 2.6 AF/acre according to METRIC studies. While agricultural demands in the White Lands range from 1.4 4.9 AF/acre the initial allowable demand will be the average demand of 2.6 AF/acre. It is expected that white lands would seek to acquire water supplies for in lieu and direct groundwater recharge via banking agreements with RRBWSD or others to offset demands.	Demand reduction will occur as follows over the 2020 2040 period; the imbalance will be reduced by 1/20 of the current imbalance each year (5%). This approach will result in about 217 AF of imbalance reduction each year and 2,170 AFY by 2030 and a total of 4,335 AFY by the 2040 sustainability planning period.
RRBMA	RRBWD 3rd Party Recharge and Storage Program	This management action could be on line as early as 2020.	The RRBWSD will assist 3rd parties (white lands, districts, and private parties) in recharging water supplies for use in the RRBMA or other down gradient areas in the Kern Sub basin. RRBWSD would offer existing conveyance and recharge facilities in exchange for a portion of the imported water supply and payments of yet to be developed costs and/or fees.	It is expected that the RRBWSD would provide this service in exchange for 20 33% of the imported water supply and that an average amount of 5000 AFY would be imported. This management action could bring an additional supply of 1,250 AFY to RRBDL lands.
Southern San Joaquin Municipal Utility District				

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
SSJMUD	In-District Spreading and Recovery Facility	SSJMUD is in the process of purchasing land and applying for construction funding. Once these steps are complete, the District will implement this project immediately.	This project will include construction of 80-acres of spreading ponds and the installation of two recovery wells within district boundaries. The proposed recharge ponds have an anticipated annual capacity of 3,240 AFY. Prior to this project, the district has not had any in-district direct recharge facilities. Implementation of this project will allow SSJMUD the opportunity to capitalize on wet period storage of CVP supplies and allow them to bypass less favorable out-of-district banking agreements to store water that would increase the District's and the subbasin's water reliability and drought resiliency.	The proposed recharge ponds have an anticipated annual capacity of 3,240 AFY. Estimated amount of water to deliver to recharge is at least 4,200 AFY. If the available surplus is delivered to an out-of-district facility, it is expected that North Kern will keep one-third of the water as part of banking agreements and SSJMUD will realize an average water benefit of 2,800 AFY. Captured water will directly offset the District's reliance on the San Joaquin River supplies to the Bay-Delta and help conserve local groundwater.
SSJMUD	SSJMUD and Semitropic Schuster Intertie	This project is in the conceptual stage of development and is included in the 2019 Poso Creek IRWM Plan Update.	The proposed project is to construct an intertie in coordination with SWSD. This pipeline will allow for SSJMUD to bank or return water to Semitropic previously delivered to Semitropic's groundwater banking program. SSJMUD could deliver wet period water from the FKC for groundwater banking to Semitropic or return water for irrigation purposes during dry years. This Project removes the need to involve a third-party in an agreement with Semitropic for banking since it establishes a direct connection to return water to SSJMUD from Semitropic, thereby increasing operational flexibility and reliability to deliver previously stored water from groundwater storage at times of drought.	Considering the frequency of surplus 'Other Water' in the Central Valley Project and the existing design limit of 50 cfs, the Project will allow for an expected average annual amount of 3,622 AF to be put into storage with 1,811 AF credited to SSJMUD for return. Given that recently the District became a member of the Poso Creek Integrated Regional Water Management Group (IRWM) in spring 2016, interties such as this pipeline were identified as the first step in the District's efforts towards banking water with their neighboring districts to add drought resiliency.
SSJMUD	SSJMUD and CWD Intertie Pipeline	This project is in the conceptual stage of development and is included in the 2019 Poso Creek IRWM Plan Update.	SSJMUD and CWD propose to construct a bidirectional intertie connecting their respective water conveyance systems. This pipeline is a regional opportunity to improve flexibility, reliability, and conjunctive use of water supplies.	The estimated annual yield of this project is approximately 50 to 500 AF, depending on the selected project size. Project size will be determined by greatest benefit yielded that is economically feasible and sustainable.
SSJMUD	SSJMUD and North Kern WSD 9-28 Intertie Pipeline	This project is in the planning stage of development, in conjunction with NKWSD, and is defined in the Poso Creek IRWM Plan.	Project proposal includes the construction of the 9-28 Intertie pipeline with NKWSD. This pipeline will allow for the return of CVP Class I, Class II, and surplus floodwater that was previously delivered to the District's groundwater banking partner (NKWSD) from the FKC for groundwater banking or irrigation purposes during wet years. The pipeline is the conveyance mechanism for return of previously stored water to the District during dry years. This project removes the need to involve a third-party in an agreement with North Kern for banking since it established a direct connection to return water to SSJMUD from NKWSD, thereby increasing operational flexibility and reliability to deliver previously stored water from groundwater storage during times of drought.	This project would allow for SSJMUD to better capture and utilize wet period supplies by increasing the District's capacity to return banked wet period water during dry periods. Considering the frequency of surplus Other Water in the Central Valley Project, the Project will allow for an expected annual amount of 10,000 AF to be put into storage with 6,667 AF credited to SSJMUD for return. The pipeline capacity to return water from North Kern to SSJMUD is 4,284 AFY, which will require roughly 1.5 years to return the water for each 10,000 AF of water banked and 6,667 AF credited.
SSJMUD	Southeast Delano Spreading Grounds	This project is in the planning stage of development. SSJMUD has already begun the process of developing a CEQA document to assess the potential impacts of the construction and operation of spreading grounds in the areas identified by the district.	SSJMUD proposes the purchasing of land holdings, with possible partnering agencies (to be identified later), in and around the eastern most portion of the District. The District is currently exploring the potential for capturing excess surface water deliveries in the FKC. Excess surface supply, or those flows beyond the quantity of water that satisfies immediate water demand, typically occur in wet years where precipitation in applicable watersheds is large enough to induce surface water available above Class I contract supplies. Potential captured flows consist of water which is currently discharged during wet year and flood conditions.	Implementation of this project has the potential for contributing water supplies to SSJMUD, the City of Delano (which qualifies as a DAC), and Poso Creek IRWM water users. Specifically, SSJMUD will use a portion of these captured flows to offset their groundwater use in dry years by moving the surplus water to this banking facility using either the Friant Kern Canal or other existing infrastructure. Wet year water supplies captured in the spreading grounds and storage locations will be utilized by SSJMUD, City of Delano, and potentially other Poso Creek stakeholders, during years where other water supplies are limited.
SSJMUD	City of Delano Spreading Grounds	This project is in the planning stage of development. SSJMUD has already begun the process of developing a CEQA document to assess the potential impacts of the construction and operation of spreading grounds in the areas identified by the district.	SSJMUD proposes identifying and evaluating potential land suitable for developing recharge basins, with possible purchase with private and/or public partnering agencies within the City of Delano. The purpose of this project is to capture surface water deliveries that are delivered through the FKC. Excess available surface supply, or those flows beyond the quantity of water that satisfies immediate water demand within a service area, typically occurs in wet years when precipitation in contributing watersheds is large enough to induce surface water available above Friant Class 1 contract supplies. Potential flows to capture consists of water which is currently discharged during wet years, during flood conditions and for water that needs to be delivered due to changes in timing to meet environmental water management goals for the San Joaquin River Restoration.	Implementation of this project has the potential for contributing water supplies to SSJMUD, the City of Delano (which is classified as DAC), and Poso Creek IRWM water users. Specifically, SSJMUD will use a portion of these captured flows to offset their groundwater use in dry years by moving the surplus surface water to this banking facility from the FKC or other existing infrastructure. Wet year water supplies captured in the spreading grounds and storage locations will be utilized by SSJMUD, City of Delano, and potentially other Poso Creek stakeholders, during years where other water supplies are limited.
SSJMUD	Pond Road Spreading Grounds	This project is in the planning stage of development. SSJMUD has already begun the process of developing a CEQA document to assess the potential impacts of the construction and operation of spreading grounds in the areas identified by the district.	SSJMUD proposes identifying and evaluating potential land holdings to be purchased, with possible private and/or public partnering agencies. The District is currently exploring the potential for capturing excess surface water deliveries in the Friant-Kern Canal. Excess surface supply, or those flows beyond the quantity of water that satisfies immediate water demand, typically occur in wet years where precipitation in applicable watersheds is large enough to induce surface water available above Class 1 contract supplies. Potential captured flows consist of water which is currently discharged during wet year and flood conditions.	Implementation of this project has the potential for contributing water supplies to SSJMUD, the City of Delano, and Poso Creek IRWM water users. Specifically, SSJMUD will use a portion of these captured flows to offset their groundwater use in dry years by moving the surplus water to this banking facility using either the California Aqueduct or other existing infrastructure. Wet year water supplies captured in the spreading grounds and storage locations will be utilized by SSJMUD, City of Delano, and potentially other Poso Creek stakeholders, during years where other water supplies are limited.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
SSJMUD	In District Spreading Grounds	This project is in the planning stage of development. SSJMUD has already begun the process of developing a CEQA document to assess the potential impacts of the construction and operation of spreading grounds in the areas identified by the district.	SSJMUD proposes identifying and evaluating potential land holdings to be purchased, with possible private and/or public partnering agencies. The District is currently exploring the potential for capturing excess surface water deliveries in the FKC. Excess surface supply, or those flows beyond the quantity of water that satisfies immediate water demand, typically occur in wet years where precipitation in applicable watersheds is large enough to induce surface water available above Class 1 contract supplies. Potential captured flows consist of water which is currently discharged during wet year and flood conditions.	Implementation of this project has the potential for contributing water supplies to SSJMUD, the City of Delano, and Poso Creek IRWM water users. Specifically, SSJMUD will use a portion of these captured flows to offset their groundwater use in dry years by moving the surplus water to this banking facility using either the California Aqueduct or other existing infrastructure. Wet year water supplies captured in the spreading grounds and storage locations will be utilized by SSJMUD, City of Delano, and potentially other Poso Creek stakeholders, during years where other water supplies are limited.
SSJMUD	Conversion of Dairy to Recharge Facility	This project is in the conceptual stage of development, with potential sites being evaluated based on data available through the RWQCB's GAMA Geotracker program, the district's recharge feasibility study, and other state and local agencies.	SSJMUD proposes identifying and evaluating potential purchase of a dairy, with possible private and/or public partnering agencies. The District is currently exploring the potential for capturing excess surface water deliveries in the FKC. Excess surface supply, or those flows beyond the quantity of water that satisfies immediate water demand, typically occur in wet years where precipitation in applicable watersheds is large enough to induce surface water available above Class 1 contract supplies. Potential captured flows consist of water which is currently discharged during wet year and flood conditions.	Implementation of this project has the potential for contributing water supplies to SSJMUD, the City of Delano, and Poso Creek IRWM water users. Specifically, SSJMUD will use a portion of these captured flows to offset their groundwater use in dry years by moving the surplus water to this banking facility using either the California Aqueduct or other existing infrastructure. Wet year water supplies captured in the spreading grounds and storage locations will be utilized by SSJMUD, City of Delano, and potentially other Poso Creek stakeholders, during years where other water supplies are limited.
SSJMUD	"Surface Water First" Incentive Program	This Management Action is in the preliminary stages of consideration by the districts. It has not been formally adopted but is under consideration.	SSJMUD has access to imported surface water to supply its jurisdictional area. However, there instances in which growers have historically opted to pump groundwater, rather than receiving deliveries of surface water from the district which services their properties. When this occurs, the district must either use that water for groundwater recharge or enter into exchanges with other districts (either in the KCS or in another basin).	An estimated reduction of 1,800 AFY of groundwater extraction would result from the implementation of this incentive program. The fees collected in this incentive program have not been quantified but would also provide a source of funding for the expansion of existing recharge or the development of new recharge projects within the districts.
SSJMUD	On-Farm Efficiency/Deficit Irrigation Practices Incentive Program	The provisions of the conservation laws are being complied with by both NKWSD and SWID. Ag water management plans, as required by SB 7, are being regularly updated by these districts for submittal to DWR. Plans will be updated to include the applicable requirements of AB 1668 and SB 606.	As an agricultural water service provider, SSJMUD complies with all provisions of SB 7 (amending Division 6, Part 2.55 of the Water Code) passed into law in November 2009 regarding agricultural water conservation and management. Efficient management practices in the law, related to SGMA objectives, include volumetric water pricing, incentives for conjunctive use and increased groundwater recharge, and development of an overall water budget. AB 1668 and SB 606 passed in 2018 did not materially add to these objectives, save for those districts serving between 10,000 and 25,000 acres who must now prepare water management plans under the newer laws.	There are no direct benefits to be derived and quantified from compliance with the aforementioned agricultural conservation laws at the present time. The districts will continue to divert for beneficial use all local and imported water supplies to which it is entitled. Should agricultural demands for irrigation water diminish as a result of some of the conservation provisions, a larger portion of diverted supplies will be devoted to groundwater recharge in the future.
SSJMUD	On-Farm Recharge Activities Incentive Program	This Management Action is in the preliminary stages of consideration by the districts. It has not been formally adopted but is under consideration.	In wet years, when the district has utilized the full capacity of their respective recharge basins and spreading grounds, it may be necessary for the districts to seek other locations for the application of available surface water for groundwater recharge. The district will develop an incentive program to encourage landowners to take delivery of available water that is in excess of customer demand and the district's capacity for recharge projects for application to fallow land and/or over-irrigation of crops to facilitate further groundwater recharge. Landowners will receive a groundwater credit in exchange for participation in this program, for their use within the district which has provided the water for on-farm recharge activities.	An estimated increase of 1,200 AFY of groundwater recharge would result from the implementation of this incentive program.
SSJMUD	Conversion of Agricultural Land to Urban Use	The conversion of land use from agricultural to urban is an ongoing process, the pace of which is determined by external factors such as the demand for land based on each city's growth and need for additional housing and/or property to support business, industrial, or municipal use. The projected growth for each city is based upon the current General Plans and may be subject to change when the cities update their respective plans.	As described in the General Plans for the cities of Delano and McFarland, anticipated population growth is expected to lead to changes in land use within the limits of each city and in the Sphere of Influence for each city. The conversion of land use from agricultural to urban use generally leads to an overall reduction in groundwater use due to the decreased demand, in terms of volume per unit area. The City of Delano and the surrounding areas have a projected increase of 2,100 acres in urban use; the City of McFarland and its surrounding areas have a projected increase of 1,100 acres.	For SSJMUD's jurisdiction, there is an anticipated reduction of 900 AF of water by 2030, based on the conversion of land use as the cities of Delano and McFarland expand. By 2040, the projected reduction is 1750 AF.
SSJMUD	Urban Water Conservation Program	The cities of Delano and McFarland are currently evaluating their respective compliance measures for indoor use and are awaiting additional information and guidelines concerning regional outdoor and landscape compliance measures. The cities presently are complying with the 2020 mandates contained in SB 7X-7 and as embodied in their respective UWMPs. As the SWRCB establishes its compliance deadlines for both indoor and outdoor usage, anticipated to occur by 2025, the municipal KGA Members will have a clearer picture of an implementation schedule.	As referenced in the Umbrella Basin Setting (Chapter 2), urban water usage in the future is expected to comply with the conservation mandates contained in SB 606 and AB 1668, both bills signed into law in May 2018. Based on that legislation, indoor residential use is to be capped at 55 gpcd in 2019 and ramp down to 50 gpcd by 2030, and outdoor residential use is to be capped in the future based on local climate and size of landscaped areas. Standards for outdoor usage are to be defined in a SWRCB rule-making process to be completed by June 2022.	Given the early implementation stages of AB 1668 and SB 606, its benefits in terms of reduced groundwater pumping by Delano and McFarland can only be roughly approximated. The Pacific Institute, in its 2014 report "Urban Water Conservation and Efficiency Potential in Calif." estimated that indoor usage could be reduced by 33-40 gpcd, and that outdoor/landscape usage could be reduced by 20-50 gpcd. These values are on a statewide basis and likely unrealistic in some regions; however, the report postulates that total urban water usage could be reduced by as much as 30-60%. Savings of this magnitude would represent a significant reduction in groundwater pumping by both cities. The Measurable Objectives to be partially met with additional urban conservation include groundwater level stabilization and, by proxy, groundwater storage stabilization.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
SSJMUD	In-District Allocation Structure	This Management Action is in the conceptual stages, having been discussed with various stakeholder groups. However, an actual structures and fee schedules have yet to be devised for either district.	At the time of this draft of the GSP, SSJMUD does not have an established allocation structure and fee schedule for groundwater extraction. As SGMA is implemented throughout the KCS, the districts are required to manage to the Sustainable Management Criteria (SMCs) established in Section 5 of this Chapter GSP. One of the ways to manage for the SMCs is to allocate the Sustainable Yield for their respective districts to the landowners within their districts. The allocation structure would allow for the transfer of groundwater pumping credits within each district's jurisdiction, provided that it does not lead to localized impacts to at the Representative Monitoring Sites defined in Sections 4 and 5 of this Chapter GSP.	The benefits to sustainable groundwater management have not been quantified at this time. However, the development and implementation of an allocation structure for each district would allow for the districts to utilize their Sustainable Yield as a management tool for reaching and maintaining their SMCs.
SSJMUD	Voluntary Land Fallowing	At this time, this Management Action is conceptual. The district will develop its fallowing program during the SGMA implementation period.	In the event of a drought, the district may not be able to entirely meet in-district demand by increasing the volume of imported water. The combination of decreased availability in surface water to supply to the district and decreased recharge from other sources in the subbasin has the potential to lead to violations of SMCs at the Representative Monitoring Sites, in the absence of decreased demand. To facilitate the district's ability to maintain sustainability at its monitoring sites, the district will develop and implement a voluntary land fallowing program.	The decrease in water demand will be dependent upon the land being fallowed and its existing land use at the time of fallowing. Agricultural demand for water is generally estimated to be 3 AF/acre. Fallowing or land retirement would reduce the demand to zero for the lands participating in the program.
SSJMUD	Pumping Restrictions	At this time, this Management Action is conceptual. The district will develop its process to implement pumping restrictions within the plan area.	In the event that the districts or the entire subbasin are nearing a condition where they are at risk of triggering an Undesirable Result, even with the implementation of the projects and management actions described in this Plan, it may be necessary for the district to limit groundwater pumping. The volume of groundwater extraction permitted under this Management Action would be determined by the district based on the Sustainable Yield for the district and the SMCs at the Representative Monitoring Sites.	The benefits of mandatory pumping restrictions have not yet been quantified, as the guidelines for such a management action have not been established.
Shafter-Wasco Irrigation District - 7th Standard				
SWID - 7th Standard	Evaluation of Potential to Utilize SWID Kimberlina Ponds for Recharge or other Facilities	Status: Conceptual, have begun initial discussions; Initiation: 2020-2024 Completion: Ongoing Accrual of Benefits: Annual-basis	SWID operates the Kimberlina Ponds groundwater recharge facility. The Annex Area will evaluate opportunities with SWID to utilize Kimberlina Pond storage capacity for recharge. The Annex Area will evaluate opportunities to purchase non-SWID water for recharge in the Kimberlina Ponds facilities, when the Ponds have unused capacity (i.e., likely in nonwet and non-drought years).	Up to 4,500 AFY of imported supply, in combination with other recharge projects. Increased groundwater levels.
SWID - 7th Standard	Evaluation of Potential to Partner in Kern Fan Groundwater Storage Project	Status: Conceptual, have begun initial discussions with RRBWSD; Initiation: 2030 Completion: 2035 Accrual of Benefits: 50 years after construction	The Kern Fan Groundwater Storage Project is under development by RRBWSD and would serve to develop a regional water bank in the Kern Fan to capture and store Article 21 water via the State Water Project (SWP) during conditions when surface water is abundant. The Annex Area could potentially become a funding partner in this project and have access to recharge and storage capacity in the Project.	Up to 4,500 AFY of imported supply, in combination with other recharge projects. Increased groundwater levels.
SWID - 7th Standard	7th Standard Annex Management Area Storage Pond Project	Status: Conceptual, have begun initial discussions with RRBWSD; Initiation: 2030 Completion: 2035 Accrual of Benefits: 50 years after construction	This project would improve water supply reliability and groundwater conditions in the Management Area. Benefits of developing a groundwater recharge facility within the Mangement Area include effective conveyance of surface water supplies when they are available, facilitation of water banking and exchange arrangements, and avoidance of direct water quality impacts. A conveyance mechanism, such as the Flat Rocks Canal would be necessary to bring such water to the Mangement Area.	Up to 1,463 AFY of recharge capacity for purchased surface water within the Management Area (assumes 320-acre basin). Increased groundwater levels.
SWID - 7th Standard	Identify Opportunities to Utilize Existing Infrastructure	Status: Conceptual, have begun initial discussions; Initiation: 2020-2024 Completion: ongoing Accrual of Benefits: annual	Several entities in the vicinity of the Annex Area have existing groundwater recharge infrastructure, which have unused capacity, particularly in nonwet years. The Annex Area will evaluate potential opportunities with these entities to utilize the unused capacity for recharge of purchased water.	Up to 4,500 AFY of imported supply, in combination with other recharge projects. Increased groundwater levels.
SWID - 7th Standard	On-Farm Groundwater Recharge	Status: Conceptual, have begun initial discussions; Initiation: 2020-2024 Completion: ongoing Accrual of Benefits: annual	In May 2019, the SWID Board adopted a new Buried Recharge policy that will allow for on-farm water banking, which will allow Annex Area landowners to purchase and recharge non-SWID water on their own properties, as well as those within the original SWID boundary.	Up to 4,500 AFY of imported supply, in combination with other recharge projects. Increased groundwater levels.
SWID - 7th Standard	Flat Rock Canal Extension	Status: Conceptual, have begun initial discussions; Initiation: 2030 Completion: 2035 Accrual of Benefits: 50 year period following construction	The Management Area will assess the feasibility of this project and seek partnership with other interest entities. This project would provide connection from the Annex Area to the Kern Water Bank Canal, Cross Valley Canal, and Goose Lake Slough. Phase 1 of this project is to distribute Kern River water to the north using gravity from Goose Lake Slough.	Improve ability to delivery surface water supplies to the District for irrigation or recharge. Benefits to neighboring entities, who would be key partners in this regional project.
SWID - 7th Standard	Develop New Interconnections Within SWID's Conveyance System (and Improve "Bottleneck" Issues)	Status: Conceptual, will require evaluation of options and benefits; Initiation: TBD Completion: TBD Accrual of Benefits: TBD	The Annex Area can work with SWID to increase the capacity and flexibility of SWID's current conveyance system, to allow access to additional supplies.	Improve operational flexibility within the SWID conveyance system to allow for increased capacity to accept surface water supplies when available.
SWID - 7th Standard	Increased Recycled Water Deliveries and Recharge	Status: In discussions for increased purchases; Initiation: In progress Completion: Anticipated 2019-2020 Accrual of Benefits: Annual	Secondary-treated municipal wastewater is from the North of the River Sanitary District is currently used for irrigation and infiltrated into groundwater within the Annex Area. The Annex Area is discussion options to increase recycled water deliveries and recharge of groundwater with secondary-treated wastewater within the Annex Area. Growth rate is projected at 2% and output expected to increase to 14,000 AFY.	Up to 8,180 AFY of treated effluent (based on project increased WWTP flows), to be used for irrigation to offset groundwater demand.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
SWID - 7th Standard	On-farm Water Conservation	Status: not yet initiated; Initiation: Upon stakeholder interest Completion: TBD Accrual of Benefits: 1-3 years after initiation	The NRCS is offering landowner incentive programs to assist in implementing various conservation activities, including but not limited to: irrigation system improvements, water/nutrient/pest management, and pump engine replacement. Interested landowners can call (661) 336-0967 or visit the website (www.ca.nrcs.usda.gov) for more information.	Reduce on-farm water demands.
SWID - 7th Standard	Voluntary Rotational Land Fallowing Program	Status: not yet initiated; Initiation: Upon approval of funding mechanism Completion: Anticipated 2020-2024 Accrual of Benefits: 1 years after initiation	In order to reduce demand within the Management Area, this project would incentivize landowners to fallow their previously farmed lands voluntarily on a rotational basis. This potential project would be implemented on a voluntary rotational basis. Incentives have not yet been established, but would be anticipated to be funded by the Annex Area landowners through the same funding mechanism used for other SGMA related activities.	Up to 1,443 AFY of reduced water demand (assumed 430 acres fallowed per year).
SWID - 7th Standard	Education of Groundwater Use per Acre	Status: not yet initiated; Initiation: Upon GSP implementation Completion: Until overdraft ends/other programs initiated Accrual of Benefits: 1 year after initiation	This program would provide groundwater users an expected groundwater volume, as an education tool, prior to enforcement actions on groundwater allocations, with the goal of providing awareness of overdraft conditions. This information would be provided in an annual letter, along with average crop demand, GSA average extraction, GW overdraft, and reminders of GSA powers and authorities.	Reduce on-farm water demands.
Semitropic Water Storage District				
SWSD	Landowner Water Budgets	Under Development; Initiation expected 2020.	Establish individual water budget for landowners by landowner classes	Water demand reduction of an estimated 60,000 af total (3,000 af/yr to 2040)
SWSD	Tiered Pricing for Groundwater Pumping	Not yet started; to be implemented in 2020 after implementation of MA 1	Develop pricing structure to incentize groundwater users to manage groundwater extractions to MA1 water Budgets	Water demand reduction consistent with MA1 (Landowner Water Budgets)
SWSD	District Fallowing Program	Not yet started; to be implemented in 2020 after implementation of MA 1	Support land fallowing as a District action and by individual landowners or groups of landowners.	Water demand reduction consistent with MA1 (Landowner Water Budgets)
SWSD	Enhanced Groundwater Recharge	Status is ongoing and expected to be initiated in 2020 upon adoption of Semitropic GSP.	Development of surface and subsurface recharge projects underlying developed agricultural lands to increase groundwater recharge capacity	Water supply augmentation up to 20,000 af average annual
SWSD	Evaluation and Assessment of GDEs within the Semitropic Area	Not yet started; Expected to be initiated in 2020 upon adoption of Semitropic GSP.	Conduct additional analysis to verify the prescence and extent of GDE's in the Semitropic and, if present, develop appropriate monitoring protocols.	
SWSD	Brackish Water Desalination	Initiated planning; expected to be initiated in 2022 upon completion of environmental and regualtory requirements.	Development of a braackish water treatment facility to treat locally sourced brackish water for District use.	Expected water supply augmentation of 1,800 af/year
SWSD	In-District Water Markets and Transfers	Not yet started; Expected to be initiated in 2022 upon adoption of Semitropic GSP.	District will allow for the development of market for in-district transfers	Water supply augmentation TBD.
SWSD	Poso Creek MAR	Upon completion of feasibility and permitting requirements; Expected initiation in 2020	Development of floodwater capture and recharge program ffrom Poso Creek flood flows	Water supply augmentation of 1,200 af average annual
SWSD	Tulare Lake Project	Under Development since 2018; Initiated upon completion of water rights determination	Development of conveyance facilities to divert Kings River flood flows for direct use and recharge in the SWSD	Water supply augmentation of 70,000 af average annual
SWSD	Water Market Acquititions	Status is ongoing and expected to be initiated in 2020 upon adoption of Semitropic GSP.	Increased participation in state-wide water markets for spot market and long-term water transfers	Water supply augmentation of 4,000 af average annual
SWSD	Stored Water Recovery Unit	Initiated; 2025 Upon approve by SWSD BOD and identification of funding	Development of water storage to expand in-lieu service areas	Increases capacity & flexibility of conveyance for recharge
SWSD	Pond-Poso Spreading Grounds, Phase II	Inititated; Upon adotion of Semitropic SWSD; 2020.	Development of spreading facililiteis to increase groundwater recharge capacity	Increases groundwater recharge capacity
SWSD	Pond-Poso Entrance Ponds	Initiated; 2025 upon approval by SWSD BOD and identification of funding.	Development of spreading facililiteis to increase groundwater recharge capacity	Increases capacity & flexibility of conveyance for recharge
SWSD	Multi-District Conveyance (CA to Friant-Kern Canal)	Ongoing; Implementation upon approval by SWSD BOD and identification of funding.	Development of a conveyance system to deliver surface water for groundwater recharge and irrigation	Increases capacity & flexibility of conveyance for recharge
SWSD	Schuster Spreading Grounds	Not yet started; Expected initiation 2030 upon approval by SWSD BOD and identification of funding	Development of spreading facililiteis to increase groundwater recharge capacity	Increases groundwater recharge capacity
SWSD	Leonard Avenue System	Inititated 2019; Upon adotion of Semitropic SWSD.	Development of an intertie system to provide east to west surface water conveyance to for supply in groundwater dependent areas	Increases capacity & flexibility of conveyance for recharge
SWSD	Diltz Intertie	Ongoing 2018; Upon adoption of Semitropic SWSD.	Connection of an intertie to provide surface water converyance for agricultural irrigation	Increases capacity & flexibility of conveyance for recharge
SWSD	Cox Canal	Ongoing 2018; Upon adoption of Semitropic SWSD.	Developed canal for the conveyance of surface water for groundwater recharge	Increases capacity & flexibility of conveyance for recharge
SWSD	Stored Water Recovery Unit- XYZ	Ongoing 2019; Upon adoption of Semitropic SWSD.		Increases capacity & flexibility of conveyance for recharge
Tejon-Castac Water District Management Area				

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
TCWDMA	Conversion of Granite Quarry to Sycamore Reservoir	The timeframe for initiation and completion of this P/MA are not certain, but presumably would begin once the Granite Quarry facility ceases operations, which is anticipated in one to four years. Construction duration is to-be-determined.	This P/MA entails repurposing of the Granite Quarry excavation into a storage reservoir upon cessation of mining operations at the facility which is expected in the next one to four years. The P/MA is being considered and developed in conjunction with Arvin-Edison Water Storage District (AEWSD), and the source of water to fill the new reservoir would likely be surplus imported surface water, brought to the reservoir by AEWSD during wet years, with possible additional contribution from local stormflow runoff. In addition, TCWD may choose to store some of its State Water Project water supplies in the facility at times, supplies which would be wheeled through the AEWSD canal system. The facility is anticipated to serve as a storage basin for water added to it, as well as a location for recharge.	AEWSD has estimated the net benefit of this P/MA to be approximately 2,500 acre-feet (AF) of increased storage capacity (which aids in delivery flexibility for AEWSD), and between 3,000 and 6,000 acre-feet per year (AFY) of increased recharge. As a secondary benefit, recharge of imported surface water would likely have a positive effect on local groundwater quality.
TCWDMA	Recharge of Carrot Wash Water	The status of this P/MA currently underway, and the timeframe to accrual of benefits is likely on the order of one year.	Tejon Ranchcorp (TRC) recharges carrot wash water generated at a nearby carrot processing facility to a 75.5-acre parcel located just outside of the TCWD MA (Township 32S Range 30E Section 6). The site, which has been in operation since 2016, receives carrot wash water from a nearby carrot processing facility which is discharged to a set of recharge ponds. A total of over 1,000 AF has been recharged at these ponds between 2016 and early 2019. This project is anticipated to continue in the future, and results in a local recharge benefit. A production well may be installed in the future at the site to allow for recovery of recharged groundwater.	Based on the amount of water recharged since operations began in 2016, the annual benefit from this P/MA is estimated at approximately 300 AFY.
West Kern Water District				
WKWD	Project 1: Automatic Meter Reading Project	The circumstance of implementation for this project would be current conditions, once funding is secured or committed and the project approved by WKWD's Board of Directors, it could be implemented.	In 2015, WKWD began installing AMR systems for all industrial and outlying customers. To further achieve sustainability goals, WKWD would install AMR systems on the remainder of its primarily residential customer meters. The AMR system selected by WKWD for its industrial and outlying customers uploads data every 24 hours to a website where customers can access their accounts and view water use data, compare their current water use to their historical water use, and receive leak alerts.	AMR provides potential water savings through early leak detection and increased awareness of water use among customers. Upgrading meters also reduces unaccounted-for losses related to accuracy degradation in older meters. WKWD estimates that AMR will save an average 8 percent of water for each metered connection, based on savings experienced by nearby agencies. The City of Sacramento had an average 4 percent water savings based on a pilot AMR project, while the Golden Hills Community Services District realized 12 percent in average savings (WKWD, 2014). WKWD's 2015 UWMP shows residential water use ranges between 2,169 AF in 2015 to a projected high of 2,597 AF in 2040, and applying the projected 8 percent conservation, anticipated water savings from this project is estimated to be 173 to 208 AFY (WKWD, 2016). Conservation achieved by the AMR project would be measured by the reduction in water deliveries to customers with AMR meters.
WKWD	Project 2: Participation in California WaterFix	Long-term	California WaterFix is intended to address the challenges of pumping water from the Delta by diverting water upstream of the current diversion points and conveying it to existing pump stations for the SWP and the Central Valley Project (CVP). Under current operation, the SWP and CVP are unable to consistently deliver state and federal water contractors their full contract supplies. California WaterFix is intended to address some of the conditions that impact the ability to export water from the Delta.	The primary benefit of this project would be the increased reliability of imported water supplies and to expand groundwater banking opportunities to meet customer demands. Additional supplies could be 1) banked in WKWD's recharge facilities, 2) used for GWE protection if monitoring shows unexpected declines in elevation, or 3) transferred to neighboring agencies to help offset groundwater pumping in the Subbasin.
WKWD	Project 3: Buena Vista Recreation Area Water Supply Management Coordination	Implementation of this project is already underway and is likely to remain an ongoing project until such time as the BVARA no longer requires water from the GSA area.	BVARA is in and adjacent to the WKWD GSA area. The 1,585-acre BVARA is home to two manmade lakes, Lake Webb and Lake Evans, boating facilities, playgrounds and volleyball courts, camp sites, and picnic areas. The lakes lie outside of the GSA area but the park facilities such as picnic areas, restrooms, and parking areas are within the GSA area. When constructed, the lakes had a combined storage capacity of over 6,800 AF. Shoreline camping and picnic areas are landscaped with grass and are irrigated during the dry season (County of Kern Parks and Recreation Department, 2019). With no outlet, water from the lakes either evaporates or percolates into the groundwater basin. Kern County pumps groundwater from wells located within the GSA area to supplement losses at the lake. Supplemental water delivered to the lakes is not metered and is not included in WKWD GSA's water balance.	Managing water supply for the BVARA would include a focused effort on monitoring pumping in that portion of the GSA area, and identifying which projects or management actions are needed to eliminate undesirable results in the Subbasin. Securing additional supplemental supplies would reduce the potential impacts to groundwater levels, storage, and water quality for this portion of the GSA area. Improved management of the BVARA water supply would also support ongoing use of the BVARA, a popular recreation area. The project does not have a directly measurable benefit unless implementation actions arise from these meetings.
WKWD	Management Action 1: Continued Balanced Pumping and Recharge	The circumstance of project implementation would be current conditions and would remain unless conditions indicated a different management approach was needed to achieve sustainability indicators.	Continued balanced pumping of groundwater and recharge of imported supplies has and will continue to be the operational norm for WKWD. Under this management action, recharge and recovery activity will continue to be monitored closely by WKWD to maintain balanced conditions.	This management action would allow WKWD to continue operating groundwater recharge and recovery in balance, resulting in a long-term net-zero balance in the Subbasin for the areas under WKWD's control.
WKWD	Management Action 2: Implement Water Shortage Response Plan	The circumstance of implementation for this project would be times of water shortage, supply interruption, or drought, as declared by WKWD's Board of Directors. Implementation would cease when shortages are no longer being experienced, and as approved by the WKWD's Board of Directors.	WKWD's Water Shortage Response Plan (WSRP) is incorporated into the 2015 UWMP and includes triggers for when the WSRP would be implemented. The WSRP describes management actions and use restrictions that would be implemented if water shortages were declared. Because current operation of groundwater recharge and recovery in the GSA area has shown a long-term increase in banked groundwater, and normal water years are projected to have a surplus of supply that can be banked, it is not expected that the WSRP would go into effect during normal or wet years. During extended dry periods, groundwater pumping would increase, and WKWD would use banked supplies to meet demands in excess of available imported and surface water supplies.	The WSRP is designed to reduce customers' overall water use by implementing restrictions on when and how water may be used. As a result, implementation of this management action would reduce overall demand, which offsets demand for imported water and groundwater. Each Response Level is designed to help achieve a specific conservation target, and would reduce overall demands between 0 and 6,900 AF (i.e., 0- to 50 percent conservation) (Table 8-3). Conservation achieved by this management action would be measured by the reduction in metered water deliveries after this management action is implemented.

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
WKWD	Management Action 3: Continued Participation in Basin-Wide Coordination	The circumstance of implementation for this project is ongoing.	The WKWD GSA is one of 11 GSAs in the Subbasin. Coordination among these GSAs is necessary for sustainable management of the Subbasin as a whole and has been ongoing during development of their respective GSPs. Coordination during GSP development has included regular in-person meetings and calls to discuss sustainability thresholds, potential projects and management actions, and to discuss specific issues and concerns. As described in this Chapter GSP, the KGA is developing an Umbrella GSP for the Subbasin, while the other GSAs in Kern County are developing Chapter GSPs.	This management action would continue existing coordination activities among GSA managers, helping to build and maintain relationships with neighboring GSAs. Potential conflicts between GSAs regarding groundwater management would be reduced because GSAs would better understand the challenges experienced in each GSA area, and how these challenges are being addressed. Coordination meetings will also provide an opportunity for GSAs to inform each other of potential issues that may require intra-Subbasin coordination to address, and to notify neighboring GSAs of management actions or projects that might affect a decision made by another GSA.
WKWD	Adaptive Management Strategy 1: Taft Recycled Water Program	This project would be implemented through an agreement between WKWD, the City of Taft, and FCTHSD.	The Taft Recycled Water Program would create up to 423 AFY of tertiary recycled water suitable for Title 22-approved applications for recycled water. This project would be implemented in partnership between WKWD, the City of Taft, and the Ford City-Taft Heights Sanitation District (FCTHSD). WKWD provides water within the WKWD GSA area, but sanitation services are provided by the City of Taft and FCTHSD, which jointly own the Taft Wastewater Treatment Facility (WWTF). The Taft WWTF currently produces undisinfected secondary effluent that is suitable for and applied to feed crops, specifically alfalfa. This effluent is not suitable for wider recycled water use, but through upgrade to tertiary treatment, it could be used more widely for non-potable applications, such as landscape irrigation, which currently use potable water to meet demands (WKWD, 2018).	The project would create up to 423 AFY of tertiary recycled water, offsetting an equal volume of potable water (WKWD, 2018). Available and unused potable water is currently banked for future use during imported and surface water supply shortages. This project would both reduce demand for groundwater pumping during dry years and allow for additional water to be banked during wet years. Tertiary recycled water would be a local supply with high supply reliability, even during drought years. The volume of water offset by this project would be measured by quantifying the amount of tertiary recycled water both produced and delivered.
WKWD	Adaptive Management Strategy 2: Shift Balance of Pumping between North and South Wellfields	Implementation would require easy-to-implement operational changes and could be implemented quickly once triggered.	In 2010, WKWD's North Wellfield (wells within the North Project Management Area) was constructed in response to falling groundwater levels at the South Wellfield (wells within the South Project Management Area). Despite a surplus of banked groundwater, local levels at the South Wellfield showed a trending decline associated with groundwater recovery activities. A single wellfield for recovery activities also limited WKWD's operational flexibility. To combat these two management challenges, the North Wellfield was constructed along with additional recharge basins. Under current operation of the two wellfields, 11,300 AFY are pumped from the South Wellfield and 12,700 AFY are pumped from the North Wellfield. The North Wellfield has an annual pumping capacity of 24,000 AFY (WKWD, 2010).	This adaptive management strategy would reduce groundwater pumping in a localized area, allowing water levels in that area to recover or to decline less sharply during times of drought. Minimizing groundwater level declines reduces the potential for localized subsidence and long-term decrease in groundwater storage capacity. It also helps to maintain well efficiency, allowing for improved wellfield longevity. Local recovery of GWEs would be determined by standard monitoring activities that are part of regular wellfield management. Local groundwater level recovery from this strategy would be measured by monitoring of groundwater levels in the vicinity of the two wellfields.
WKWD	Adaptive Management Strategy 3: Implement Permanent Demand Management Measures	As needed	According to the 2016 WSRP, Response Level 1 is ongoing, and all water use restrictions are strictly voluntary. These actions only become mandatory if a Response Level 2 is declared, which requires a declaration by the WKWD's Board of Directors. This adaptive management strategy would convert the Response Level 1 actions in the WSRP from voluntary to mandatory. These water restrictions would require a 25 percent reduction in large landscape watering from 2007 levels, prohibit water waste, and reduce non-contracted industrial water use by 15 percent from 2007 levels. WKWD may choose to implement these or a different set of permanent demand management measures as appropriate at the time this adaptive management strategy is approved.	Project benefits are expected to be like those achieved under Management Action 2 (Implement WSRP), though they will have long-term benefits because they are permanent measures rather than temporary ones under the WSRP. Conservation achieved by this management action would be measured by the reduction in metered water deliveries after this management action is implemented.
Westside District Water Authority				
WDWA	Collect Representative Hydrogeologic Data	The PMA No.1 will be implemented beginning with acceptance of the MNP, and directly support WDWA MT/MOs by providing foundational data to monitor and manage adaptive management projects that are designed and implemented to ameliorate the potential for significant reduction of ground water elevations and groundwater in storage	Historically, because of the brackish and naturally degraded quality of groundwater in the WDWA, growers have relied almost exclusively on surface water from the SWP for their irrigation needs. Groundwater is used primarily for blending when annual SWP deliveries are less than expected. As a result, there is currently little representative hydrogeologic data in the WDWA. This lack of data represents a significant data gap that must be addressed in order to refine the current understanding of the WDWA Conceptual Hydrogeologic Model, including key elements such as groundwater elevations, pumping and changes to groundwater in storage and the overall water budget.	The ability to generate representative data for use in updating water budget elements; Improved numerical groundwater modeling results; and Better forecasting and planning of adaptive management projects and management actions.
WDWA	Water Resource Coordination	The implementation of the disparate Water Resource Coordination Programs vary, some as described above are already in place and ongoing. Others, like a KCS wide coordination program would likely begin with planning during the first five year reassessment period after KCS Plan implementation. Coordination between the WDWA and its immediately adjacent GMAs would likely be structured to begin with meetings shortly after Plan approval.	The member growers in the WDWA have historically made significant investment in efficient irrigation technologies and methods that promote water conservation and sustainable management. They have also coordinated amongst themselves as individuals or via the various Water Districts to implement focused reduction demand measures, trade or purchase surplus water when deliveries from the SWP have been reduced. It is assumed that these effective ad hoc arrangements will continue after Plan implementation. In addition, the WDWA will work cooperatively and in close consultation with its members, the KGA and adjacent GMAs to coordinate water resource monitoring, testing and future water trading as part of its overall strategy for the sustainable management of all its available water resources.	More reliability and flexibility in water availability; Drought resiliency; and Sustainable water strategies for both short and long term planning horizons.
WDWA	Conjunctive Reuse of Naturally Degraded Brackish Groundwater	Preliminary planning for a Project Engineering FS for the first phase of the project has already begun. It is expected there will be at a minimum two phases of distributed treatment facility construction.	To further enhance the sustainable and adaptive management strategies for the Westside, the WDWA is evaluating the feasibility of an innovative phased project that will integrate the treatment and conjunctive reuse of naturally degraded brackish groundwater and oilfield produced water for multiple beneficial uses.	When operational, the Project will result in multiple potential beneficial uses, including many of the "One Water" concepts enumerated in the State's California Water Action Plan.
Wheeler Ridge-Maricopa Water Storage District				

Table 4-1. Kern Groundwater Authority List of Projects and Management Actions

Entity	Project Title	Implementation Status	Description	Benefits
WRMWSD	On Farm Recharge	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Study and implement on farm recharge where viable.	approx. 2,000 AFY (10,000 AF every five years)
WRMWSD	In District Banking Facilities	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Program to promote private and/or District owned banking facilities within the District.	approx. 2,000 AFY (10,000 AF every five years) approx. 2.75 AFY per acre of land converted to basins
WRMWSD	Increase Out of District Banking Operations	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Increase size/participation in out of District banking facilities (i.e., Kern Water Bank and Pioneer Project). Increased banking of wet year supplies outside of the District would support deliveries of imported water into the District in normal/dry years.	TBD; depends on recharge basin area
WRMWSD	Expand District Distribution System	Not yet initiated; TBD	Project to expand District distribution system into area currently using only private groundwater.	approx. 2,000 AFY
WRMWSD	Purchase Additional Supplies	Ongoing	Continue purchase of additional supplies, as available, for banking outside of the District or direct delivery within the District.	Increase purchases by 5,000 AFY
WRMWSD	Desalination Facilities	Not yet initiated; TBD	Desalination facilities to allow for use of additional poor quality groundwater for agricultural use, easing demand on principal aquifer.	No net supply augmentation, but minimizes local GW pumping impacts
WRMWSD	"Thru Delta" Facility	State-led effort underway	Particpation of some sort of "Thru Delta" Facility to increase access to contracted (SWP) supplies.	up to 25,000 AFY
WRMWSD	Acreage Assessment	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Set policy to implement an acreage assessment to fund purchase of additional supplies, purchase of land for fallowing, and other investments to support SGMA compliance.	
WRMWSD	Groundwater Allocation and Market	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Develop a groundwater pumping allocation methodology, including a market system for trading and/or transfering of allocations.	
WRMWSD	Voluntary Pumping Limitations	Not yet initiated; To be implemented upon adoption of WRMWSD GSP Chapter - 2020	Set non binding pumping limitations in conjunction with a fee for pumping above limits.	up to 21,000 AFY
WRMWSD	Mandatory Pumping Limitations	Not yet initiated; 2030	Set binding pumping limitations in conjunction with a fee for pumping above limits.	up to 21,000 AFY
WRMWSD	Land Retirement	Not yet initiated; 2035	Purchase and permanently fallow previously irrigated acreage within District to reduce overall water demand and groundwater extractions.	up to 21,000 AFY

KERN RIVER GSA

Groundwater Sustainability Plan

SGMA Project and Management Actions

January 2020

7 PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

Multiple projects and management actions have been identified for planning and implementation to support the KRGSA sustainability goal. In particular, the projects and actions center around conjunctive use, a cornerstone of the sustainability goal of the KRGSA. The projects and actions also have been defined in the context of the sustainability goal of the Kern County Subbasin, which is to:

- Achieve sustainable groundwater management in the Kern County Subbasin through the implementation of projects and management actions at the member agency level of each GSA
- Maintain its groundwater use within the sustainable yield of the basin through as demonstrated by monitoring and reporting groundwater conditions
- Operate within the established sustainable management criteria, which are established based on the collective technical information presented in the GSPs in the Subbasin.
- Collectively bring the Subbasin into sustainability and to maintain sustainability over the implementation and planning horizon.

Projects involve substantial efforts that provide either an increase in water supply or a reduction in demand for the KRGSA. *Actions* provide a framework for groundwater management including establishing GSP policies and filling data gaps.

Projects and actions are categorized as Phase One or Phase Two, depending on the timing and circumstances of implementation. Phase One projects and actions will begin implementation during the first five years of the GSP. Some Phase One project benefits should be evident by the five-year update of this GSP, scheduled for 2025. Implementation of some project elements will extend into the second or third five-year periods (to 2035). Phase Two projects and actions involve additional activities that could be considered, as needed, for future sustainable management. These projects and actions will begin implementation after the 2030 five-year update, as needed. Additional project and actions may be identified at that time as needed to achieve the KRGSA and Subbasin sustainability goals.

7.1 PHASE ONE PROJECTS

The KRGSA already has under its control sufficient Kern River and imported SWP water to achieve sustainability under a variety of future demand scenarios. By using all of its Kern River entitlement (less obligations) conjunctively with imported water and recycled water supplies, the KRGSA intends to implement six Phase One projects that collectively provide:

- Increases in recharge and banking to offset potential future deficits and avoid overdraft
- Decreases in municipal and agricultural pumping
- Optimal conjunctive management of surface water and groundwater resources
- Improvements in drinking water quality for disadvantaged communities
- Mitigation for the potential of land subsidence in disadvantaged communities.

Three water supply projects have been identified to meet potential future deficits in the historical and projected water budgets, thereby reducing the potential for future overdraft conditions while providing adequate supply to support projected demands. One project provides for demand reduction with increased urbanization of former agricultural lands. Two water quality projects provide improvements to drinking water quality for disadvantaged communities (DACs) in the KRGSA.

A summary of the six water supply projects is provided in **Table 7-1** and described in the following sections.

Table 7-1: Phase One Project Summary for KRGSA GSP

Project	Description	New KRGSA Water Supply
Water Allocation Plan	KDWD plans to use its full Kern River entitlement as prioritized in its Water Allocation Plan (WAP) for the Agricultural MA. The WAP total average supply has been corrected for planned sales to NKWSD.	20,797 AFY
Kern River Optimized Conjunctive Use	The City plans to use its full Kern River entitlement, less current obligations, to mitigate undesirable results for water levels and water quality in the Urban MA.	89,619 AFY
Expand Recycled Water Use in the KRGSA	The City will increase recycled water use inside of the KRGSA from its WWTP No. 3 in 2026 when a contract for use outside of the KRGSA expires (about 72% is currently used outside of the KRGSA).	11,556 to 13,407 AFY
Conversion of Agricultural Lands to Urban Use	Approximately 10,000 acres of current KRGSA agricultural lands is expected to be urbanized; this future urban demand is already included in the projected water budget, so 100% of this agricultural water use represents a demand reduction.	27,000 AFY
ENCSD North Weedpatch Highway Water System Consolidation	Up to six small water systems in the northeast KRGSA will be consolidated into the ENCSD system for benefits to drinking water quality, including to disadvantaged communities (DACs).	No new supply; improved water quality to DACs
Possible Water Exchange	KRGSA member agencies can perform exchanges of surface water and groundwater for benefits to water quality, including to DACs	No new supply; improved water quality to DACs

As indicated in **Table 7-1**, Phase One projects provide about 148,972 AFY to 150,823 AFY of additional water supply to the KRGSA. As discussed in **Section 4.7.2** and summarized in **Table 4-14**, projected future deficits could range between -67,640 AFY (Baseline Conditions) and -165,135 AFY (2070 Climate

Change Conditions) using a conservative checkbook method approach. Accordingly, projects on **Table 7-1** have been selected to address deficits in this estimated range. At this time, Phase One projects fully address projected deficits for both baseline and 2030 climate change conditions. In addition, projects are within about 15,000 AFY of the projected 2070 deficits. Phase Two projects provide additional measures in the event that the more severe climate change conditions of the 2070 scenario are realized.

Each of these six projects will begin implementation during the first five years of the GSP. However, several projects will require adjustment and possible re-direction over time to optimize project performance and avoid undesirable results. Incorporating this concept of adaptive management will be key to achieving the KRGSA sustainability goal.

7.1.1 Water Allocation Plan (WAP) – Kern Delta Water District

For more than 130 years, canal systems on the Kern River have delivered a cost-effective, high quality water supply to support the agricultural economy in the KRGSA Plan Area. These systems were first developed as separate canal companies, each with its own Kern River water right and defined service area; separate canal companies were later consolidated. Until recently, KDWD had managed water supply according to each canal's separately-defined water right, which resulted in increased reliance on groundwater for some portions of KDWD. In 2011, KDWD developed its Water Allocation Plan (WAP) to optimize its Kern River entitlement,[35] increasing overall supply across the Agricultural MA. Project implementation was delayed due to litigation regarding compliance with the California Environmental Quality Act (CEQA). In 2018, the litigation was resolved, a Supplemental Environmental Impact Report (SEIR) was certified (ESA, 2017), and the WAP was adopted by the KDWD Board (Resolution 2018-03).

The WAP (Todd Engineers, 2011) consists of a series of prioritized management actions to allow KDWD to use its full Preserved Entitlement of 201,943 AFY from the Kern River to meet both agricultural and municipal demands in its service area. By revising internal operations for full use of the Preserved Entitlement, the WAP provides a supplemental supply of about 33,048[36] AFY on average to offset groundwater demands for both agricultural and municipal beneficial uses. The additional supply will be delivered directly to meet irrigation demands. Recharge will occur in unlined conveyance canals and will also be focused locally to benefit water levels and water quality near municipal wells, including the disadvantaged communities of Greenfield and Lamont (**Figure 2-15**). This beneficial recharge is documented as a specific management action in the WAP.

To estimate an average amount for this new supply to the KRGSA in **Table 7-1**, the historical Study Period (WY 1994 – WY 2015) is used to estimate the increase in supply if the WAP had been in place

[35] Pre-1914 water right as modified by recent court decisions; also referred to as the *Preserved Entitlement*.
[36] As explained in the SEIR (ESA, 2017), the average of 33,048 AFY from the WAP was developed from a strict accounting of unused water from 1997 through 2007, representing average hydrologic conditions on the Kern River. As noted in the SEIR, the average varies slightly depending on the time period selected for average hydrologic conditions.

during that time period. During this time period, the average annual supply associated with the WAP was 30,472 AFY. In a 2017 Settlement Agreement with NKWSD, KDWD committed a certain portion of the WAP water for sale to NKWSD, with an approximate total of 9,675 AFY occurring for conditions during the historical Study Period. Accordingly, a new supply of 20,797 AFY is provided in **Table 7-1**.

GSP regulations require the inclusion of specific details associated with projects and management actions in the GSP (§354.44). These requirements are also listed in the GSP Preparation Checklist develop by DWR for GSP submittal (**Appendix E**). These required items have been categorized into project benefits and the project implementation process, as described below.

7.1.1.1 Project Benefits

Specific benefits of the WAP are summarized below:

- Provides an additional 33,048 AFY[31] to the Agricultural MA to reduce groundwater demands
- Maintains water levels through both increased recharge and decreased groundwater pumping to support measurable objectives for all of the sustainability indicators applicable to the KRGSA
- Provides operational flexibility through the network of conveyance canals and recharge basins to focus recharge and manage water levels for subsidence and municipal well water quality in the Agricultural MA (see **Sections 5.7.4** and **5.8.4**)
- Mitigates overdraft conditions as estimated by the adjusted checkbook water budget method described in **Section 4.4.2**. Sufficient to meet the estimate of 29,000 AFY of overdraft discussed in **Section 4.5.4** and shown in **Table 4-10**)
- Addresses numerous GSP elements described in Water Code §10727.4 and listed in **Section 2.6.6** of this GSP, most notably the replenishment of groundwater extractions, activities for implementing conjunctive use or underground storage, and measures addressing groundwater recharge, in-lieu use, diversions to storage, and conveyance projects.

7.1.1.2 Implementation Process:

The WAP was approved and adopted in 2018, and implementation has already begun. Public notice, permitting, regulatory, and procedural requirements were addressed through applicable provisions of the California Water Code (WC 35525 et seq.), the CEQA process, and the certified KDWD SEIR (ESA, 2017). Legal authority is provided through the California Water Code, various contractual agreements, and court decrees, decisions, and judgments. No additional legal authority is required for implementation. Costs have already been accounted for in KDWD operational budgets; no added costs are anticipated for full implementation. The implementation process will occur over time to optimize operations for the additional water supply in KDWD; as such, the project is expected to be fully implemented over the next five years. However, operations will be adapted on an ongoing basis to best support the sustainability goal while meeting beneficial uses of the water supply.

7.1.2 Kern River Conjunctive Use Optimization – City of Bakersfield

In order to increase flows in the Kern River channel to support municipal wellfields and other beneficial uses, and to avoid undesirable results, the City intends to optimize conjunctive use of its full entitlement of Kern River water that is now available due to the expiration of the "basic term" of City contracts with several parties outside of the KRGSA. Specifically, the City executed three long-term contracts for sale of certain amounts of Kern River water after its acquisition of the Kern River water right in 1976. At that time, funds were needed for infrastructure improvements relating to the City's River management responsibilities. The initial 35-year basic term of the contracts expired in 2012, making about 70,000 AFY of Kern River water available to the City to supplement current supplies. It is recognized that the City may still have an obligation to supply some amount of water to certain parties under the "Extension Term" of the agreements, limited to years when there are substantial surface water supplies available to the City, and only after the City's needs and demands have been satisfied.

In addition to the expired contract water, other discretionary historical diversions by the City were tabulated to better identify additional amounts of water that might be available to meet future urban demand increases. The tabulation of historical discretionary diversions and expired contract water resulted in an average amount of about 89,619 AFY (**Table 7-1**), indicating a significant additional future water supply for the KRGSA. This water is supplemental to the average amount of 59,770 AFY used by the City during the historical Study Period (**Table 4-11**). The total amount of 149,389 AFY accounts for the City's full Kern River entitlement less future obligations and represents the City's Kern River surface water supply to serve beneficial uses in the KRGSA and to avoid undesirable results (see **Section 5.4.4**). Accordingly, the net new supply of 89,619 AFY (**Table 7-1**), is incorporated as a Phase One project in the projected future water budgets. This project alone is sufficient to mitigate future water budget deficits estimated for baseline (-67,640 AFY) and 2030 Climate Change (-75,953 AFY) conditions (see **Table 4-14**).

The City has developed priority uses for allocating the GSP project water. The first will be to meet municipal demands by conveyance of water to the three water treatment plants in the KRGSA. Additional water will be targeted for recharge in the Kern River channel below the Calloway weir where the channel is dry most of the time. For planning purposes, three segments of the channel are prioritized for recharge, but locations and amounts will vary depending on available water, other obligations, and activities by others in the River. Finally, water will continue to be recharged in the COB 2800 facility, which has excess capacity in most years. As such, recharge of GSP project water would occur in addition to routine ongoing banking in the COB 2800 facility by the City. Priorities for use of GSP project water are summarized in **Table 7-2** below along with maximum monthly amounts.

Table 7-2: Kern River Conjunctive Use Optimization Project

Priority	Location	Maximum Monthly Amounts
1	Henry C. Garnett Water Purification Plant (WPP)	Up to 542 AF/month
2	Cal Water North East Treatment Plant (WTP)	Up to 5,604 AF/month
3	Cal Water North West Treatment Plant (WTP)	Up to 747 AF/month
4	Kern River Channel (below Calloway Weir)	Up to 12,000 AF/month
5	Kern River Channel (below the River Canal)	Up to 2,000 AF/month
6	Kern River Channel (below Rocky Point)	Up to 2,800 AF/month
7	COB 2800 Facility	Up to 20,000 AF/month

As indicated in **Table 7-2**, the City recognizes the potential for water budget deficits related to decreases in SWP supply, especially when considering the DWR climate change factors applied to Table A allocations. Therefore, the City has determined that the first priority for this GSP project will involve deliveries of Kern River water to the Henry C. Garnett Water Purification Plant operated by ID4 and the Northeast and Northwest water treatment plants operated by Cal Water. Treated surface water will be limited by plant capacity and demand; as such, plant deliveries will vary over time. In its UWMP, Cal Water documents plans for future expansion of its Northeast WTP that increase capacity to 43 MGD by 2030 (Cal Water, 2016a). Build-out for the plant is 60 MGD, with a peaking capacity of 69 MGD (Cal Water, 2016a). Although the final expansion is not currently scheduled before 2035, plans are in place for implementing the expansion earlier, as needed, depending on growth and urban demand.

7.1.2.1 Project Benefits

Project benefits of the Kern River Conjunctive Use Optimization Project are summarized as follows:

- Additional banking of water in the Kern River channel will benefit water levels in municipal wellfields and assist in meeting measurable objectives for chronic lowering of water levels, degraded water quality, and mitigation of potential future land subsidence.
- Aquifer replenishment raises water levels locally in the Urban MA for all beneficial uses and avoidance of undesirable results.
- Municipal wellfields will have excess capacity allowing a reduction in groundwater pumping of certain wells at certain times. This will provide operational flexibility for managing local water levels to avoid undesirable results.
- The Project provides sufficient water to meet the checkbook deficits estimated for the 2070 climate change scenario in **Table 4-14**. When combined with other projects, the amount fully mitigates the potential for future overdraft conditions, based on projected demands.
- The Project addresses numerous GSP elements described in Water Code §10727.4 and listed in **Section 2.6.6** of this GSP, most notably the replenishment of groundwater extractions, activities for implementing conjunctive use or underground storage, and measures addressing groundwater recharge, in-lieu use, diversions to storage, and conveyance projects.

- Use of the River channel as a primary groundwater recharge source restores more natural hydrologic functions of recharge beneath the River.

7.1.2.2 Implementation Process:

The City intends to implement this project incrementally over time and to continue project adaptation to changing conditions, adjusting the direct use of the additional Kern River water based on plant capacity and demand. Increased recharge associated with the project will be implemented in Year 1 (2020). Depending on the availability of Kern River water, the project will begin by testing the recharge capacity and aquifer response in certain areas of the channel to better develop management strategies for avoiding undesirable results. In particular, the location and amount of groundwater level increases will be evaluated over time, based on an analysis of scenarios involving resting wells and channel recharge.

Implementation of the project can begin without impediments because the GSP project water supply is part of the City's Kern River entitlement based on its pre-1914 appropriative rights. This provides the City with the legal authority to use the water for multiple reasonable beneficial uses. The City developed an EIR to describe how current water supplies and potential additional water supplies would be incorporated into a new proposed program referred to as the Kern River Flow and Municipal Water Program; that program involved a potential new supply and associated rights on the Kern River, which is on hold pending the outcome of a SWRCB application. However, this GSP project includes only the current Kern River entitlement that belongs to the City and remains available to the City. Additionally, the use of the water is not subject to new permits or regulatory requirements beyond current obligations regarding Kern River management and use.

Public notice of the City's intent to increase conjunctive use in the Kern River was provided during the CEQA process for numerous projects, including, but not limited to, the EIR for the Kern River Parkway project, the EIR for the 2800 Acres project, the EIR for the Kern River Flow and Municipal Water Program, and in a number of City planning and policy documents including the land use planning efforts described above and documented in **Sections 2.6.1** and **2.6.2** of this GSP (although this GSP does not involve all water sources included in those projects and documents). Additional public notice will be accomplished through the GSP outreach process, which includes public hearings and an open house occurring over the next several months.

Because this project simply increases the volume of water retained in the KRGSA, the City will manage a similar total of water that is managed now but will be directing it to increased recharge and/or water purification facilities. Accordingly, project costs are anticipated to be managed within the City's current operational budget for Kern River management. If additional facilities for recharge are required, those costs will be developed as a new KRGSA GSP project.

The timing for full implementation of this project is related, in part, to the planned expansion of the North East treatment plant (and other treatment plants), which in turn is tied closely to growth and future demands. Expansion of the Northeast WTP to 43 MGD is scheduled to occur by 2030 and full

buildout will likely occur in the GSP Planning horizon. Scheduling of project details will be developed for the five-year update to the GSP, based on then-current projections.

Two additional treatment plants – Southwest Bakersfield WTP and Rosedale Ranch/Seventh Standard Corridor WTP – are also proposed to increase capacity for direct deliveries of Kern River water (Cal Water, 2016a). These plants are on hold due to economic conditions, but ultimately would serve to decrease reliance on groundwater.

7.1.3 Expand Recycled Water Use in the KRGSA Plan Area

For more than 30 years, the City of Bakersfield has been providing treated wastewater from its WWTP No. 3 to a 4,700-acre farm for irrigation, known as Green Acres. The farm is owned by the City of Los Angeles and located on the western edge of the KRGSA with most of the land outside of the KRGSA boundary (about 72 percent). Currently the City provides an average of about 18,000 AFY to Green Acres in accordance with its contract.

On July 17, 2019, the Bakersfield City Council voted not to renew the contract when it expires in 2026. This action allows all of the recycled water to be used in the KRGSA as needed. The City is currently exploring options for use including replacement of potable water for irrigation or for groundwater recharge. Although the water will not be available until after 2026, planning has begun for identification of needs in the Plan Area.

The average amount of water provided to Green Acres during the historical Study Period of WY 1995 – 2015 was about 11,321 AFY, but this average has increased over time with increasing inflows to WWTP No. 3. In addition, current amounts are expected to increase over time with population growth in the City. For analysis in the C2VSim-FG Kern local model, wastewater flows from WWTP No. 3 were increased proportional to the increase in urban water demand over time with a similar proportional increase in available recycled water. As a simplifying and conservative assumption, the amount of new water supply was limited to the percent of supply that had been used outside of the KRGSA (72 percent of the total amount). This calculation indicates a new average annual water supply to the KRGSA of about 11,556 to 13,407 AFY for the 20-year implementation period and the entire 50-year planning horizon, respectively.

Benefits and Implementation: This project will increase the availability of recycled water in the KRGSA for beneficial use. This water supply will support measurable objectives for all sustainability indicators with a net positive impact on the KRGSA Plan Area water budget to mitigate the potential for future overdraft. If used to replace potable water, the net benefit would be even greater by preserving a high-quality potable supply for other beneficial uses. This project supports a key GSP element by providing measures to address water recycling, as listed in Water Code §10727.4 and re-stated in **Section 2.6.6** (see item (h)). Depending on the selected water use, this project supports additional GSP elements including replenishment of groundwater extractions, opportunities for conjunctive use or underground storage.

The City owns the wastewater and no additional legal authority is needed to retain the water for local use. A permitting and regulatory process may be required depending on the type of use. At this time, the project is simply to retain the recycled water for use within the KRGSA; implementation will occur with the expiration of the contract in 2026. A more defined project and other implementation considerations will be developed between 2020 and 2026; updated project components will be provided in annual reports as they are developed. Costs have not yet been estimated for this project. The public was notified of this project at the City Council meeting on July 17, 2019. Numerous newspaper articles documented the discussion and vote of the City Council (Bakersfield Californian, 2019). Additional public notice will be provided through the public review period of this GSP. Additional public outreach will occur as specific uses are identified for the increase in available recycled water.

7.1.4 Land Use Conversion - Urbanization of Agricultural Lands

As indicated by the increase in urban demand over time (**Table 4-14**), growth in Metropolitan Bakersfield is anticipated. According to the UWMPs in the northern Plan Area, urbanization is expected to occur through increased density in urban lands, expansion onto undeveloped lands, and conversion of agricultural lands. Although the exact location of urban growth has not been defined specifically, much of the growth has been expanding to the south into the central and southern Plan Area, as indicated by the delineation of the KRGSA Urban MA (see **Figure 5-1**). Much of this land is either currently or historically used for irrigated agriculture and some of that land will likely be converted within the 20-year GSP implementation phase.

For the purposes of this project, it is assumed that about 10,000 acres of agricultural lands in the KRGSA Plan Area (about 10 percent of the total agricultural lands) will be urbanized. Most of this area is located in the Agricultural MA, but agricultural lands also occur in the Urban MA. Although the acreage and locations are uncertain, the City indicates that this is a reasonable assumption based on current urbanization areas. Project acreage would already be embedded in the analysis of future urban demand in the projected water budget, which is based simply on population growth. Accordingly, the total agricultural demand for the project acreage is decreased to prevent double counting of water use on these 10,000 acres. Using the average crop ET demand in the southern KRGSA Plan Area of 2.7 AF/acre, approximately 27,000 AFY is eliminated from the agricultural demand, representing an overall net demand reduction in the KRGSA as a result of this project.

Project benefits of this urbanization of former agricultural lands are summarized as follows:

- Decreases overall water demand, which supports measurable objectives of all sustainability indicators applicable to the KRGSA including chronic lowering of water levels, reduction of groundwater in storage, degraded water quality, and the potential for land subsidence
- Mitigates potential for future overdraft conditions by decreasing demand; this allows for surface water to meet a larger portion of the demand, thereby reducing groundwater pumping
- Allows for decreased pumping in areas of potential land subsidence

- Addresses several GSP elements described in Water Code §10727.4 and listed in **Section 2.6.6** of this GSP, most notably processes to review land use plans and efforts to coordinate with land use planning agencies and measures addressing in-lieu use.

7.1.4.1 Implementation Process:

There are no impediments to implementation of this project. Although the GSA does not specifically control the location of future growth, the City will assist in tracking and coordinating the conversion of agricultural lands through time as opportunities arise. Given previous patterns of growth and projections of population increase, this project is expected to be fully implemented within the 20-year GSP implementation period. Legal authority, permitting, and regulations for locations of population growth within the City limits reside with the land use planning, water resources, and other City departments and with the City Council. Outside city limits, land use planning resides with Kern County. Funding is not needed for implementation of this project.

Water use for urbanization of agricultural lands in KDWD is covered under an agreement between KDWD and the City of Bakersfield. That agreement obligates KDWD to make water available for those newly-urbanized lands, provided that those lands have been served historically by the water rights obtained by KDWD. Some of the recently urbanized lands in KDWD were not historically served by KDWD water rights and, as such, are not currently served by KDWD. KDWD has the responsibility to support the new urban demand at a rate of about 1.0 – 1.5 AF/acre. This agreement will provide sufficient water to serve urban demand and will prevent the need for additional groundwater pumping to support new growth in this area.

7.1.5 ENCSD North Weedpatch Highway Water System Consolidation Project

Six small water systems in the vicinity of Highway 184 (Weedpatch Highway) and Muller Road have had to cope with water quality issues including elevated nitrate, TCP, and arsenic concentrations detected in water supply wells. These disadvantaged communities (DACs) have limited resources and provide drinking water supply to more than 1,400 persons along the eastern KRGSA boundary. Three of these systems are located within the KRGSA Plan Area as noted below; the remaining three are just outside the KRGSA Plan Area in AEWSD.

- Oasis Property Owners Association (Oasis POA) – in KRGSA
- East Wilson Road Water Company (East Wilson Rd) – in KRGSA
- Wilson Road Water Community (Wilson Road WC) – east of KRGSA
- San Joaquin Estates Mutual Water Company (SJE MWC) – east of KRGSA
- Del Oro Water Company Country Estates District (Del Oro WC) – east of KRGSA
- Victory Mutual Water Company (Victory MWC) – in KRGSA.

Service areas of these small water systems are adjacent to, and in some areas surrounded by, the ENCSD service area (see **Figure 2-4**). In response to water quality violations, the SWRCB DDW ordered corrective actions to meet drinking water standards. Consolidation with ENCSD was evaluated as a possible corrective action for each of the water systems. ENCSD prepared an initial Engineering Report

in 2016 evaluating the consolidation of four of the water systems (AECOM, 2019, see Attachment T-1). At the request of the SWRCB-DDW, an amendment to the Engineering Report was prepared in April 2019 to add Del Oro WC and Victory MWC to the consolidation evaluation (AECOM, 2019).

The project includes new water distribution systems, a new well (1,400 gpm capacity) with arsenic treatment, a storage tank, hydropneumatics tank, and a booster pump station. If TCP is detected in the new well, the grant will also fund a TCP treatment system. All wells with water quality violations will be properly abandoned according to Kern County Environmental Health regulations. Grant funding through the Drinking Water State Revolving Fund (DWRSF) program has been secured for construction costs. The small water systems have also received assistance from Self-Help Enterprises, a community development organization that assists rural communities identify clean drinking water sources in eight counties of the San Joaquin Valley.

Although this consolidation project was conceived prior to the preparation of this GSP, ENCSD is documenting this project in the GSP as a member agency in the KRGSA.

7.1.5.1 Project Benefits

Project benefits of the North Weedpatch Consolidation Project are summarized as follows:

- Supports measurable objectives for degraded water quality by managing local arsenic concentrations with construction of an arsenic wellhead treatment facility, thereby avoiding an undesirable result
- Controls projected urban demand through conservation efforts implemented by ENCSD
- Abandons wells with poor water quality
- Provides DACs with a reliable, clean drinking water supply
- Supports numerous GSP elements described in Water Code §10727.4 and listed in **Section 2.6.6** of this GSP, including wellhead protection areas (for the new project well), migration of contaminated groundwater (elevated nitrate from a nearby septic system as suggested in one DDW Water Quality Violation Order), adherence to well abandonment and well construction policies, measures addressing groundwater contamination, and efficient water management practices.

7.1.5.2 Implementation Process:

Numerous activities are required prior to project construction. ENCSD has adopted standards and policies that control this annexation process and requires legal Consolidation Agreements with the water systems for adherence to ENCSD requirements. Annexation proceedings will be completed through the Local Agency Formation Commission (LAFCO); approval is anticipated. CEQA compliance will include preparation of a CEQA Plus mitigated Negative Declaration, with a Notice of Determination filed with Kern County and the State Clearinghouse. ENCSD will need to acquire about 1.5 acres of undeveloped land from the Fairfax School District for the new well site. Construction design documents are approximately 90 percent complete (Ruiz, personal communication, 7/31/2019).

The project is scheduled for implementation once all of the agreements and CEQA compliance have been completed. To date, ENCSD has signed agreements to annex and consolidate service areas into ENCSD for SJE MWC, Oasis POA, and Wilson Road WC. Once annexed, ENCSD will have the legal authority to serve water throughout its expanded service area. Construction permits, including well drilling, are required for the project. The ENCSD permit with DDW for the provision of drinking water will be amended to include system improvements.

Construction of the consolidation project is being funded by a DWRSF grant. Funding includes new infrastructure, including pipelines, pump station, storage, and a new well. Costs for an arsenic treatment facility and TCP treatment, if needed, are included in the grant. Project costs are estimated at approximately $20 million. More detailed costs, including O&M are provided in the Engineering reports (AECOM, 2019).

The Project schedule is summarized below and expected to take approximately 62 months.

- Project design and CEQA Plus Document – 6 months
- DWRSF construction application process – 24 months
- Annexation proceedings, property acquisition, permitting and well drilling – 8 months
- Well equipping, booster pump station, treatment processes, facilities construction – 24 months.

Once permitted, ENCSD will have the authority to deliver drinking water to all customers and no additional legal authority is needed for project implementation. Public notice will occur through the CEQA process as well as in planned public hearings on this GSP. As mentioned previously, project design activities are proceeding, and agreements have been executed with three of the six systems (as of July 31, 2019).

7.1.6 Possible Water Exchange for Improved Drinking Water Quality in Disadvantaged Communities

The GSA recognizes the challenges of the DACs within the KRGSA to obtain sufficient high-quality drinking water with limited resources. Given the large infrastructure network in the KRGSA, the potential for numerous exchanges of various source waters provides management flexibility for controlling water levels, water quality, and avoiding undesirable results.

One possible exchange is envisioned between ENCSD, which serves water to DACs, and KDWD, who operates the Eastside Canal located through the ENCSD service area. In the event that ENCSD has an immediate need to mitigate elevated nitrate concentrations, KDWD could deliver Kern River water to the ID4 treatment plant on behalf of ENCSD. Then ENCSD could provide groundwater with elevated nitrate or arsenic into the Eastside Canal, where it would be blended and provided for agricultural irrigation (recognizing that nitrate and arsenic are not constituents of concern for agricultural use).

A similar exchange to assist DACs in Oildale MWC could be developed. For this exchange, surface water would be provided for treatment from an additional agency who could receive returned groundwater from Oildale MWC in the Beardsley Canal.

7.1.6.1 Project Benefits

Project benefits of water exchanges to improve drinking water quality for DACs are summarized as follows:

- Support measurable objectives for degraded water quality.
- Assists with improvement of water quality to DACs within the KRGSA and supports the KRGSA sustainability goal to meet municipal demands.
- Supports GSP elements described in Water Code §10727.4 and listed in **Section 2.6.6** of this GSP measures addressing groundwater contamination and efficient water management practices.

7.1.6.2 Implementation Process:

For implementation of this type of project, KRGSA Plan Managers would need to coordinate and consider institutional, legal, or permitting barriers prior to the exchange. For these types of exchanges, additional agreements may be required. For example, ID4 cannot deliver treated surface water from its purification plant outside of ID4 boundaries without amending or developing new contracts. Public notice will be accomplished as part of the public review of this GSP. Implementation of this type of water exchange is considered discretionary and will be considered and implemented only on an as-needed basis. Nonetheless, it remains a viable option for assisting DACs with a high-quality drinking water supply.

7.2 PHASE ONE MANAGEMENT ACTIONS

Phase One *management actions* differ from Phase One *projects* in that they typically do not represent new water supply or reductions in demand. Rather, these actions provide a framework for overall groundwater management including establishing GSP policies and filling data gaps. Ten management actions have been identified for implementation in Phase One.

As provided by SGMA and re-sated in the MOU forming the GSA, the KRGSA may perform the following functions:

1. Adopt standards for measuring and reporting water use.
2. Develop and implement policies designed to reduce or eliminate overdraft within the boundaries of the GSA.
3. Develop and implement conservation best management practices.
4. Develop and implement metering, monitoring, and reporting related to groundwater pumping.

The management actions included in this section rely on SGMA authority and no additional legal authority is required. In addition, the MOU states that the City and ID4 are jointly responsible for GSP implementation in the City limits and ID4 boundaries. KDWD is responsible for GSP implementation in its boundaries. In addition, Greenfield CWD is responsible for GSP implementation in its service area as per

HENRY MILLER GSA

Groundwater Sustainability Plan

SGMA Project and Management Actions

December 2019

4 PROJECTS AND MANAGEMENT ACTIONS (REG. § 354.44)

4.1 Project #1: Optimizing the recovery of Pioneer Project banked supplies in dry years

HMWD is a Recharge Participant in the Pioneer Project. Therefore, the District has a second priority right to recover banked water supplies from the Project. Since its inception in 1995, the District has banked SWP, Kern River, CVP, and other water in the Pioneer Project (or related Kern Fan facilities) for future recovery or flexibility with exchanges/transfers. In efforts to supplement supplies to the District in years when other surface supplies are sparse, the District could recover its banked supplies and deliver said water to lands within the District.

4.1.1 Measurable Objective that is Expected to Benefit from the Project or Management Action

Recovering banked supplies is expected to offset a decline in local water levels and a negative change in groundwater storage.

4.1.2 Circumstances for Implementation

The project may be implemented in a circumstance where HMWD's supplies are below their average quantities and the District would otherwise pump groundwater beyond its sustainable yield. The project would require the ability to recover and deliver the water; this may be difficult in certain years, when the Recovery Participants maximize their first priority to recover and preclude Participants, such as HMWD, from recovering their banked supplies.

4.1.3 Overdraft Mitigation Projects and Management Actions

The purpose of this project is to avoid overdraft in HMWD.

4.1.4 Time-Table for Initiation and Completion

In the event of a banked water recovery, HWMD will coordinate with Pioneer Project participants and stakeholders as needed.

4.1.5 Expected Benefits and how they will be Evaluated

The purpose of recovering banked water supplies is to prevent the decline of conditions below MT levels and prevent future MT exceedances for each of the applicable sustainability indicators.

4.1.6 How the Project will be Accomplished

HMWD will coordinate with the Pioneer Project as necessary to recover needed supplies.

4.1.7 Estimated Cost of Project

HMWD bears a portion of the recharge facility operations, maintenance, and facility costs through the contractual agreement already established with the Pioneer Project. Since this agreement is already in place, no additional costs will be incurred to implement this Project.

Other descriptive items outlined by SGMA were reviewed and deemed inapplicable to the implementation of this project including: public noticing, permitting and regulatory process, legal

authority required, management of groundwater extractions and recharge, and additional GSP elements in Water Code § 10727.4.

Appendix E Attachments to Comment Letter From Kern Water Bank Authority

State Water Resources Control Board

Division of Water Rights
1001 I Street, 14th Floor ♦ Sacramento, California 95814 ♦ 916.341.5300
P.O. Box 2000 ♦ Sacramento, California 95812-2000
Fax: 916.341.5400 ♦ www.waterrights.ca.gov

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Victoria A. Whitney, Chief
DIVISION OF WATER RIGHTS

FROM: Katherine Mrowka
Chief, Watershed Unit 3
DIVISION OF WATER RIGHTS

DATE: OCT - 2 2008

SUBJECT: PETITIONS TO REVISE STATUS OF KERN RIVER ON STATE WATER BOARD FULLY APPROPRIATED STREAMS LIST

In accordance with California Code of Regulations, title 23, section 871, five petitions have been filed with the State Water Resources Control Board (State Water Board), Division of Water Rights (Division), requesting revision of the Kern River's fully appropriated status as declared in Order 89-25 and subsequent orders, the Declaration of Fully Appropriated Streams (collectively "the Declaration"). The five petitions were received from: (1) North Kern Water Storage District (North Kern) and City of Shafter; (2) City of Bakersfield; (3) Buena Vista Water Storage District; (4) Kern Water Bank Authority; and (5) Kern County Water Agency (Petitioners). The Petitioners also filed applications to appropriate water.

The Petitioners cited the Fifth District Court of Appeal's decision in *North Kern Water Storage District v. Kern Delta Water District* as the basis for filing the petitions. The Fifth District's ruling found that there was a partial forfeiture of Kern Delta Water District's (Kern Delta) pre-1914 water rights on the Kern River.

Background

Water Rights on Kern River

Water diversions from the Kern River for agricultural and domestic purposes date back to the 1860's. The historical administration of the water rights on the Kern is based on the concept of "the law of the river," which refers to the body of decrees, agreements, customs and practices that came into existence over the history of disputes on the river. Those court decisions and agreements of interest are:

1) Decision of the California Supreme Court in *Lux v. Haggin* (1886) 69 Cal. 255;
2) *Famers Canal Company v. J.R. Simmons* (Super. Ct., Kern County, 1900, No. 1901), commonly known as the Shaw Decree
3) Miller-Haggin Agreement, 1888;

4) Amendment to the Miller-Haggin Agreement, 1930;
5) Amendment to the Miller-Haggin Agreement, 1955;
6) Kern River Water Rights and Storage Agreement, 1962;
7) Lake Isabella Recreation Pool Agreement, 1963; and
8) Other more recent court cases further discussed below

For the past 100 years, the major users of water from the Kern River have relied upon the original division of water in the various agreements and decrees and have been contracting and interchanging Kern River water among themselves. In most cases, water disputes have been settled out of court by agreement among the disputing parties.

A relatively small portion of water presently diverted from the Kern River and its tributaries is based on post-1914 water rights. The extent and validity of the pre-1914 water rights have been challenged in court, which led to the finding of partial forfeiture of Kern Delta's water rights. (*North Kern Water Storage District v. Kern Delta Water District* (2007) 147 Cal.App.4th 555.) The present distribution, use, and basis of water rights in the Kern River is complex and based on the various decrees and agreements. As of this date, a definitive quantification of the extent and validity of all water rights on the Kern River has not been undertaken.

Kern River's Fully Appropriated Stream Status

Pursuant to Water Code sections 1205 through 1207, the State Water Board has adopted and periodically revised the Declaration. The Declaration includes a list of stream systems that have been found to be fully appropriated for all or part of the year based on court decisions or decisions of the State Water Board. The Kern River stream system has been found to be fully appropriated throughout the year from the Buena Vista Sink upstream, including all tributaries where hydraulic continuity exists in Kern County. The Kern River system was included in the original Declaration adopted by State Water Board Order WR 89-25, and it remains listed on the most recent revised Declaration adopted with State Water Board Orders WR 91-07 and WR 98-08. Order 89-25 cited State Water Rights Board Decision 1196 (D1196), issued on October 29, 1964, to include the Kern River on the Declaration. Specifically, D1196 found that, "there was no showing that there is unappropriated water available" in the Kern River watershed. (D1196, p.5.)

Change in circumstances since issuance of D1196

Water Code section 1205(b) states that, "A declaration that a stream system is fully appropriated shall contain a finding that the supply of water in the stream system is being fully applied to beneficial uses where the board finds that previous water rights decisions have determined that no water remains available for appropriation." In substantiating the Kern River's status as fully appropriated, paragraph 7 of D1196 concluded that there was no water surplus to established uses in the Kern River, based on data included in the State Water Rights Board Engineering Staff Analysis of Record, dated May 28, 1964.

California Code of Regulations title 23, section 871, subdivision (b) states that the Division Chief may recommend a hearing to consider revision to the Declaration as follows: "The Chief's recommendation for revocation or revision may be based upon any relevant factor, including but not limited to a change in circumstances from those considered in a previous water right decision determining that no water remains available for appropriation, or upon reasonable cause derived from hydrologic data, water usage data, or other relevant information acquire by the Division of Water Rights in the course of any investigation conducted by it."

Following is staff's analysis regarding the change in circumstances from the information considered in D1196.

Kern River-California Aqueduct Intertie

The U.S. Army Corps of Engineers (Corps) constructed the Kern River-California Aqueduct Intertie (Intertie) as a flood control project in 1977. The Intertie diverts water from the lower Kern River near the City of Tupman, and its flood control function is intended to protect downstream agricultural lands on the Buena Vista Lake and Tulare Lake lakebeds. Absent the Intertie and upstream uses, Kern River flows would reach these areas and be used to irrigate crops, but as a result of upstream agricultural diversions and storage in Lake Isabella, these areas are usually dry, other than in years of very large runoff.

The Corps acknowledged that the Intertie was designed with the understanding that water would be diverted into the California Aqueduct and would be put to beneficial use via the State Water Project (SWP). The Department of Water Resources (DWR) operates the facility in accordance with an agreement among DWR, the Kern County Water Agency, and other water districts asserting water rights on the Kern River. The agreement limits Intertie diversions to flood flows *in excess of the needs of the districts claiming water rights on the Kern River.*

DWR diverted water through the Intertie in six different years between 1978 and 1988, in 1997 and 1998, and again in 2006. DWR has informed the State Water Board that it intends to use the Intertie more frequently over the next several years. The State Water Board has notified DWR of the necessity for it to obtain water rights for the Intertie diversions. However, DWR has questioned its need to obtain water rights.

In 1996, North Kern filed an action with the Tulare County Superior Court that sought a judgment that pre-1914 water rights acquired by Kern Delta in 1976 were partially forfeited by nonuse. (*North Kern Water Storage District v. Kern Delta Water District* (Super. Ct. Tulare County, 1999, No. 96-172919) hereinafter "the Conn Judgment.")

The Conn Judgment found that Kern Delta's pre-1914 water rights had been partially forfeited. The Conn Judgment also declared that Kern Delta's forfeiture resulted in an unspecified quantity of unappropriated water in the Kern River. In response to the finding of unappropriated water in the Conn Judgment, North Kern, the City of Bakersfield (Bakersfield), Kern Delta and others submitted petitions to the Division to request modification of the Declaration and accompanying applications to appropriate water from the Kern River.

The Fifth District Court of Appeal later reversed the Conn Judgment and remanded the case back to the Tulare County Superior Court. After a second trial, a second judgment was rendered. (*North Kern Water Storage District v. Kern Delta Water District* (Super. Ct. Tulare County, 2004, No. 96-172919) hereinafter "the Reed Judgment.") The Reed Judgment determined that as much as 60,895 acre-feet annually of Kern Delta's rights were forfeited.

On May 26, 2005, after the Reed Judgment but before the second appeal, the Division Chief issued a notice to North Kern, Kern Delta, Bakersfield and the other petitioners that their petitions and applications submitted in response to the Conn Judgment were rejected without prejudice. The notice indicated that new petitions and applications could be presented upon final resolution of the ongoing litigation. Bakersfield filed a petition for reconsideration that was rejected by the State Water Board with Order WR 2005-0017-EXEC. That order stated in

section 3.2, "Until the litigation determining the amount of water forfeited by Kern Delta is concluded with a final judgment, it is premature for the State Water Board to conduct a hearing on whether to revise the Declaration concerning the Kern River."

Ultimately, on April 25, 2007, the California Supreme Court denied petition for review. Therefore the Fifth District Court of Appeal's February 5, 2007 decision, is final. The Appellate Court judgment concluded that there was a partial forfeiture of Kern Delta's pre-1914 water rights. (*North Kern Water Storage District v. Kern Delta Water District* (2007) 147 Cal.App.4th 555.) The Court of Appeal further ruled that although the court determined water had been forfeited by Kern Delta's predecessors, the State Water Board was the proper body to determine whether the forfeiture would affect the status of the Kern River as fully appropriated pursuant to the Declaration.

Further, the Appellate Court judgment found that North Kern's argument that Kern Delta forfeited "water" was incorrect. Instead, the Court found that Kern Delta had actually forfeited "water rights" and stated,

> If water rights are forfeited, however, the cumulative effect could be that the river is no longer oversubscribed. That is a determination not for the courts, but for the SWRCB. If those resulting limitations on appropriation might result in a determination that the Kern River is no longer fully appropriated, that determination will be made by the SWRCB on petition of a potential appropriator of the excess.

(*Id.*, at 583.)

Conclusion

Paragraph 7 of D1196 states, in part:

> A comparison of the quantities of water used in the First Point, Second Point, and Lower River Service Areas for the period 1894-1963, with the quantities of water flowing past the first point of measurement, adjusted to eliminate the effect of Isabella Reservoir, shows that there is no water surplus to the established uses of the applicants, protestants, and other users in these areas.

Diversion of water to the California Aqueduct via the Intertie on numerous occasions since its construction in 1977 confirms that there has been a change in circumstances since D1196. Kern River flows in excess of the established uses of historical water right holders have been available, and excess water has been put to beneficial use through the SWP.

Further, the underlying basis upon which the petitions for revision of the Declaration were filed is that the courts have confirmed that water rights have been forfeited by Kern Delta. This also can be considered a change in circumstances since approval of D1196, because if those forfeitures are applied historically, it could be concluded that the water in the Kern River would not have been fully applied to beneficial use as described in D1196.

Because water rights have been forfeited subsequent to the determination under D1196 which in part was based on the pre-1914 water rights, it follows that the "established uses" referred to may have diminished as evidenced by the forfeiture. Further, Section 3.3 of WR Order 98-08 states in part,

Water Code section 1205 provides for revision of the Declaration under appropriate conditions. In the event that water becomes available for appropriation due to the revocation of a previously issued permit or license, the Declaration could be revised accordingly.

The information above shows there may have been a change in circumstances since D1196 was issued. Therefore I conclude that there is sufficient information to process the petitions and conduct a hearing on the question of whether the Declaration should be revised pursuant to title 23, California Code of Regulations, section 871, subdivision (b). Any action on the petitions would be for purposes of determining whether the Declaration should be revised, and no determinations on whether to approve the pending applications would be made until after the hearing resulted in a determination on whether the stream is fully appropriated.

Concur: _____
Victoria A. Whitney
Division Chief

Date:

KMG:dcc: 08/26/08;jmtipps 09.25.08\kmg 10.02.08
U:\PERDRV\KGaffney\Kern FAS memo 10-2-08.doc

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WR-2010-0010

In the Matter of the Petitions to Revise the
Declaration of Fully Appropriated Streams to Allow
Processing of Applications to Appropriate Water from the Kern River

SOURCE: Kern River

COUNTIES: Kern and Tulare

ORDER AMENDING DECLARATION OF FULLY APPROPRIATED STREAMS TO REMOVE DESIGNATION OF THE KERN RIVER AS FULLY APPROPRIATED

BY THE BOARD:

1.0 INTRODUCTION

Pursuant to Water Code sections 1205 through 1207, the State Water Resources Control Board (State Water Board or Board) has adopted and periodically revised the Declaration of Fully Appropriated Streams (Declaration). The Declaration includes a list of streams that have been found to be fully appropriated for all or part of the year based on court decisions or decisions by the State Water Board. The Kern River system has been found to be fully appropriated throughout the year from Buena Vista Sink upstream, including all tributaries where hydraulic continuity exists in Kern County. The Kern River system was included in the original Declaration adopted by State Water Board Order WR 89-25, and it remains listed on the most recent revised Declaration adopted by State Water Board Orders WR 91-07 and WR 98-08. Order 89-25 cited State Water Rights Board Decision 1196 (D-1196), issued on October 29, 1964, as the basis for including the Kern River on the Declaration. D-1196 was based on the fact that "there was no showing that there is unappropriated water available" in the Kern River watershed. (D-1196, p.5.)

In 2007, in accordance with California Code of Regulations, title 23, section 871, five petitions were filed with the State Water Board, Division of Water Rights (Division), requesting revision of the Kern River's fully appropriated status as listed in the Declaration. The five petitions were

received from: North Kern Water Storage District and City of Shafter, City of Bakersfield, Buena Vista Water Storage District, Kern Water Bank Authority and Kern County Water Agency (Petitioners). Petitioners also filed applications to appropriate water. Petitioners cited the Fifth District Court of Appeal's decision in *North Kern Water Storage District v. Kern Delta Water District* (1997) (147 Cal.App.4th 555 [54 Cal.Rptr.3d 578]) (North Kern Decision) as the basis for filing the petitions. The Fifth District's ruling found that there was a partial forfeiture of Kern Delta Water District's (Kern Delta) pre-1914 water rights on the Kern River.

2.0 BACKGROUND

California Code of Regulations, title 23, section 871 provides that the State Water Board may revoke or revise the Declaration upon its own motion or upon petition of any interested person. In this instance, the Board received the petitions from the above-named entities to revise the Declaration. In a memorandum dated October 8, 2008, the State Water Board Deputy Director for Water Rights concluded that there was sufficient information to process the petitions and conduct a hearing on the question of whether the Declaration should be revised. The Board held a pre-hearing Conference on September 24, 2009. The purpose of the pre-hearing conference was to receive comments from the parties and other participants on the scope of the hearing, the status of any negotiations to resolve protests, and any other appropriate procedural issues. Representatives of the following parties participated in the pre-hearing conference: Kern County Water Authority, Buena Vista Water Storage District, North Kern Water Storage District, Kern County Water Agency, City of Shafter[1] and the City of Bakersfield.

The primary concern of the parties raised at the pre-hearing conference was the scope of evidence that would be considered in this proceeding. In his letter of September 25, 2009, Board Member Arthur Baggett, Jr., the hearing officer for this proceeding, stated that, as expressed in the Notice of Public Hearing, the purpose of this proceeding is to determine if there has been a change in circumstances since the Kern River was included in the Declaration sufficient to justify the State Water Board revising the Declaration for the purpose of processing water right applications for the Kern River. Therefore, the parties were requested to limit evidence and testimony to whether additional information, based on court decisions or Board

[1] At the pre-hearing conference, these five parties, collectively called the North Kern Petitioners, agreed to consolidate testimony and file most exhibits jointly. The North Kern Petitioners likewise agreed to conduct direct and cross-examination of witnesses jointly. Each participant was allowed to give a separate opening statement and closing statement.

orders, or hydrological data showing periods of flows exceeding recognized rights, has become available since the Board listed the Kern River as fully appropriated.

A question was also asked regarding whether the State Water Board would accept evidence pertaining to contractual disputes over water in the Kern River. Board Member Baggett's September 25, 2009 letter to the service list stated that to the extent that these disputes are relevant to whether additional information has become available to justify the Board revising the Declaration, then such evidence may be considered.

The final issue raised at the pre-hearing conference was the extent to which instream flows and public trust matters would be addressed in this hearing. In his September 25, 2009 letter, the Hearing Officer stated public trust issues did not appear to be relevant to this proceeding. This issue is addressed more fully in Section 5.0 of this order.

The Board held a public evidentiary hearing on October 26-27, 2009. The hearing provided an opportunity for the petitioners and all interested parties to present evidence and argument in support of their positions. Following the hearing, the Board received legal briefs from the City of Bakersfield; the North Kern Petitioners, jointly; and the Kern County Water Agency, separately.

3.0 DESCRIPTION OF PENDING PETITIONS AND APPLICATIONS

Each petitioner submitted an application to appropriate the water identified in the petitions as follows:

1) Buena Vista Water Storage District's petition and application request a right to collect a maximum of 520,000 acre-feet/annum (afa) in surface and underground storage, and to directly divert a maximum amount of 180,000 afa for the purpose of irrigation.

2) City of Bakersfield's petition and application propose combined direct diversion and surface and underground storage of 90,000 afa. The purpose of use is for irrigation, domestic, municipal, recreation, industrial, fish and wildlife enhancement, and water quality uses.

3) Kern County Water Agency's petition and application propose combined direct diversion and surface and underground storage of 2,279,000 afa. The purpose of use is for municipal, irrigation, and aquifer storage.

4) Kern Water Bank Authority's petition and application propose to directly divert at a rate of 10 cubic feet per second (cfs) for 5,000 afa for municipal use, 1,500 cfs for 490,000 afa for irrigation use, and 15 cfs for 5,000 afa for industrial use. The total combined amount taken by direct diversion and underground storage will be 500,000 afa.

5) North Kern Water Storage District and City of Shafter's petition and application request to directly divert at a rate of 1,850 cfs. The maximum combined amount of direct use and surface and underground storage is 500,000 afa. The application by North Kern Water Storage District and City of Shafter lists irrigation, groundwater replenishment, municipal, industrial, domestic and other uses, of the water.

4.0 EVIDENCE SUPPORTING REVISION OF FULLY APPROPRIATED STREAM DECLARATION

As described above, the purpose of the hearing was to receive evidence and testimony regarding whether additional information has become available since the Board listed the Kern River as fully appropriated to justify the State Water Board revising the Declaration for the purpose of processing water right applications for the Kern River. The information could be based on court decisions or Board orders, or hydrological data showing periods of flows exceeding recognized rights. To this end, both Bakersfield and the North Kern Petitioners presented evidence that in some years there are periods of flows exceeding recognized rights in the Kern River, even without regard to any additional water that may be available due to the Kern Delta's partial forfeiture of its pre-1914 water rights. (Bakersfield 2-1, p. 15 ¶ 69 & 70; Joint Exhibit (JE)-46, pp. 2-3, ¶ 4.)

Specifically, Bakersfield submitted exhibit 2-18, which is a table of water diversions via the Kern River/California Aqueduct Intertie (Intertie). This table shows Kern River water being diverted into the Intertie in nine separate years since 1978.

Likewise, the North Kern Petitioners presented a graph; exhibit JE 67, showing Kern River water "undistributed to existing entitlements" in several years. Daniel Easton, witness for the North

Kern Petitioners, explained in his written and oral testimony that there was what he calls "undistributed release" water in at least eight months since 1964. (JE-46, p. 12, ¶ 28; Reporter's Transcript (R.T.) pp. 208-209.) Mr. Easton testified that water diverted into the Intertie is in excess of traditionally held and exercised rights and claims of right to Kern River water, and that whenever water has been released into the Intertie in the past, all Kern River water right claims had already been satisfied. (R.T. p. 264.) This water is, by definition, unappropriated water.

When asked about this "undistributed" water, Mr. Easton expressed his belief that the North Kern Decision would not have changed the availability of water in years of high flows; that water would have been available in those years anyway. (R.T. pp. 210-211.) Because the purpose of this hearing was to determine whether there is unappropriated water in the Kern River, not limited to whether the North Kern Decision made additional water available for appropriation, Mr. Easton's point merely reinforces the fact that in some years there is unappropriated water. Mr. Easton's point that water would have been available in those years regardless of the North Kern Decision further supports the conclusion that unappropriated water exists in the Kern River in some years.

In addition to the undisputed evidence that water has historically been diverted into the Intertie, and that those diversions are in excess of any proprietary water rights to the diversion and use of Kern River water, the evidence presented by the parties did not clearly resolve whether the partial forfeiture of Kern Delta's rights itself created any additional unappropriated water. Because, however, there is sufficient evidence, as discussed above, to justify the State Water Board revising the Declaration for the purpose of processing water right applications for the Kern River, the Board will not make a determination at this time regarding whether the other pre-1914 rights claimants will use, in full, any water released to the Kern River by the forfeiture judgment. It will be up to the applicants to show when and how much available water there is for appropriation in the context of the Division's processing of those applications.

5.0 ENVIRONMENTAL ISSUES/PUBLIC TRUST

Several parties raised the issue of the extent to which instream flows and public trust matters would be addressed in this hearing. In his September 25, 2009 letter to the service list, the Hearing Officer stated that based on the key issues identified in the August 24, 2009 Notice of Public Hearing, public trust issues did not appear to be relevant to this proceeding. As specified in the Notice of Public Hearing, no determination regarding approval of the pending applications for appropriation of water will be made until after the State Water Board makes a determination on whether the stream system is fully appropriated.

The environmental issues associated with the North Kern Petitioners' and City of Bakersfield's water right applications will be addressed by the State Water Board in the context of processing Petitioners' applications. Prior to any potential approval or decision to proceed with a proposed project, these entities and the State Water Board must fulfill their obligations under the California Environmental Quality Act (CEQA). (Pub. Res. Code, § 21000 et seq.) In addition to meeting statutory responsibilities under CEQA, the State Water Board will comply with its obligation to consider environmental and public interest issues under the Water Code and the public trust doctrine in the context of processing the water right applications submitted by Petitioners. As such, those issues are not relevant to this order.

6.0 CONCLUSION

It is clear from the evidence and testimony submitted by the parties to this hearing that, even without regard to the North Kern Decision, there is some unappropriated water in the Kern River. The State Water Board recognizes that processing water right applications will require consideration of numerous issues not addressed in this order, including those discussed above, the specific amounts of water available for appropriation under the applications, the season of water availability, the public interest in approval or denial of the applications, and any conditions to be included in any permits that may be issued on the applications. As indicated in the hearing notice, the focus of the Board's inquiry in this proceeding was on the relatively narrow task of determining if the evidentiary record supports revising the fully appropriated status of the Kern River. Based on our review of the record and the findings above, we conclude that the Declaration of Fully Appropriated Streams, as adopted by State Water Board Orders WR 89-25, WR 91-07 and WR 98-08, should be revised to allow for processing the applications to

appropriate water from the Kern River in accordance with the provisions of the Water Code and other applicable law.

ORDER

IT IS HEREBY ORDERED THAT, based upon the foregoing findings:

1) The Declaration of Fully Appropriated Streams, as adopted by the State Water Board in Orders WR 89-25, WR 91-07 and WR 98-08, is amended to allow for processing applications to appropriate water from the Kern River.[2]

2) The Division shall process any water right applications accepted as a result of this order in accordance with applicable law.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on February 16, 2010.

AYE:	Chairman Charles R. Hoppin Vice Chair Frances Spivy-Weber Board Member Arthur G. Baggett, Jr. Board Member Tam M. Doduc Board Member Walter G. Pettit
NAY:	None
ABSENT:	None
ABSTAIN:	None

Jeanine Townsend
Clerk to the Board

[2] This order does not affect the separate designations of the North Fork Kern River or the unnamed spring tributary to Cuddy Creek as fully appropriated.

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WR 2010-0016

In the Matter of Petition for Reconsideration of

North Kern Water Storage District
City of Shafter
Buena Vista Water Storage District
Kern Water Bank Authority
Kern County Water Agency

Regarding Order Amending Declaration of Fully Appropriate Streams
To Remove Designation of the Kern River as Fully Appropriated

---

ORDER DENYING RECONSIDERATION

BY THE BOARD:

1.0 INTRODUCTION

On February 16, 2010, the State Water Resources Control Board (State Water Board or Board) issued State Water Board Order (Order) WR 2010-0010 amending the Declaration of Fully Appropriated Streams (FAS declaration) to remove the designation of the Kern River as fully appropriated. The FAS declaration was amended based on evidence showing unappropriated water in the Kern River. North Kern Water Storage District, City of Shafter, Buena Vista Water Storage District, Kern Water Bank Authority and Kern County Water Agency (Petitioners) jointly filed a petition for reconsideration on March 18, 2010 (Petition). Petitioners request that the State Water Board amend Order WR 2010-0010 to find that the petitioners requesting revision of the FAS declaration failed to demonstrate the existence of unappropriated water available for appropriation, and for that reason dismiss all petitions to revise the declaration. Petitioners also request that the Board amend Order WR 2010-0010 to "clearly state that occasional flood flows are not the basis for amending the FAS declaration absent an application" to place such waters to beneficial use, and for that reason dismiss all petitions to revise the declaration. In the alternative, Petitioners ask that the Board reopen the proceeding to receive further evidence regarding whether the Fifth District Court of Appeal's (Court of Appeal) decision in *North Kern*

Water Storage District v. Kern Delta Water District (*North Kern*) (1997) 147 Cal.App.4th 555 resulted in additional water available for appropriation and definitively resolve that issue before accepting any water right applications on the Kern River.

2.0 GROUNDS FOR RECONSIDERATION

Any person interested in any application, permit or license affected by a State Water Board decision or order may petition for reconsideration of the decision or order. (Cal. Code Regs., tit. 23, § 768.)[1] The legal bases for reconsideration are: (a) irregularity in the proceedings, or any ruling, or abuse of discretion, by which the person was prevented from having a fair hearing; (b) the decision or order is not supported by substantial evidence; (c) there is relevant evidence which, in the exercise of reasonable diligence, could not have been produced; or (d) error in law.

The State Water Board may refuse to reconsider a decision or order if the petition for reconsideration fails to raise substantial issues related to the causes for reconsideration set forth in section 768 of the State Water Board's regulations. (§ 770, subd. (a)(1).) Alternatively, after review of the record, the State Water Board may deny the petition if the State Water Board finds that the decision or order in question was appropriate and proper, set aside or modify the decision or order, or take other appropriate action. (*Id.*, subd. (a)(2)(A)-(C).)

3.0 LEGAL AND FACTUAL BACKGROUND

The Kern River system was previously found to be fully appropriated throughout the year from the Buena Vista Sink upstream, including all tributaries where hydraulic continuity exists in Kern County, and, pursuant to Water Code section 1205, was included in the original FAS declaration. (Order WR 89-25.) That original FAS declaration cited State Water Rights Board D1196 (D1196), issued on October 29, 1964, as the basis for including the Kern River in the declaration. (Order WR 89-25, pp. 13-14.)

[1] All further regulatory references are to the State Water Board's regulations located in title 23 of the California Code of Regulations unless otherwise indicated.

In 2007, five petitions were filed with the State Water Board's Division of Water Rights (Division), requesting revision of the Kern River's fully appropriated status as listed in the FAS Declaration. The five petitions were received from the North Kern Water Storage District (North Kern) and City of Shafter, City of Bakersfield, Buena Vista Water Storage District, Kern Water Bank Authority and Kern County Water Agency. The petitions cited *North Kern* as the basis for filing the petitions. The Court of Appeal's ruling in *North Kern* found that there was a partial forfeiture of Kern Delta Water District's pre-1914 water rights on the Kern River, leaving it to the State Water Board to determine whether the Kern River is no longer fully appropriated. (*North Kern*, *supra*, 147 Cal.App.4th p. 583.)

Pursuant to section 871, subdivision (b), Victoria Whitney, the State Water Board Deputy Director for Water Rights, issued a memorandum dated October 8, 2008 (Whitney Memo), concluding that there is sufficient information to process the petitions and conduct a hearing on the question of whether the FAS declaration should be revised. The Whitney Memo identified two changes in circumstances since D1196 was issued in 1964 that provide bases for concluding that water may be available for appropriation. First, water has been diverted from the Kern River into the California Aqueduct on numerous occasions since the aqueduct's construction in 1977. (Whitney Memo, pp. 3-4.) Second, *North Kern* found that some of the rights that were considered in D1196 had been partially forfeited. (*Id.,* at pp. 3-5.)

On August 24, 2009, the Board issued a Notice of Public Hearing and Pre-Hearing Conference (Hearing Notice), stating that any action on the petitions would be for purposes of determining whether the Declaration should be revised, and no determination regarding approval of the pending applications will be made until after the Board makes a determination on whether the stream system is fully appropriated. (Hearing Notice, p. 2.) Pursuant to the Hearing Notice, the State Water Board held a pre-hearing conference on September 24, 2009 and a public hearing on October 26 and 27, 2009. After receiving all evidence, the Board accepted closing arguments, and on February 16, 2010, issued Order WR 2010-0010 amending the FAS Declaration to remove the designation of the Kern River as fully appropriated. Order WR 2010-0010 concluded that there is unappropriated water on the Kern River, because water in excess of any proprietary water right to diversion from the Kern River has been diverted into the Kern River-California Aqueduct Intertie (Intertie). (*Id.*, pp. 4-5.) Having determined that there is some unappropriated water on the Kern River without regard to the forfeiture,

Order WR 2010-0010 concluded that it was unnecessary to determine how much, if any, additional water was made available through forfeiture. (*Id.*, pp. 5-6.)

4.0 DISCUSSION

Petitioners offer six reasons why they believe Order WR 2010-0010 is inappropriate and improper. In summary, these arguments claim that it has not been established that any additional water has been made available for appropriation as a result of forfeiture, and that it was inappropriate to consider other changes in circumstances indicating that water is available for appropriation.

4.1 It is not necessary for the evidentiary record to prove that the *North Kern* decision created "new water."

In Order WR 2010-0010, the Board concluded that even without regard to the *North Kern* decision, the evidentiary record established that there is some unappropriated water in the Kern River. Petitioners contend that "a petition [must] be dismissed unless the petitioner proves the existence of 'new water'." (Petition, p. 4.) Petitioners equate "new water" with a demonstration that the *Kern River* decision made additional water supplies available in excess of that needed to satisfy existing rights. (See *id.*, pp. 7-8.)

The Water Code does not set any specific limitation on the factors that may be considered in determining whether to revise the FAS declaration. (Wat. Code, § 1205, subd. (c).) State Water Board regulations indicate that the FAS declaration may be revised based on "any relevant factor, including but not limited to a change in circumstances …. " (§ 871, subd. (b).) The diversion of water into the California Aqueduct through the Intertie in amounts in excess of those needed to meet the demands of proprietary water right holders on the Kern River is a relevant factor because it constitutes a change in circumstance and demonstrates that there is unappropriated water on the Kern River.

In support of their argument that the existence of "new water" must be established, Petitioners rely on Order WR 2000-12.[2] However, Order WR 2000-12 does not specify such a requirement. As Petitioners recognize, Order WR 2000-12 determined that there was a basis for revising the FAS declaration because "water previously lost as flood flows can now be stored or regulated by the new Seven Oaks Dam flood control project." (Order WR 2000-12 at p. 1, see *id.* at pp. 13-14.) One of the circumstances justifying a revision of the FAS declaration here – the construction of a major water development project making it possible to capture what were previously considered to be flood flows that could not practicably be appropriated – is essentially the same as identified as a basis for modifying the FAS declaration in Order WR 2000-12.[3]

4.2 The Board was not required to determine whether the North Kern decision resulted in unappropriated water.

Petitioners contend that the Board improperly deferred a decision whether the *North Kern* decision resulted in appropriated water. Because the evidence in the record established that there is some unappropriated water in the Kern River even without regard to the forfeiture issue, it was unnecessary to determine whether the *North Kern* decision resulted in unappropriated water. It is not necessary to determine how much unappropriated water is available, and therefore is not necessary, at this stage, to determine whether there are additional reasons unappropriated water may be available beyond that identified as a basis for deciding that at least some unappropriated water is available. Once it is determined that there is adequate cause to revise the FAS declaration, the determination whether sufficient unappropriated water is available for the diversion and use proposed under an application can best be decided in proceedings to issue or deny a permit on that application. As stated in Order WR 2010-0010:

> [P]rocessing water right applications will require consideration of numerous issues not addressed in this order, including … the specific amounts of water available for appropriation under the applications, the season of water

[2] Petitioners also rely on an unpublished draft Board order concerning the American River. Because a draft order has not been adopted by the Board, it does not constitute "longstanding FAS precedent," and Petitioners' reliance on it is misplaced.

[3] Petitioners characterize the water made available by the Seven Oaks flood control project as "new water." (Petition, p. 6.) Applying Petitioners' definition of "new water," water made available through flood control facilities that divert water through the Intertie would also constitute "new water." Because the Water Code, Board regulations and Board precedents do not establish any requirement for "new water," we see no need to define the term.

> availability, the public interest in approval or denial of the applications, and any conditions to be included in any permits that may be issued on the applications.

(Order WR 2010-0010, p. 6.)

The Board has been consistently clear that these issues would not be decided during this particular portion of the proceeding, and that "[a]s indicated in the hearing notice, the focus of the Board's inquiry in this proceeding was on the relatively narrow task of determining if the evidentiary record supports revising the fully appropriated status of the Kern River." (*Ibid.*)

This approach is consistent with the Board's approach in previous Board orders. As part of an order revising the FAS declaration as applied to the Santa Ana River, the Board stated:

> All questions regarding the specific amount of water available for appropriation under the applications, the season of water availability, approval or denial of the applications, and the conditions to be included in any permit(s) that may be issued… will be resolved in further proceedings on each application pursuant to applicable provisions of the Water Code.

(Order WR 2000-12, p. 2.)

In Order WR 94-1, the Board denied a request for modification of the declaration for the Kern River because there had been no "showing that hydrologic conditions in the Kern River have changed or that other circumstances exist which justify the continued processing of Application 27554." (Order WR 94-1, p. 9.) The Board did not suggest that the petitioner was required to show exactly how much water had been made available in order for the Board to revise the declaration. The Board merely required a sufficient showing of the availability of at least some unappropriated water as to justify the processing of an application.

Contrary to Petitioners' contentions, this approach is not in conflict with the *North Kern* decision. The Court of Appeal held that "the initial determination whether the forfeiture creates an allocable excess is reserved in the first instance to [the State Water Board]." (*North Kern*, *supra,* 147 Cal.App.4th p. 584.) The *North Kern* decision did not dictate that the Board would make its determination as part of its processing of a petition for revising the FAS declaration. If the FAS declaration is revised based on a determination that at least some water is available for appropriation, the Board may determine how much, if any, water is made available as a result of forfeiture as part of its subsequent review of an application to appropriate the water alleged to

have been forfeited. The approach followed by the Board in Order WR 2010-0010, where the Board determines to what extent unappropriated water is available as a result of the forfeiture in the context of a request by a party seeking to appropriate that water, is fully consistent with the *North Kern* decision. (See *id.,* p. 583 [the "determination will be made" by the State Water Board in reviewing "a petition of a potential appropriator of the excess."].)[4]

4.3 The evidence in the record supports the conclusion that water diverted into the Intertie is unappropriated water.

The Whitney Memo directly raises the issue of water diverted into the Intertie, stating that "the agreement [between the Department of Water Resources (DWR), the Kern County Water Agency and other water districts asserting water rights on the Kern River] limits Intertie diversions to flood flows *in excess of the needs of the districts claiming water rights on the Kern River.*" (Whitney Memo, p. 3, italics in original.) Evidence presented at the hearing, as described in Order WR 2010-0010, directly supports this conclusion. Petitioners contend that the evidence supporting this conclusion cannot be relied upon.

Petitioners concede that substantial amounts of water have been diverted into the California Aqueduct, with diversions occurring on several occasions. (See Order WR 2010-0010, pp. 4-5.) They claim, however, that the testimony that these diversions were in excess of the needs of water right holders should be disregarded because the witnesses did not have the expertise necessary to conduct a legal analysis for the water rights of parties claiming rights on the Kern River. (Petition, pp. 13-14.) Petitioners' argument mischaracterizes the nature of the testimony, which was based on the demands of those claiming entitlements, not the amounts to which the claimants might be entitled if they both intended to divert and reasonably needed the water for beneficial use. All water rights are limited to amounts reasonably necessary for beneficial use (Wat. Code, §§ 100, 101), and even if water could be put to beneficial use, it is unappropriated water if no water right holder intends to use it. (See *id.,* § 1201.) The witnesses were familiar

[4] We do not read the Court of Appeal's use of the word "petition" as intended to exclude the State Water Board's consideration of the issue as part of its processing of a water right application. There is no indication that the court had any intent to limit the discretion vested in the Board, including the discretion to decide which procedures the Board should employ in making its determination.

with hydrologic conditions and water demands on the Kern River, and were competent to testify on those issues. (See Joint Exhibit (JE) 46 and Bakersfield Exhibit 2-1.) Their testimony was more than adequate to support the conclusion that the waters diverted into the Intertie are taken from flows in excess of the amounts reasonably necessary to meet the demands of those with entitlements to divert water for beneficial use from the Kern River.

Based on previous determinations that the Kern River is fully appropriated, Petitioners also contend that the record indicates that diversions though the Intertie were not in excess of proprietary rights. (Petition, pp. 15-17.) But these determinations were based on conditions as they were understood to be prior to construction of the Intertie. (See, e.g., D1196; see also Order WR 89-25 [basing determination on the record before the Board when it issued D1196].) Moreover, these determinations and testimony cited by Petitioners are addressed to the general issue of whether unappropriated water is available under most conditions, and does not specifically address the relatively infrequently occurring conditions prevailing at times when water is diverted though the Intertie. Far from establishing that there is never any unappropriated water on the Kern River, Petitioners' reliance on previous determinations underscores the point that the evidence concerning diversions through the Intertie amounts to changed conditions.

Petitioners contend that there is "no evidence" that the water diverted through the Intertie has been "anything other" than water voluntarily transferred pursuant to pre-1914 appropriative rights. (See Petition, p. 18, citing Wat. Code, § 1706.)[5] But a voluntary transfer would be made pursuant to the entitlements and demands of Kern River users, contrary to the testimony that diversions through the Intertie are based on water in excess of those demands. (See JE 46 and Bakersfield Exhibit 2-1; see also Whitney Memo, p. 3 ["the agreement [between DWR, the Kern County Water Agency and other water districts asserting water rights on the Kern River] limits Intertie diversions to flood flows *in excess of the needs of the districts claiming water rights on*

[5] In the alternative, Petitioners contend that if the water diverted into the Aqueduct is being diverted solely for flood control purposes, and not for beneficial use, then the diversions are not subject to the Board's water right authority. (Petition, p. 18-19; see generally State Water Board Decision 100, p. 61 [flood control is not a beneficial use].) The purpose of these proceedings is not to determine whether water diverted though the Intertie is subsequently put to beneficial use for which a water right permit is required, but merely to determine whether the FAS declaration should be revised. Evidence that water is being diverted through the Intertie and exported from the Kern River watershed during periods when the diversion does not injure any water right holder on the Kern River, where there is no permit authorizing appropriation of water diverted through the Intertie, establishes the availability of unappropriated water whether or not a permit is required for those diversions.

the Kern River."].) The testimony also indicated that diversions were made for flood control purposes. (Reporter's Transcript, pp. 263-265.) There is no evidence in the record that any, let alone all, of the water diverted through the Intertie was delivered pursuant to a voluntary transfer under pre-1914 water rights.

4.4 In determining whether to revise the FAS declaration, the Board is not limited to consideration of sources of unappropriated water sought to be appropriated by a party petitioning for revision of the FAS declaration.

Petitioners suggest that because there are no applications for water diverted into the Intertie, the Board cannot amend the FAS declaration based on the availability of that water. (Petition, pp. 19-21.) However, the procedures for revising the FAS declaration do not limit the Board's consideration to water sought to be appropriated in an application filed by a petitioner, or even require that an application be filed. Board regulations establish that the Board may revise the declaration based either on the recommendation of the Deputy Director for Water Rights, as provided by section 871, subdivision (b), or based on a petition of a person seeking revision of the fully appropriated status of a stream system, as provided by section 871, subdivision (c). Subdivision (b) does not include any requirement for the filing of an application, and under subdivision (c), a petitioner "may," but is not required to, file an application accompanying the petition. (§ 871, subd. (c)(2).) The proceedings leading to adoption of Order WR 2010-0010 were based both on the recommendations of the Deputy Director for Water Rights and the petitions that had been filed.

Petitioners claim that they did not have proper notice that the availability of water diverted into the Intertie was relevant to whether the FAS declaration should be revised. This contention is without merit. The Whitney Memo, which was sent to the parties under cover of letter dated October 30, 2008, directly raises the issue of water diverted into the Intertie and unambiguously specifies that construction and use of the Intertie constitute changed circumstances since 1964. (Whitney Memo, p. 4.) The hearing notice clearly identified this memo as part of its discussion of the bases for the proceedings, and included a link to the Whitney Memo. (Hearing Notice, p. 2.) The Hearing Notice recited the conclusion that "there is sufficient information to process the petitions *and conduct a hearing on the question of whether the Declaration should be revised pursuant to California Code of Regulations, title 23, section 871, subdivision (b).*" (*Ibid.*) Thus, the parties were on notice that the hearing would include consideration of the

recommendations of the Deputy Director for Water Rights, as provided by section 871, subdivision (b), including the Deputy Director's recommendation that the FAS declaration be revised due to changed circumstances involving diversions into the Intertie, and not based solely on the petitions, pursuant to section 871, subdivision (c).

4.5 The potential for issuance of temporary permits does not preclude revision of the FAS declaration.

Petitioners claim it was legal error to revise the FAS declaration based on evidence indicating unappropriated water is available intermittently, during periods of high flows. (Petition, pp. 21-23.) Petitioners point out that these flows could be appropriated based on temporary permits, even if a stream system is listed as fully appropriated in the FAS declaration. (See Wat. Code, §§ 1206, subd. (c), 1425 et seq.) The temporary permit procedure is not intended as a substitute for approval of appropriations pursuant to the ordinary permitting process. (See *id.*, § 1425, subds. (a) [authorizing temporary permits based on "urgent need"] & (c) [the Board ordinarily should not issue a temporary permit if the applicant has not exercised due diligence to obtain a permit pursuant to the ordinary permitting process].) The desirability of authorizing appropriations though the ordinary permitting process, instead of through repeated issuance of temporary permits, is underscored by the statement in the Whitney Memo that "DWR has informed the State Water Board that it intends to use the Intertie more frequently over the next several years." (Whitney Memo, p. 3.)

While Petitioners are correct that temporary permits could be issued to authorize appropriations of flood flows, it does not follow that a temporary permit is the best or only method for authorizing such appropriation, as the circumstances where a temporary permit may be issued include almost any other circumstance that might support amendment of the FAS declaration to remove a fully appropriated listing. A temporary permit may be issued if unappropriated water is available on a stream system listed as fully appropriated, and permitting the appropriation would further the state policy that waters should be put to beneficial use to the fullest extent to which they are capable. (Wat. Code, § 1425, subd. (c).) If the FAS declaration could not be amended under circumstances where a temporary permit could be issued, the FAS declaration could not be amended based on changed circumstances indicating that unappropriated water is available. The Water Code provides the Board with broad authority to revoke or revise a declaration that a stream system is fully appropriated, without any reference to whether unappropriated waters are

available only occasionally or could be appropriated pursuant to temporary permits. (*Id.*, § 1205, subd. (c).) Adopting Petitioners' argument would eliminate that discretion, leaving the Board with little or no ability to revise a declaration that a stream system is fully appropriated.

In Order WR 2000-12, the Board revised the declaration that the Santa Ana River is fully appropriated based on occasional flood flows. Petitioners do not contend that Order WR 2000-12 was incorrectly decided, but instead argue that the Board's authority to revise the FAS declaration based on intermittently or occasionally available flows is limited to cases where an application is filed to appropriate those flows. (Petition, pp. 22-23.) As discussed above, however, the Board's authority to revise the FAS declaration is not limited to those issues that must be decided in addressing an application accompanying a petition to revise the FAS declaration.

As in the case of Order WR 2000-12, revising the FAS declaration here is consistent with the constitutional policy of putting waters to beneficial use to the fullest extent to which they are capable. (Cal. Const., art. X, § 2.) Revising the FAS declaration allows for the filing of applications to obtain rights to put to beneficial use high flows initially diverted for flood control purposes pursuant to the statutory appropriative rights procedures, and these statutory procedures are in furtherance of the constitutional policy. (See Wat. Code, § 1050.)[6]

[6] Order WR 2010-0010 and this order do not specifically address the issue of whether a permit is required for current operations of the Intertie. It is unnecessary to address that issue in order to determine that the FAS declaration should be revised, and the Department of Water Resources has requested that we not make a determination on the issue at this time. The Board's decision not to address the issue should not be construed as a determination that no permit is required or that the Board has any misgivings about the opinions expressed by the Chief Counsel in a memo dated January 22, 2007. Allowing parties to obtain water rights for beneficial use of waters diverted through the Intertie helps promote the constitutional policy of putting water to full beneficial use, and the Legislative determination that this policy should be implemented through the statutory permitting and licensing system, whether or not a permit is required for diversions through the Intertie.

4.6 Order WR 2010-0010 is not unlawfully broad or uncertain.

Petitioners observe that the Board has discretion to impose conditions and limitations when it revises the FAS declaration to remove the designation of a stream system as fully appropriated, but cite no authority requiring the Board to impose conditions and limitations. In this case, the Board has determined that at least some unappropriated water is available, but has not determined how much. While some water rights on the Kern River have been partially forfeited under the *North Kern* decision, and some water may be available for appropriation as a result, it has not been determined how much, if any, unappropriated water has become available, or under what conditions it may have become available due to forfeiture. In addition, while water has been diverted through the Intertie only occasionally, it appears that the Intertie will be used more frequently in the future. In these circumstances, it would be difficult, if not impossible, to craft conditions or limitations that would meaningfully limit the types of applications that could be filed without having the undesirable effect of precluding applications seeking to appropriate water that is in fact unappropriated.

In these circumstances, Order WR 2010-0010 reasonably concluded that issues concerning the specific amounts of water available for appropriation, the season of water availability, and other issues relevant to determining whether water rights permits may be issued are best determined as part of the processing of water right applications. (Order WR 2010-0010, p. 6.) As part of its evaluation of a water right application, the Board may require the applicant to prepare and submit a water availability analysis. (See Wat. Code, §§ 1260, subd. (k), 1275, subd. (a).) The Board may also require of those who protest the application based on claims that the appropriation would divert water to which they are entitled, that they provide information supporting their protests. (*Id.,* § 1335, subd. (c)(3).) These procedures allow the Board to address availability of unappropriated water as part of application processing in greater detail than in a FAS declaration proceeding. Application processing procedures also serve to address other relevant issues, including environmental and public trust issues. (Order WR 2010-0010, p. 6.)

While the Board has discretion to impose conditions and limitations on the applications it will consider, imposing conditions like those suggested by Petitioners is neither necessary nor desirable at this time. If, as part of its consideration of an application, the Board issues an order

or decision determining that no water is available for appropriation under particular seasons or conditions, including but not limited to a determination that no water is available for appropriation taking into account waters reasonably necessary for the protection of instream beneficial uses under those seasons or conditions, the Board may amend the FAS declaration at that time. (See Wat. Code, §§ 1205, subd. (b), 1243.)

ORDER

IT IS HEREBY ORDERED THAT, for the foregoing reasons, Petitioners' petition for reconsideration is denied.

CERTIFICATION

The undersigned Clerk of the Board does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 4, 2010.

AYE:	Chairman Charles R. Hoppin Vice Chair Frances Spivy-Weber Board Member Arthur G. Baggett, Jr. Board Member Tam M. Doduc Board Member Walter G. Pettit
NAY:	None
ABSENT:	None
ABSTAIN:	None

Jeanine Townsend
Clerk to the Board

ENDORSED

FILED
SUPERIOR COURT, METROPOLITAN DIVISION
COUNTY OF KERN

JUL 21 2011

TERRY McNALLY, CLERK
BY _____ DEPUTY

SUPERIOR COURT OF THE STATE OF CALIFORNIA

KERN COUNTY, METROPOLITAN DIVISION

NORTH KERN WATER STORAGE DISTRICT, a California Water Storage District, CITY OF SHAFTER, a municipal corporation, BUENA VISTA WATER STORAGE DISTRICT, a California Water Storage District, KERN WATER BANK AUTHORITY, a California Joint Exercise of Powers Authority, KERN COUNTY WATER AGENCY, a California Special Act District, Petitioners, v. **STATE WATER RESOURCES CONTROL BOARD,** Respondent, **CITY OF BAKERSFIELD, a charter city and municipal corporation,** Real Party in Interest.	Case No. S-1500-CV 270613 NFT **~~[PROPOSED]~~ JUDGMENT DENYING PETITION FOR WRIT OF ADMINISTRATIVE MANDATE** Dept: 17 Judge: Hon. Stephen D. Schuett Action Filed: June 2, 2010

The Petition for Writ of Administrative Mandate filed by Petitioners North Kern Water Storage District, City of Shafter, Buena Vista Water Storage District, Kern Water Bank Authority

and Kern County Water Agency (Petitioners) came on for hearing in Department 17 of this Court on March 23, 2011 at 1:30 p.m. Matthew G. Bullock, Deputy Attorney General, appeared on behalf of Respondent State Water Resources Control Board. Scott K. Kuney, Nicholas Jacobs, Daniel Raytis, Jason Ackerman, and Kevin O'Brien appeared on behalf of Petitioners. Colin L. Pearce appeared on behalf of Real Party in Interest City of Bakersfield (Bakersfield).

Having reviewed and considered all papers submitted by all parties and the administrative record, and having heard the argument of counsel, IT IS ORDERED THAT:

1. For the reasons stated in the "Final Ruling on Petition of Writ of Mandate" dated June 14, 2011 and attached hereto as Exhibit A and made a part hereof, the petition for writ of mandate is denied.
2. Judgment is entered in favor of Respondent and Bakersfield as prevailing parties in this proceeding and against Petitioners.
3. ~~Respondent and Bakersfield shall be awarded their costs.~~ SAS
4. ~~The Court shall retain jurisdiction to hear a motion for attorney fees.~~ SAS

Respondent and Bakersfield are awarded costs, subject to the filing of a Memorandum of Costs.

Dated: JUL 21 2011

JUDGE OF THE SUPERIOR COURT

STEPHEN D. SCHUETT

THE HON. STEPHEN D. SCHUETT

APPROVED AS TO FORM

SCOTT K. KUNEY
Attorney for Petitioner
North Kern Water Storage District

JASON ACKERMAN
Attorneys for Petitioner
City of Shafter

DANIEL RAYTIS
Attorneys for Petitioner
Buena Vista Water Storage District

KEVIN O'BRIEN
Attorneys for Petitioner,
Kern Water Bank Authority

NICHOLAS A. JACOBS
Attorney for Petitioner
Kern County Water Agency

COLIN L. PEARCE
Attorney for Real Party in Interest
City of Bakersfield

MATTHEW G. BULLOCK
Attorney for Respondent
State Water Resources Control Board

SA2010302141
31260107.doc

Exhibit A

SUPERIOR COURT OF CALIFORNIA

METROPOLITAN DIVISION

1415 TRUXTUN AVENUE, BAKERSFIELD, CA 93301

DATE: TUESDAY, JUNE 14, 2011 **COURT MET AT:** 11:00 AM DEPARTMENT 17

PRESENT: HON: STEPHEN D SCHUETT, JUDGE **CLERK:** LINDA KROLNIK/LK

REPORTER: NONE **BAILIFF:** NONE

TITLE:	COUNSEL:
NORTH KERN WATER STORAGE DISTRICT A CALIFORN CITY OF SHAFTER A MUNICIPAL CORPORATION BUENA VISTA WATER STORAGE DISTRICT, A CALIFO, ET AL	ERNEST A CONANT " " " "
VS.	
STATE WATER RESOURCES CONTROL BOARD, A CALIF CITY OF BAKERSFIELD, A CHARTER CITY AND MUNI	MATTHEW G BULLOCK COLIN L PEARCE

CASE NUMBER: S-1500-CV-270613, SDS

NATURE OF PROCEEDINGS: RULING. FINAL RULING ON PETITION OF WRIT OF MANDATE

SEE RULING ATTACHED AND MADE A PART HEREOF.

PETITION FOR WRIT OF MANDATE DENIED.

COPY OF MINUTE ORDER MAILED TO ALL PARTIES AS STATED ON THE ATTACHED DECLARATION

NATURE OF PROCEEDINGS: FINAL RULING ON PETITION FOR WRIT OF MANDATE

The Court, after consideration of the Petitioners' objections to the proposed decision and the responses to those objections filed by Respondent and Real Party in Interest, the court reaches the following decision:

Petitioners North Kern Water Storage District, City of Shafter, Buena Vista Water Storage District, Kern Water Bank Authority, and Kern County Water Agency (collectively "Petitioners") seek to set aside the decision of the State Water Resources Control Board (the "SWRCB")[1] set forth in WR Order 2010-0010 and WR Order 2010-0016 determining there is unappropriated water in the Kern River.

1. The Administrative Proceedings.

In 2007, the Fifth District Court of Appeals, in *North Kern Water Storage District v. Kern Delta Water District* (2007) 147 Cal.App.4th 555, held that Kern Delta Water District had forfeited certain senior water rights in the Kern River. However, the court declined to allocate those rights among the parties, deferring that process to the SWRCB: "That is a determination not for the courts in the first instance, but for SWRCB. If those resulting limitations on appropriation might result in a determination that the Kern River is no longer fully appropriated, that determination will be made by SWRCB on the petition of a potential appropriator of the excess." *Id.* at p. 583.

Subsequent to the *North Kern* decision, Petitioners, along with Real Party in Interest City of Bakersfield (the "City"), filed petitions with the SWRCB requesting that it consider revising the prior declaration of fully appropriated status (the "FAS Declaration") with respect to the Kern River. These petitions were filed pursuant to Water Code section 1205 and section 871 of Title 23 of the California Code of Regulations. Petitioners and Bakersfield also filed separate applications to appropriate water, should the SWRCB determine there was, in fact, unappropriated water in the Kern River.

In a memorandum dated October 2, 2008, the SWRCB concluded there was sufficient information to process the petitions and conduct a hearing on the question of whether the SWRCB should revise the FAS Declaration with respect to the Kern River. The SWRCB then conducted an evidentiary hearing on October 26 and 27, 2009. Petitioners and the City each presented evidence and testimony at the hearing.

On February 16, 2010, the SWRCB issued WR Order 2010-0010 amending the FAS Declaration to remove the designation of the Kern River as fully appropriated. The SWRCB concluded that there was water in excess of recognized rights, even without regard to any additional water that may be available due to Kern Delta Water District's partial forfeiture of its existing rights. The SWRCB based this decision on the finding

[1] In 1967, the State Water Quality Control Board and the State Water Rights Board were merged to form the State Water Resources Control Board. For simplicity, the Court refers collectively to the State Water Resources Control Board and its predecessor boards simply as the "SWRCB."

that there has been water diverted into the Kern River-California Aqueduct Intertie ("the Intertie"), a flood control project, in nine separate years since 1978. The SWRCB also found that because there was sufficient evidence to justify revision of the FAS Declaration on the basis of the diversion of water into the Intertie, it would "not make a determination at this time regarding whether the other pre-1914 rights claimants will use, in full, any water released to the Kern River by the forfeiture judgment." (KR002410)

On March 18, 2009, Petitioners filed a joint petition for reconsideration with the SWRCB. On May 4, 2010, the SWRCB issued Order WR 2010-0016 denying the application for reconsideration.

Petitioners now seek to set aside the decision of the SWRCB contained in WR 2010-0010 and WR 2010-0016 and have filed their petition for writ of mandate pursuant to Code of Civil Procedure section 1094.5. Petitioners allege four causes of action. First, that the SWRCB acted in excess of its jurisdiction in that the water diverted to the California Aqueduct through the Intertie is not within the jurisdiction of the SWRCB as authorized by Division 2 of the Water Code relating to the processing of applications for water rights. Second, the SWRCB acted in excess of its jurisdiction by failing to follow the procedures set forth in Water Code section 1205 and section 871, Title 23 of the California Code of Regulations in conducting the proceedings that led to the decision challenged by Petitioners. Third, the SWRCB's decision constitutes prejudicial abuse of discretion by adopting findings that are not supported by the evidence. Fourth, the SWRCB failed to proceed in the manner required by law by failing to follow the *North Kern* decision.

For the reasons stated below, the Court denies the Petition for Writ of Mandate.

2. Petitioners' Standing

Real party in interest City challenges the standing of the Petitioners to bring this action because Petitioners are not aggrieved in any way by the decision below of the SWRCB. City argues that the SWRCB has not made any order or taken any action which impacts the rights of Petitioners, any other rights on the Kern River or the practical operation of the Kern River. Moreover, argues the City, the Petitioners obtained exactly what they asked for by filing their petitions with the SWRCB, a declaration that the Kern River is not fully appropriated. "Generally speaking a party not aggrieved is a party not beneficially interested." *Grant v. Board of Med. Examiners* (1965) 232 Cal.App.2d 820, 827.

In *Bodinson Mfg. Co. v. California Employment Commission* (1941) 17 Cal.2d 321, the court considered whether an employer was a beneficially interested party under Code of Civil Procedure section 1086. In concluding it was, the court stated:

> We are aware of no authority which holds that a person permitted by statute to participate as an interested party in the administrative hearings and to take appeals at the administrative level is, nevertheless, without a

> sufficient interest in the result to test the legality of the final decision before a court of law. Indeed, it seems to us that elemental principles of justice require that parties to the administrative proceeding be permitted to retain their status as such throughout the final judicial review by a court of law, for the fundamental issues in litigation remain essentially the same. (Cf. *L. Singer & Sons v. Union Pac. R. Co.*, ___ U. S. ___ [61 Sup. Ct. [Adv.] 254, ___ L. Ed. ___], Frankfurter, J., concurring at p. 259.) Furthermore, it seems apparent that the employer whose reserve account is affected is the only person having sufficient incentive to challenge a decision awarding benefits. Action by this employer provides the only procedural guarantee that the commission can be held by legal process to comply with the requirements of the statute under which it operates.

Water Code section 1205 allows "any interested person" to petition the SWRCB seeking a revocation or revision of a declaration that a stream system is fully appropriated. Petitioners filed their petitions as permitted by the Water Code as interested parties. Petitioners continue to retain their "interested person" status in this writ proceeding to test before a court of law the legality of the SWRCB's final decision. *Temescal Water Co. v. Department of Public Works* (1955) 44 Cal.2d 90, 107. Therefore, Petitioners have standing under Code of Civil Procedure section 1086.

3. Standard of Review

Subsection (b) of Code of Civil Procedure §1094.5 states that "[t]he inquiry in such a case shall extend to the questions whether the respondent has proceeded without, or in excess of jurisdiction; whether there was a fair trial; and whether there was any prejudicial abuse of discretion. Abuse of discretion is established if the respondent has not proceeded in the manner required by law, the order or decision is not supported by the findings, or the findings are not supported by the evidence." Where, as here, the issue is whether a fair administrative hearing was conducted, the petitioner is entitled to an independent judicial determination of the issue: *City of Fairfield v. Superior Court* (1975) 14 Cal.3d 768, 776. This independent review is not a "trial de novo." *Hadley v. City of Ontario* (1974) 43 Cal.App.3d 121, 127. Instead, the court renders its independent judgment on the basis of the administrative record. Accordingly, the parties have stipulated that the standard of review in this matter, at least with respect to the First, Second and Fourth causes of action, should be "de novo." The Court has therefore considered those causes of action using that standard of review.

Real parties in interest City and SWRCB believe the Third Cause of Action should also be reviewed under the substantial evidence standard. Petitioners argue that the Third Cause of Action should be reviewed under the "independent judgment" test. For the reasons stated below, the Court determines that the Third Cause of Action is subject to review under the substantial evidence standard.

Under Code of Civil Procedure section 1094.5(c), "[i]n cases in which the court is authorized by law to exercise its independent judgment on the evidence, abuse of

discretion is established if the court determines that the findings are not supported by the weight of the evidence." By law, the trial court must exercise its independent judgment when the administrative decision substantially affects a vested right of the petitioner. *Bixby v. Pierno* (1971) 4 Cal.3d 130.

Petitioners argue their vested rights are affected by the decision of the SWRCB in this case because "the Order infringes upon existing Kern River water rights entitlements which are fundamental and vested." (Petitioners' Opening Brief, at 20:8-10.) However, the effect of a revocation of a fully appropriated stream declaration is to allow processing of water rights applications, not to approve an application or to make the findings required as a prerequisite to the issuance of a water right, i.e. that there is definitely unappropriated water available to supply the applicant. Water Code §1375(d). The effect of revoking the declaration is only to give the applicants the opportunity to subsequently obtain an individualized determination on the availability of unappropriated water for their applications. Once the SWRCB revokes or revises a fully appropriated stream declaration, it will process applications for permits to appropriate water on that stream system consistent with the order revoking or revising the declaration, including review of a Water Availability Analysis. Water Code §§1243, 1260 and 1375.

Because the decision of the SWRCB at this stage in the proceedings cannot determine rights to the Kern River it cannot affect Petitioners' existing rights. To the extent the SWRCB has determined there is unappropriated water in the Kern River, any potential water rights that it would issue in subsequent proceeding would, pursuant to the Water Code, be junior to and subject to all prior existing vested rights. *Temescal Water Co. v. Department of Public Works*, supra, 44 Cal.2d 90, 106. *North Kern Water Storage District v. Kern Delta Water District*, supra, 147 Cal.App. 4th 555, 583-4. Water Code §§ 695, 731. Petitioners' vested rights, whatever they may be, are not impacted by this decision of the SWRCB. Therefore, substantial evidence is the proper standard of review for the Third Cause of Action.

In reviewing the record below, this Court is mindful of the role of the trial court in this matter as explained in *Johnson Rancho Water District v. State Water Rights Board* (1965) 235 Cal.App.2d 863, 867, that "[t]he legislature has entrusted the allocation of the state's uncommitted water resources to the Water Rights Board, not to the courts. Unless it can be demonstrated that the board's actions are not grounded upon any reasonable factual basis the courts should not interfere with its discretion or substitute their discretion for that of the board. [Citations.]"

Petitioners bear the burden of proof to demonstrate that the administrative record does not contain sufficient evidence to support the SWRCB's decision. *State Water Resources Control Cases*, (2006) 136 Cal.App.4th 744, 763-64. In reviewing the SWRCB's decision, the trial court "exercises an essentially appellate function in that only errors of law appearing on the administrative record are subject to its cognizance." *El Dorado Irrigation Dist. v. State Water Resources Control Bd.* (2006) 142 CalApp.4th 937, 960. Moreover, the court should presume that the SWRCB considered the documents before it and all reasonable doubts should be resolved in favor of upholding the SWRCB's

decision. *County of Los Angeles v. State Water Resources Control Bd.* (2006) 143 Cal.App.4th 985, 997-98.

With these principals in mind, the Court has reviewed the record below and made the following determinations with respect to each of Petitioners' causes of action.

4. The SWRCB did not lack jurisdiction to determine whether to revoke the declaration of fully appropriated stream with respect to the Kern River.

Petitioners argue that errors by the SWRCB in initiating the proceedings below as well as errors with the hearing notice deprived the SWRCB of jurisdiction to act. Petitioners are incorrect.

a. The SWRCB initiated the administrative proceedings by determining the petitions showed reasonable cause to conduct a hearing.

Water Code section 1205 and section 871 of Title 23, California Code of Regulations, provide for two mechanisms by which the SWRCB may consider whether to revoke a declaration of fully appropriated stream. Subsection (c) of section 1205 provides: "Upon its own motion or upon petition of any interested person, and following notice and hearing, the board may revoke or revise a declaration that a stream system is fully appropriated." This process is further delineated in section 871, of Title 23:

> (a) The board may, upon its own motion or upon petition of any interested person, revoke or revise a declaration, as hereinafter provided.
>
> (b) Upon recommendation of the Chief, Division of Water Rights, and following notice and hearing, the board may adopt an order revoking the fully-appropriated status of a stream system which has previously been declared fully appropriated, or revising any condition specified in a declaration upon which applications to appropriate unappropriated water will be accepted for filing and registrations of small domestic use appropriations will be accepted. The Chief's recommendation for revocation or revision may be based upon any relevant factor, including but not limited to a change in circumstances from those considered in a previous water right decision determining that no water remains available for appropriation, or upon reasonable cause derived from hydrologic data, water usage data, or other relevant information acquired by the Division of Water Rights in the course of any investigation conducted by it.
>
> (c) Any person may petition the board to revoke or revise the fully appropriated status of a stream system included in a declaration. The Chief, Division of Water Rights, shall give notice of receipt of any such petition to all persons known by the Chief to be interested in the fully-appropriated status of the stream system.
>
> (1) The petition shall include hydrologic data, water usage data, or other relevant information based upon which the Chief, Division of Water Rights, may determine that reasonable cause exists to conduct a

hearing on the question whether the fully appropriated status of the stream system should be revoked or revised.

(2) The petition may also be accompanied, depending upon the magnitude of the proposed appropriation, either (A) by a proposed application to appropriate unappropriated water, or (B) by a proposed registration of small domestic use, notwithstanding that the proposed application or registration is unacceptable because it proposes appropriation from a stream system declared to be fully appropriated and does not meet existing conditions for acceptance. Any such proposed application or registration should be complete pursuant to the law and the rules of the board, including payment of the filing fee. The board may cancel the application for failure to pay any annual fee for the application when due.

(3) A proposed application or registration submitted pursuant to subsection (c)(2) will not be accepted but will be retained by the board. Should the board thereafter act in response to the petition to change the declaration in a manner which would make the proposed application or registration acceptable, the proposed application or registration will, if otherwise complete pursuant to the law and the rules of the board, be accepted. A proposed application or registration accepted pursuant to this subsection shall be assigned a priority superior to that assigned to any subsequently retained or accepted application or registration, respectively, proposing to appropriate from a source included in the earlier proposed application or registration; provided that, in proceeding upon competing applications accepted because of a change in the declaration pursuant to this section, the board will implement all provisions of law governing approval and rejection of applications including, but not limited to, Water Code section 1255 relating to public interest.

(4) If the Chief determines that the petition shows reasonable cause to conduct a hearing on the question whether the declaration should be changed, the Chief shall notice a hearing on the issue. The board may thereafter adopt an order changing the declaration or declining to do so.

(5) If the Chief determines that the petition does not show reasonable cause to conduct a hearing on the question whether the declaration should be changed, the Chief shall notify the petitioner, and all persons given notice pursuant to subsection (c) of this section, of such determination. The petitioner may, within 30 days of the date of the notice, file a request that the board review the Chief's determination. Following receipt of any such request timely filed, the board will review the Chief's determination. The board's review shall be limited to the information provided by petitioner to the Chief, pursuant to subsection (c)(1) of this section. Following its review, the board may affirm the Chief's determination, direct the Chief to reconsider the determination, or

direct the Chief to notice a hearing on the question whether the declaration should be changed.

The process provided for in section 871 contemplates that the SWRCB acts either by way of a petition filed by any person or by way of a recommendation by the Chief, Division of Water Rights.

The SWRCB argues that the Board acted under both subdivision (b), on the Board's own motion, and under subdivision (c), upon the petitions of the interested parties. Petitioners argue that the SWRCB failed to invoke either procedure properly and, therefore, lacked jurisdiction to proceed. The Court finds that both positions are incorrect, but does determine that the Board properly proceeded under the authority of subdivision (c), acting on the petitions of the parties.

Following the filing of the petitions, Katherine Mrowka, Chief, Watershed Unit 3, Division of Water Rights, in a memorandum dated October 2, 2008 to Victoria A. Whitney, Division Chief, states, "[t]herefore I conclude that there is sufficient information to process the petitions and conduct a hearing on the question of whether the Declaration should be revised pursuant to title 23, California Code of Regulations, section 871, subdivision (b)." (KR 001813.) On October 10, 2008, Deputy Director Whitney "concurred," (KR 001813.) This document has been referred to by the parties as the "Whitney Memo."

In its brief, SWRCB cites to KR 002508, which is a portion of Order WR 2010-0016 denying the application for reconsideration, as evidence of its compliance with subdivision (b). The decision relies on the Whitney Memo as the sole basis for concluding the SWRCB complied with subdivision (b). However, the record is absent of any evidence of the SWRCB's compliance with the basic requirements under subdivision (b), which are a "recommendation" by the Chief, Division of Water Rights and the Board acting "on its own motion."

SWRCB contends the Whitney Memo is "tantamount" to a recommendation by the Chief, Division of Water Rights. However, the statement in the Whitney Memo clearly reflects only the determination of reasonable cause to conduct a hearing on the petitions and there simply is no recommendation to the Board for the Board to proceed on its own motion. Moreover, there is nothing in the record to demonstrate that the Board did in fact proceed on its own motion. While the SWRCB now contends that the there is no need for the Board to present itself with a formal written motion, section 871 clearly contemplates some affirmative action by the Board in order to proceed under subdivision (b) and this did not occur. Therefore, there has not been compliance by the SWRCB with subdivision (b).

However, the Court's determination that the SWRCB did not comply with subdivision (b) does not mean it lacked jurisdiction to proceed. Subdivision (c)(4) of section 871 provides that "[i]f the Chief determines that the petition shows reasonable cause to conduct a hearing on the question whether the declaration should be changed, the Chief

shall notice a hearing on the issue." The Whitney Memo documents the Chief's determination that there was reasonable cause to conduct the hearing and proceeded on that basis. Therefore, there has been compliance with subdivision (c) in initiating the hearing process.

b. The notice of hearing was not inadequate.

Subsection (a) of section 874 of title 23, California Code of Regulations governs the notice of hearing:

> (a) The Chief, Division of Water Rights, shall give notice of any hearing scheduled pursuant to this article in accordance with Water Code Section 1207 and shall in addition mail notice at least 60 days prior to the date of the hearing to all persons interested in any pending application to appropriate unappropriated water from any stream which is the subject of the hearing.

Water Code section 1207 requires:

> Notice of hearing pursuant to this article shall be given as follows:
> (a) The notice shall be published at least once a week for four consecutive weeks in one or more newspapers of general circulation published in each county in which any part of the stream system is situated, and publication shall be complete at least 60 days prior to the date of hearing.
> (b) At least 60 days prior to the date of the hearing, the notice shall be mailed to all persons known to the board who own land that appears to be riparian to the stream system, who divert water from the stream system, or who have made written request to the board for special notice of hearing pursuant to this article.

In the administrative proceedings below, the SWRCB prepared a four-page Notice of Hearing (KR 001842). That notice provided the background information leading up to the decision to conduct a hearing and included three key issues: 1) should the State Water Board revise the Declaration to allow the Division of Water Rights to accept and process water rights applications to appropriate water from the Kern River?; 2) has adequate information been provided to demonstrate that there is a change in circumstances since the Kern River was included in the Declaration?; and 3) have the petitioners provided sufficient hydrologic data, water usage data, or other relevant information to support a determination that there is unappropriated water in the Kern River system during the season applied for to justify revising the Declaration for the purpose of accepting and processing water right applications for the Kern River?. The hearing notice also included an enclosure entitled "Information Concerning Appearance at Water Right Hearing." (KR001845.) The hearing notice was mailed to interested parties (KR001853; KR001876) at least 60 days prior to the hearing. Therefore, the notice provided by the SWRCB met the statutory requirement.

(The Court notes that the proof of publication is not contained in the administrative record. However, as the Petitioners have not alleged any violation related to the publication of the Notice of Hearing, the Court does not need to address any issue related to publication of the notice.)

c. The SWRCB procedures were consistent with due process considerations.

Petitioners' real argument is not whether the SWRCB had jurisdiction to act, as it clearly did, but whether the scope of the proceedings as ultimately captured in the SWRCB decision was beyond the scope contemplated by the notice of hearing, as contained in the statement of key issues discussed above. Petitioners believe that they were not provided with fair notice that the proceedings could include consideration of water entering the Intertie and, moreover, that the SWRCB could only consider evidence within the scope of the issues raised by the petitions. (Petitioners' Reply Brief, 8:25 – 9:27.) This failure to provide advance notice and the SWRCB's consideration of evidence beyond the scope of the issues raised by the petitions, argue Petitioners, has resulted in a denial of a full and fair hearing on the merits.

From a strict due process analysis, this argument lacks legal merit. The Fourteenth Amendment to the United States Constitution prohibits states from depriving "any person of life, liberty, or property, without due process of law; ..." California Constitution article I, section 7, mirrors its federal counterpart: "(a) A person may not be deprived of life, liberty, or property without due process of law...." However, contrary to the Petitioners' general statements regarding the application of due process principles to the hearing notice in the instant case, the courts have consistently refused to extend due process protection to public entities, which all the Petitioners are.

"[S]ubordinate political entities, as 'creatures' of the state, may not challenge state action as violating the entities' rights under the due process or equal protection clauses of the Fourteenth Amendment or under the contract clause of the federal Constitution. 'A municipal corporation, created by a state for the better ordering of government, has no privileges or immunities under the federal constitution which it may invoke in opposition to the will of its creator. [Citations.]' [Citations.]" (*Star–Kist Foods, Inc. v. County of Los Angeles* (1986) 42 Cal.3d 1, 6. See also *Santa Monica Community College Dist. v. Public Employment Relations Bd.* (1980) 112 Cal.App.3d 684, 690, citing "the long line of cases which hold that a public entity, being a creature of the state, is not a 'person' within the meaning of the due process clause, and is not entitled to due process from the state." Consequently, Petitioners lack standing to assert the notice and hearing process followed by the SWRCB deprived them of any due process.

Even if Petitioners' argument is reframed to suggest that the SWRCB's jurisdiction was limited to taking testimony and evidence that was only within the scope of the petitions that argument is not supported by the record.

First, this argument suggests that the SWRCB should have turned a blind eye to any evidence, albeit relevant to the issue of whether the FAS Declaration should be revoked, unless it was specific to the forfeiture issue raised by the *North Kern* decision. However, the notice of hearing was sufficiently broad to allow the SWRCB to consider any evidence related to whether there is "sufficient hydrologic data, water usage data, or other relevant information to support a determination that there is unappropriated water in the Kern River system during the season applied for to justify revising the Declaration for the purpose of accepting and processing water right applications for the Kern River." (KR001845.)

Second, there is significant evidence in the record to indicate the parties were aware that the hearing could encompass issues outside the limits of the issues raised by the petitions. By letter dated September 17, 2009, Petitioners provided their views on the nature and scope of the upcoming hearing. The letter from Petitioners contains a footnote which reads: "The Petitioners understand that the State Board's omission of any reference to the Kern River Intertie Canal and California Aqueduct in the list of Key Issues set forth in the Notice indicates that the State Board no longer believes this issue is relevant to these proceedings (a position with which Petitioners agree)." (KR001880.)

By letter dated September 25, 2009, following the SWRCB pre-conference hearing to discuss procedural issues related to the upcoming hearing, the SWRCB hearing officer stated:

> The primary concern of the parties was the scope of the evidence that will be considered in this proceeding. As expressed in the Notice of Public Hearing, the purpose of this proceeding is to determine whether there has been a change in circumstances since the Kern River was included in the Declaration, sufficient to justify the State Water Board revising the Declaration for the purpose of accepting and processing water right applications for the Kern River. To this end, and to avoid undue burden on the parties and the State Water Board Hearing Team, evidence and testimony should be limited to whether additional information, based on court decisions or Board orders, or hydrologic data showing periods of flows exceeding recognized rights, has become available since the Board listed the Kern River as fully appropriated to justify the Board revising the Declaration.

(Emphasis added; KR001960.)

The September 25, 2009 letter goes on to address an issued raised in the pre-hearing conference:

> A question was also asked regarding whether the State Water Board will accept evidence pertaining to contractual disputes over water in the Kern River. To the extent that contractual disputes are relevant to whether, based on Board orders, court decisions, or hydrological data, additional

> information has become available since the Board listed the Kern River as fully appropriated to justify the Board revising the Declaration, then such evidence may be considered. Testimony not related to adjudicated or otherwise recognized rights to divert and use water from the Kern River will be excluded as irrelevant.

(Emphasis added; KR001960.) That letter was served on all interested parties. (KR001961.)

It is clear from the statements in this letter from the SWRCB that any evidence related to whether there is additional information, based on Board orders, court decisions or hydrological data, that information would be relevant to the proceedings. While the parties were certainly focused on the potential impact of the *North Kern* decision on the FAS Declaration, the SWRCB had not limited itself to considering only testimony related to that single issue and had advised the parties that the scope of the hearing would be broader than that.

The September 25, 2009 SWRCB letter did specifically exclude from the hearing process "instream flows and public trust matters." (KR001960.) It is significant that the SWRCB did not exclude, as requested by Petitioners, the Intertie issue from those matters that were deemed to be not relevant to the hearing process. Given the breadth of the hearing notice and the subsequent correspondence from the SWRCB, it cannot be said that Petitioners were misled to their prejudice regarding the scope of the hearing.

Further, Petitioners received a full and fair hearing on the merits. Petitioners were allowed to present and rebut evidence, were represented by counsel and allowed to cross examine witnesses. Petitioners were also permitted to file post-hearing briefing. Petitioners' post-hearing brief addresses the possibility of the SWRCB modifying the FAS Declaration so that diversions to the Intertie would be subject to SWRCB water right permitting authority. (KR002095-96; 002109-13.) Nowhere do Petitioners object to the SWRCB accepting evidence related to the diversion to the Intertie but actually provide suggestions on how the SWRCB could address the issue.

Moreover, under the SWRCB rules, Petitioners were afforded an opportunity to object to evidence. With respect to the evidence relied upon by the SWRCB in reaching its decision, Petitioners first objected to the testimony of Florn Core, which discusses the Intertie operations, prior to the hearing by filing their Joint Motion and Memorandum of Points and Authorities in Support Thereof to Exclude Written Testimony of Gene W. Bogart and Florn R. Core, and Request for Order Limiting Oral Testimony. (KR 001984.) However, Petitioners did not raise any objections to the testimony based on it being irrelevant or outside the scope of the proceedings.

In reaching its decision, the SWRCB also relied on evidence produced by Petitioners at the hearing, including Joint Exhibit 46 (KR006984) and Joint Exhibit 67 (KR007021) and the testimony of Daniel Easton, Petitioners' expert witness, regarding the Intertie. (KR002781-83.) This testimony was in response to questions from SWRCB staff and

made without objection from the Petitioners. Petitioners cannot now claim that the SWRCB exceeded its jurisdiction or denied them a fair hearing by considering the evidence produced by Petitioners themselves or introduced by other parties without objection as to its relevance.

Therefore, the Court finds in favor of the Respondent and Real Party in Interest SWRCB on the Second Cause of Action.

5. The SWRCB did not fail to comply with the *North Kern* decision.

Petitioners argue that the SWRCB failed to comply with the direction of the Court of Appeal in the *North Kern* decision. Petitioners point to the following language that appears at 147 Cal.App.4th 555, 583:

> If water rights are forfeited, however, the cumulative effect could be that the river is no longer oversubscribed. That is a determination not for the courts in the first instance, but for SWRCB. If those resulting limitations on appropriation might result in a determination that the Kern River is no longer fully appropriated, that determination will be made by SWRCB on the petition of a potential appropriator of the excess.

Petitioners rely on the court's use of the phrase, "that determination will be made" by the SWRCB to argue that the court was directing the SWRCB to make that determination. The Court finds this argument is without merit.

Clearly, this language is not part of the court's order nor was the SWRCB a party to the action. It is difficult to imagine how the SWRCB would be bound by language that is obiter dictum in a decision to which it is not a party. The court of appeal is simply indicating that it is within the jurisdiction of the SWRCB in the first instance to rule on any petition to revoke the FAS rather than a decision that can be made by the court The use of the word "will" reflects only the temporal relationship of the SWRCB decision to the court's opinion, i.e. that it will occur in the future, as opposed to mandatory language directing the SWRCB to make a decision. As the SWRCB has correctly pointed out in its brief "if Petitioners wanted resolution of water availability on the river, the State Board was the proper venue." (Respondent's Opposition to Petition for Writ of Mandate, p. 19:16-17.)

Therefore, the Court finds for Respondent and Real Party in Interest SWRCB with respect to the Fourth Cause of Action.

6. The SWRCB did not act in excess of its jurisdiction by finding water entering the Intertie is unappropriated water.

Petitioners argue that the SWRCB exceeded its jurisdiction by finding the water entering the Intertie is unappropriated water. By way of background, the U.S. Army Corps of Engineers constructed the Intertie as a flood control project in 1977. The Intertie

operates to discharge high water flows of the Kern River into the California Aqueduct, and its flood control function is intended to protect downstream agricultural lands. The California Department of Water Resources operates the Intertie in accordance with an agreement among the Department of Water Resources, the Kern County Water Agency and other water districts asserting water rights on the Kern River. (KR001811, 002212, and 005583.)

Petitioners' Petition for Writ of Mandate claims that "[a]ll of the Kern River water discharged into the Intertie during flood control operations is governed exclusively by the separate and independent legal authorities adopted by the Legislature as stated in Divisions 5 and 6 of the Water Code relating to floods, flood water, and flood control projects and policies." (Petitioners' Verified Petition for Writ of Administrative Mandamus, 18:13-16.) While this may be true, it is not dispositive of the issue before this Court and that was addressed by the SWRCB. The issue to be decided by the SWRCB was whether, prior to it entering the Intertie facility, the water is appropriated or unappropriated water. It is not the end use that the SWRCB is regulating in the decision below, but making its determination regarding the status of the water in the river prior to it reaching the Intertie.

The California courts have held that "flood" or "excess" flows are under state jurisdiction and are available for appropriation and use as surplus water. [2] In *Allen v California Water & Tel. Co.* (1946) 29 Cal.466, 486, the court found that that high, surplus flows could be appropriated even if "subject to interruption or cessation." In *Chowchilla Farms v. Martin* (1933) 219 Cal. 1, 36, the Court stated that flood waters "are nevertheless a part of the regular flow of the stream and are not subject to appropriation as against riparian owners on the stream so long as they are or can be put to a beneficial use by said riparian owners." Therefore, the Court finds that the SWRCB did not exceed it jurisdiction by making the determination regarding water that ultimately flows into the Intertie.

Petitioners further argue that it appears that the SWRCB revised the Kern River FAS Declaration because "the Water Board erroneously believes that the Department cannot accept Kern River flood water into the California Aqueduct via the Intertie without a water right permit." (Petitioners' Opening Brief, 10:19-21.) Petitioners point to the statement in the Whitney Memo (KR 001811) as evidence that this served as part of the basis for the SWRCB's decision. However, the actual decision of the SWRCB as set out in WR Order 2010-0010 and 2010-0016 does not contain such a statement or finding. Accordingly, the attribution of this argument to the SWRCB is not supported by the record and mischaracterizes the basis of the SWRCB decision.

The draft order sent out by the SWRCB after the conclusion of the hearing did contain a line that read: "In addition to the undisputed evidence presented regarding unappropriated water that has historically been diverted into the Intertie without a valid basis of right, the evidence presented by the parties did not clearly resolve whether the partial forfeiture of

[2] "Flood waters are those which escape from a stream or other body of water and overflow the adjacent territory." *LeBrun v. Richards* (1930) 210 Cal. 308, 315. The extraordinary overflow of rivers and streams is known as "flood water." *Keys v. Romley* (1966) 64 Cal.2d 396, 400.

Kern Delta's rights itself created any additional unappropriated water." (Emphasis added; KR002137.) In response to the draft order, David Sandino, the Chief Counsel for the State of California Department of Water Resources, submitted a comment letter objecting to the emphasized language in the draft order. Mr. Sandino stated, in part, that the "purpose of the Intertie operation is not to divert water for beneficial use but to direct it out of the river for flood protection purposes. The statement on page 5 of the Draft Order that the Intertie diversions are 'without a valid basis of right' is both unnecessary and misleading and should be deleted." (KR002212.) The final order does not contain the language objected to by Mr. Sandino. Therefore, it is clear to the Court that the SWRCB did not base its decision on whether the Intertie operations required a water right permit.

Moreover, the proceedings before the SWRCB were simply to determine whether the FAS declaration should be revised and were not to determine whether any water permit was necessary for discharge into the Intertie. That issue – whether a permit is required for the Intertie - is beyond the scope of the SWRCB proceedings and is not an issue considered by this Court.

Petitioners next argue that because the Intertie is a federally authorized flood control facility, the Supremacy Clause of the U.S. Constitution prohibits the SWRCB from taking any action affecting the Intertie. As discussed above, the actions of the SWRCB in determining whether the Kern River FAS should be revised has no present impact on the allocation or use of any water in the Kern River. No determination has been made as to when or how much water is available or whether the SWRCB will grant any applications for use of unappropriated water. Consequently, it cannot be said that the SWRCB decision has any effect on the Intertie and, therefore, the SWRCB was not preempted from making the decision it did.

This conclusion is supported by the February 9, 2010 letter from David Sandino, referred to above. In that letter, Mr. Sandino states:

> The question before the Board is whether the Kern River is fully appropriated or whether the Board should entertain water right applications because there is unappropriated water in the system. The Intertie operation simply does not affect that determination. The very purpose of the Intertie is only to take flows that will otherwise remain in the stream and cause damage at the bottom of the system. And, if those flows are diverted out of the stream under a water right – reducing or perhaps even eliminating the need for the Intertie to intercept them – so much the better from the flood perspective. It is the Department's view that from a flood control perspective, there is no inconsistency or objection to others taking water from the Kern under water rights that would otherwise be removed by Intertie flood operations.

(KR002213.)

Therefore, the Court finds for Respondent and Real Party in Interest SWRCB with respect to the First Cause of Action.

7. Substantial evidence supports the findings of the SWRCB.

Petitioners' Third Cause of Action alleges that the findings adopted by the SWRCB in WR Order 2010-0010 are not supported by the evidence. The scope of this Court's review of the SWRCB decision is whether the findings of the SWRCB were based on substantial evidence in light of the whole record. *Young v. Gannon* (2002) 97 Cal.App.4th 209, 225.

This means examining all relevant evidence in the entire record, considering both the evidence that supports the administrative decision and the evidence against it, in order to determine whether or not the SWRCB decision is supported by "substantial evidence." *Bixby v. Pierno, supra* 4 Cal.3d at p. 149, fn. 22. For this purpose "substantial evidence" has been defined in two ways: first as evidence of "'ponderable legal significance . . . reasonable in nature, credible, and of solid value.'" *Ofsevit v. Trustees of Cal. State University & Colleges* (1978) 21 Cal.3d 763, 773, fn. 9; and, second, as "'relevant evidence that a reasonable mind might accept as adequate to support a conclusion.'" *Hosford v. State Personnel Bd.* (1977) 74 Cal.App.3d 302, 307.

In this case, Petitioners have the burden of proving that the SWRCB's findings are not supported by substantial evidence. "[I]t is [the] appellant's burden to demonstrate that the administrative record does not contain sufficient evidence to support the agency's decision." *International Brotherhood of Electrical Workers v. Aubry* (1996) 42 Cal.App4th 861, 870.

There are two issues that are presented in this case with respect to the findings adopted by the SWRCB in reaching its decision. First, whether the evidence presented established there has been a change in circumstances since the Kern River was included in the FAS Declaration and, second, whether there was sufficient hydrologic data, water usage data, or other relevant information to support a determination that there is unappropriated water in the Kern River system during the season applied for to justify revising the FAS Declaration. These were the two evidentiary issues included in the Key Issues adopted by the SWRCB in its Notice of Public Hearing and Pre-Hearing Conference. (KR001841.) These issues were repeated in the September 25, 2009 letter from the SWRCB to interested parties. (KR 001960.)

The Court notes that, as stated above, the decision of the SWRCB did not make any findings with respect to the effects of the North Kern decision. "[T]he evidence presented by the parties did not clearly resolve whether the partial forfeiture of Kern Delta's rights itself created any additional unappropriated water." (KR002410.) Instead, the SWRCB determined there was sufficient evidence based on the water entering the Intertie to find that there was unappropriated water in the Kern River and, therefore, good cause to revise the FAS Declaration. Accordingly, the Court has only reviewed the

record below with respect to the existence of substantial evidence to support the findings actually made by the SWRCB with respect to the existence of unappropriated water.

a. There is substantial evidence to establish a change in circumstances since the prior SWRCB consideration of the FAS Declaration for the Kern River.

As stated in the September 25, 2009 SWRCB letter, "the purpose of this proceeding is to determine whether there has been a change in circumstances since the Kern River was included in the Declaration, sufficient to justify the State Water Board revising the Declaration . . . ." (KR 001960.) The decision of the SWRCB also confirms that "the purpose of the hearing was to receive evidence and testimony regarding whether additional information has become available since the Board listed the Kern River as fully appropriated to justify the State Water Board revising the Declaration for the purpose of processing water right applications for the Kern River." (KR002409.) In order to evaluate the Board's consideration of this issue, it is first necessary to review the history of the SWRCB's determination that the Kern River has been fully appropriated.

In 1964, the SWRCB issued a comprehensive water rights decision, D1196, that determined the entire flow of the Kern River had been apportioned among First Point, Second Point and Lower-River diverters by court decisions, decrees and agreements since 1894.[3] (KR005228-32; 5536.) D1196 was based, in part, on the SWRCB's engineering staff's conclusion, based on a 70-year period of record that the entire Kern River natural flow had been diverted for irrigation within the First Point, Second Point and Lower-River areas since prior to 1894. (KR005232; 005280; 005537.) This 70-year analysis covered the period from 1894 through 1963. The SWRCB found that a "comparison of the quantities of water used in the First Point, Second Point and Lower-River Service Areas for the period of 1894-1963, with the quantities of water flowing past the First Point of Measurement, adjusted to eliminate the effect of Isabella Reservoir, shows that there is no water surplus." (KR005538.)

With the adoption of Water Code section 1205 et seq. authorizing the adoption of a declaration of fully appropriated stream and forbidding the processing of water right applications on stream systems that had previously been determined to be fully appropriated, the SWRCB adopted the FAS Declaration with respect to the Kern River in 1989. When it adopted the FAS Declaration, contained in WR 89-25, the SWRCB determined that D1196 contained "ample substantial evidence to support the finding that no water remains available for appropriation." (KR005551.)

Petitioners point to the SWRCB's decision in WR 94-1 wherein the SWRCB denied a petition seeking to revoke and revise the Kern River FAS Declaration based on years of extraordinarily high flows occurring since the adoption of D1196. The years discussed in

[3] As a result of a lengthy history of agreements and litigation commonly referred to by the parties as the "law of the river" the rights to the Kern River are divided among various classes of users. "First Point" diverters are the upstream appropriators; "Second Point" diverters are the downstream riparian interests; and Lower-River diverters are essentially those with rights subordinate to the First Point and Second Point diverters.

WR 94-1 were 1966, 1967, 1969, 1978, 1980 and 1983. (KR005567-69.) The SWRCB concluded that the flows submitted did not exceed the flows reported for the 1894 – 1963 period and "are far less than the maximum flows reported in the Engineering Staff Analysis of Record which formed the basis for finding that there is no unappropriated water in the Kern River. (KR005569.)

The evidence relied on by the SWRCB related to the following months and/or years in which there may be unappropriated water in the Kern River:

1. 1978 (KR004981)
2. 1980 (KR004981)
3. 1982 (KR004981)
4. December 1982 (KR002726-27; 007021)
5. 1983 (KR004981)
6. August, September November and December 1983 (KR002726-27; 007021)
7. 1984 (KR004981)
8. January 1984 (KR002726-27; 007021)
9. 1986 (KR004981)
10. 1997 (KR004981)
11. 1998 (KR004981)
12. 2006 (KR004981)

Mr. Easton also testified that although he could not recall the exact number of times water had reached the Intertie, "I recall that it occurred in, just forfeiture months from 1994 to 2008 it was." (KR002782.)

When comparing the years in which the SWRCB considered there may be unappropriated water to those years in which prior decisions had already considered flows to be completely appropriated, the evidence before the SWRCB indicates that it had not previously considered flows for the years 1982, 1984, 1986, 1997 and 1998.[4] There is

[4] While a portion of the record of the SWRCB proceedings related to WR 94-1 (KR005561) is included in the Administrative Record, Petitioners have not established that the flows considered by the SWRCB as set out at KR005567-69 are the flows entering the Intertie. Nevertheless, it is clear that there are flows in years not previously considered by the SWRCB that were the basis of its decision in the present proceedings.

also Mr. Easton's testimony concerning some months from 1994 to 2008. Based on this comparison, it is clear that there is sufficient evidence to determine there has been a change in circumstances from those considered in the prior SWRCB proceedings related to the FAS Declaration for the Kern River.

b. The SWRCB is not estopped from considering water entering the Intertie as unappropriated water.

The Court considers Petitioners' argument with respect to judicial estoppel to be closely related to the issue of whether there is evidence of a change in circumstances and so considers it here. Petitioners argue that the SWRCB and the City are judicially estopped from relying on water entering the Intertie as evidence of unappropriated water. Petitioners appear to claim the decision of the SWRCB in WR 89-25 is evidence that water entering the Interite can never be considered unappropriated water. This claim is based on the SWRCB's rejection of the argument advanced by the Kern Property Corporation in the WR 89-25 proceedings that there was water available for appropriation because of the Intertie operation. The City disputed that "during high flows . . . into the California Aqueduct through the Kern River-California Aqueduct Intertie is some evidence of unappropriated water." (Petitioners' Reply Brief at p. 13:19-20 citing from the Kern River Water Users' Response to Kern Property Corporation's Policy Statement Opposing Declaration re Kern River, of which this Court took judicial notice.)

First, the decision of the SWRCB in WR 89-25 did not base its decision on whether or not the operation of the Intertie supported a finding of unappropriated water. What the SWRCB decided was whether the language of D 1196 regarding an absence of a showing of the availability of unappropriated water was the same thing as a determination that no water is available for appropriation. The SWRCB concluded as follows:

> If there is any ambiguity as to whether Decision 1196 determined that no water remains available for appropriation in the Kern River System, the Board is aided by the administrative record upon which the decision is based. That record contains ample substantial evidence to support a finding that no water remains available for appropriation. . . . Accordingly, the Board finds that Decision 1196 does determine that no water remains available for appropriation in the Kern River System.

(KR005551.) Petitioners argue that the SWRCB could not have reached this conclusion unless it rejected the argument that the Intertie created unappropriated water. While this may be true, the Court does not find the SWRCB to be estopped from considering whether flows into Intertie, not already considered by the SWRCB, may be unappropriated water.

Petitioners cite *International Engine Parts, Inc. v. Feddersen and Company* (1998) 64 Cal.App.4th 345 for the principles of judicial estoppel that should be applied in this case. In that case, the court states that "[t]he concept of judicial estoppel prevents a party from asserting a position in a judicial proceeding that is contrary or inconsistent with a position

previously asserted in a prior proceeding. The purpose is to protect the integrity of the judicial process and not the parties of the lawsuit. [Citation.] 'The doctrine of judicial estoppel, sometimes referred to as the doctrine of preclusion of inconsistent positions, is invoked to prevent a party from changing its position over the course of judicial proceedings when such positional changes have an adverse impact on the judicial process.' [Citation.]" *Id.* at p. 350.

The court in *International Engine Parts* went on to provide the elements required for the court to apply the equitable doctrine of judicial estoppel: 1) the same party has taken two positions; 2) the positions were taken in judicial or quasi-judicial administrative proceedings; 3) the party was successful in asserting the first position; 4) the two positions are totally inconsistent; and 5) the first position was not taken as a result of ignorance, fraud, or mistake. *Id.* at p. 351. Reviewing the facts asserted by Petitioners and the evidence in the record, they have not established all the elements of the doctrine.

With respect to the SWRCB, while necessarily a party in the proceeding before this Court, it may not be considered to be a "party" when acting in its adjudicatory function, such as when it rendered its decision in WR 89-25 or in the decision challenged in this action. There is certainly nothing in WR 89-25 to suggest it is a blanket decision related to the Intertie that would forever preclude the parties from considering flows that occurred in years subsequent to the adoption of WR 89-25. Nor could the SWRCB make such a determination.

California law specifically contemplates and authorizes a revision of the FAS Declaration based on new developments, new evidence or new circumstances. Water Code §1205(c); 23 Cal.Code of Regs. § 871(c). The courts have also explained that "[w]hat is unappropriated water is a constantly fluctuating question, depending upon the seasonal flow of the stream, the annual rainfall, the forfeiture of prior appropriations and default in the use of riparian rights. *Tulare Water C. v. State Water Commission* (1921) 187 Cal. 533, 537. Moreover, "[a] judicial determination as to existing appropriative and riparian rights rests upon then present uses which may be quite different at a later time." *Temesacal Water Co. v. Department of Public Works* (1955) 44 Cal.2d 90, 106. Simply put, the SWRCB is not precluded by the doctrine of judicial estoppel from determining, based on evidence provided to it, that there have been changed circumstances since it adopted WR 89-25 to justify the revocation of the FAS Declaration.[5]

c. There is substantial evidence in the record to support the SWRCB's finding that there may be unappropriated water in the Kern River.

Having concluded there is substantial evidence in the record to support the SWRCB's determination that there are sufficient changed circumstances since adopting the FAS Declaration for the Kern River, the Court turns to the issue of whether there is substantial

[5] Given that the SWRCB is not estopped from rendering a different decision than it reached in WR 89-25, the issue of the application of the doctrine of judicial estoppel to the City is moot.

evidence to support its finding that there are periods of flows that exceed recognized rights in the Kern River. As discussed below, the Court concludes the SWRCB's finding is supported by substantial evidence.

As the SWRCB recognized in its initial order, unappropriated water exists on a river when there is "hydrological data showing periods of flows exceeding recognized rights." (KR002409.) The SWRCB has previously explained that "in general, unappropriated water is determined by (1) quantifying the water physically available in the watershed and (2) subtracting the needs of riparian users and the claims of the holders of prior rights. The quantity of water surplus to the needs of riparian users and the claims of the holders of prior rights is available for appropriation." *In the Matter of Application 27253*, Order No. WR 86-1. See, also, *City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 925, stating that "[a]ny water not needed for the reasonable beneficial uses of those having prior rights is excess or surplus water."

At the October 2009 hearing, the SWRCB received evidence from the City regarding excess, surplus diversions of water into the Intertie, which were depicted and quantified in the City's Exhibit 2-18. (KR004980.) This exhibit, based on the records maintained by the City, shows that the Intertie has accepted excess Kern River water six times, in seven different years. This exhibit also indicates that diversions into the Intertie have ranged from as little as 1,793 acre feet to as much as 664,036 acre feet.

The SWRCB also relied on evidence and testimony from Petitioners that established that excess, unappropriated water had been diverted into the Intertie. As explained by the SWRCB in WR-2010-0010, "the North Kern Petitioners presented a graph; exhibit JE 67 showing Kern River water 'undistributed to existing entitlements' in several years. Daniel Easton, witness for the North Kern Petitioners, explained in his written and oral testimony that there was what he calls 'undistributed release' water in at least eight months since 1964." (KR002409-10.) The SWRCB further stated that "Mr. Easton testified that water diverted into the Intertie is in excess of traditionally held and exercised rights and claims of right to Kern River water, and that whenever water has been released into the Intertie in the past, all Kern River water right claims had already been satisfied." (KR002410.)

Based on the evidence cited by the SWRCB, this Court finds that there is substantial evidence to support its findings regarding unappropriated water.

d. Petitioners have failed to establish water entering the Intertie is merely a change in use.

Petitioners' final argument with respect to the evidence in the record is that the water entering the Intertie is simply a lawful exercise by Kern River water right entitlement holders to change the point of diversion, place and purpose of water in accordance with agreements with other agencies. However, Petitioners have failed to identify any water rights which attached to the water diverted into the Intertie or identify which entity held

rights to the diverted water. The record below does not contain any evidence regarding claimed rights to the water entering the Intertie.

Therefore, the Court finds for Respondent and Real Party in Interest SWRCB with respect to the Third Cause of Action.

Accordingly, the Petition for Writ of Mandate is denied.

DECLARATION OF SERVICE BY OVERNIGHT COURIER

Case Name: ***North Kern Water Storage District et al. v. State Water Resources Control Board***

Case No.: **Kern County Superior Court No. S-1500-CV 270613 NFT**

I declare:

I am employed in the Office of the Attorney General, which is the office of a member of the California State Bar, at which member's direction this service is made. I am 18 years of age or older and not a party to this matter; my business address is: 1300 I Street, Suite 125, P.O. Box 944255, Sacramento, CA 94244-2550. I am familiar with the business practice at the Office of the Attorney General for collection and processing of correspondence for overnight mail with the **GOLDEN STATE OVENIGHT**. In accordance with that practice, correspondence placed in the internal mail collection system at the Office of the Attorney General is deposited with the overnight courier that same day in the ordinary course of business.

On August 15, 2011, I served the attached **NOTICE OF ENTRY OF JUDGMENT DENYING PETITION FOR WRIT OF ADMINISTRATIVE MANDATE** by transmitting a true copy via electronic mail. In addition, I placed a true copy thereof enclosed in a sealed envelope, in the internal mail system of the Office of the Attorney General, for overnight delivery, addressed as follows:

SEE ATTACHED SERVICE LIST

I declare under penalty of perjury under the laws of the State of California the foregoing is true and correct and that this declaration was executed on August 15, 2011, at Sacramento, California.

Rochelle Uda-Quillen
Declarant

Rochelle Uda-Quillen
Signature

SA2010302141
31323525.doc

SERVICE LIST

North Kern Water Storage District et al. v. State Water Resources Control Board

Kern County Superior Court no. S-1500-CV 270613 NFT

Scott K. Kuney
Young Wooldridge, LLP
1800 30th Street, 4th Floor
Bakersfield, CA 93301-5298
Email: skuney@youngwooldridge.com
Attorney for North Kern Water Storage District

Jason M. Ackerman, Esq.
Best, Best & Krieger LLP
3750 University Ave., Suite 400
P.O. Box 1028
Riverside, CA 92502-1028
Email: Jason.ackerman@bbklaw.com
Attorney for City of Shafter

Daniel N. Raytis, Esq.
McMurtrey, Harstock and Worth
2001 22nd St., Suite 100
Bakersfield, CA 93301
Email: gene@mcmurtreyhartsock.com
Email: dan@mcmurtreyhartsock.com
Attorney for Buena Vista Water Storage District

Kevin O' Brien, Esq..
Downey Brand LLP
621 Capitol Mall, 18th Floor
Sacramento, CA 95814
Email: kobrien@downeybrand.com
Attorney for Kern Water Bank Authority

Nicholas A. Jacobs
Somach Simmons & Dunn
500 Capitol Mall, Suite 1000
Sacramento, CA 95814
Email: njacobs@somachlaw.com
Attorney for Kern County Water Agency

Colin Pearce
Duane Morris LLP
Suite 2200
One Market Plaza, Spear Tower
San Francisco, CA 94105-1127
Email: CLPearce@duanemorris.com
Attorneys for City of Bakersfield

Filed 4/18/13 North Kern Water Storage Dist. v. State Wat. Resources Cont. Bd. CA5

IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA

FIFTH APPELLATE DISTRICT

NORTH KERN WATER STORAGE DISTRICT et al.,

Plaintiffs and Appellants,

v.

STATE WATER RESOURCES CONTROL BOARD,

Defendant and Respondent;

CITY OF BAKERSFIELD,

Real Party in Interest and Respondent.

F063989

(Super. Ct. No. S-1500-CV-270613)

OPINION

APPEAL from a judgment of the Superior Court of Kern County. Stephen D. Schuett, Judge.

Law Offices of Young Wooldridge, Scott K. Kuney, Ernest A. Conant, and Alan F. Doud for Plaintiff and Appellant North Kern Water Storage District.

Best, Best & Krieger, Jill N. Willis and Jason Ackerman for Plaintiff and Appellant City of Shafter.

McMurtrey, Hartsock & Worth, Gene R. McMurtrey and Daniel N. Raytis for Plaintiff and Appellant Buena Vista Water Storage District.

Somach Simmons & Dunn and Nicholas A. Jacobs for Plaintiff and Appellant Kern County Water Agency.

Kamala D. Harris, Attorney General, Kathleen A. Kenealy, Assistant Attorney General, Denise Ferkich Hoffman and Matthew G. Bullock, Deputy Attorneys General, for Defendant and Respondent.

Virginia Gennaro, City Attorney; Duane Morris and Colin L. Pearce for Real Party in Interest and Respondent.

-ooOoo-

This is an appeal from a judgment denying a petition for writ of administrative mandate. (See Code Civ. Proc., § 1094.5, subd. (f).) The trial court concluded appellants were beneficially interested parties with a right to bring the petition to review respondent's administrative decision and, addressing the merits of the petition, rejected appellants' challenges to the administrative decision. We conclude, to the contrary, that appellants have not demonstrated a beneficial interest, as that term is defined in the case law, sufficient to challenge respondent's administrative orders at issue in this proceeding. Respondent's orders do not adversely affect any protected interest of any appellant. For this reason, we dismiss the appeal thereby, in net effect, affirming the judgment rejecting appellants' challenges to the administrative decision. (See Code Civ. Proc., § 913.)

FACTS AND PROCEDURAL HISTORY

General Background

In general terms, a person or entity not owning property along a stream or river could, prior to 1914, establish a right to use available water in the stream or river by giving notice of a claim and actually using the water. (See Hutchins, The Cal. Law of Water Rights (1956) p. 86 et seq.) These pre-1914 rights have come to be known as nonstatutory rights of appropriation. (*Id*. at p. 86.) (The law governing riparian use is different (*id*. at pp. 52-56); this case does not involve riparian rights, i.e., the rights

accruing to property owners because their property abuts the river (see *id*. at p. 179 et seq.).)

In 1914, the Water Commission Act went into effect. Thereafter, the right to appropriate water could only be established through a statutory procedure. (Hutchins, The Cal. Law of Water Rights, *supra*, at pp. 94-95.) The Water Commission Act is now codified in the Water Code at sections 100 to 4407.[1] The procedure for granting statutory rights to appropriate water is administered by a body now known as the State Water Resources Control Board, respondent in this appeal (hereafter respondent or the board). (See § 174; Hutchins, The Cal. Law of Water Rights, *supra*, at pp. 96-97.)

Nonstatutory appropriative rights are "senior" or "junior" to one another, normally depending upon the date of appropriation. However, the owner of a nonstatutory right of appropriation is permitted to change the purpose and place of use of the water, and to sell or otherwise transfer the right. (*North Kern Water Storage Dist. v. Kern Delta Water Dist.* (2007) 147 Cal.App.4th 555, 559 (*North Kern*).) Thus, changes in ownership of nonstatutory rights of appropriation do not alter the seniority—that is, the relative priority—of such rights, but such changes in use or ownership must not injure others with rights in the watercourse. (*Ibid*.) All use of water must be reasonable and beneficial. (*Ibid*.; see Cal. Const., art. X, § 2 [rights limited to water "reasonably required for the beneficial use to be served"].)

Nonstatutory rights of appropriation have sequential priority. That is, when the river flow is insufficient to supply all appropriators, the highest priority appropriator (usually the right established the earliest) is entitled to its full appropriation before the next highest is entitled to any, and so forth, throughout the hierarchy of rights holders; there is no mandatory proration of the available flow of the river. (*North Kern, supra,*

---

[1] All further statutory references are to the Water Code unless otherwise indicated.

147 Cal.App.4th at p. 561.) Further, pre-1914 nonstatutory rights have priority over statutory rights granted in Water Code proceedings. (*North Kern, supra,* at p. 583.)

Appellants North Kern Water Storage District (North Kern), Kern County Water Agency, and Buena Vista Water Storage District own nonstatutory rights to appropriate water from the Kern River.[2] Appellant City of Shafter apparently does not own rights directly, but uses water supplied through North Kern's rights.

Although there have been sales and consolidations of ownership of Kern River appropriative rights, there have been no new appropriative rights in well over a century. For example, in a 1964 adjudicative decision of respondent's predecessor agency, which rejected appropriation applications from some of the present appellants, the board found there was no unappropriated water available in the Kern River system. (Cal. Water Rights Bd., Decision D 1196 (Oct. 29, 1964), p. 5, at <http://www.swrcb.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1150_d1199/wrd1196.pdf> [as of Mar. 20, 2013] (D 1196).) When there is no water available for new appropriations on a river system, the river is described as "fully appropriated." Respondent most recently affirmed its order that the Kern River was fully appropriated in 1998.

After the river became fully appropriated, there were periodic disputes among the numerous rights holders, which resulted in a court decree and a contractual agreement that, together, governed operation of the river for most of the 20th Century. (D 1196, *supra*, at p. 3.) In 1976, however, one of the rights holders, Kern Delta Water District (Kern Delta), announced plans to increase usage of water over the historical usage of its

---

[2] The nature of North Kern's right to water from the Kern River is disputed by the City of Bakersfield. For purposes of this appeal, as we will discuss below, it does not matter whether North Kern owns nonstatutory appropriative rights or, instead, receives water pursuant to an agreement with the owner of such rights. In either case, the water is taken pursuant to a pre-1914 appropriation. The present proceeding does not involve an adjudication of North Kern's rights.

predecessors in interest. North Kern objected and sued to establish that the right to greater usage had been forfeited by Kern Delta's predecessors. (See *North Kern, supra,* 147 Cal.App.4th at p. 567.) The case resulted in two long trials and two appeals, at the end of which it was determined that Kern Delta's rights had been reduced through nonuse. (*Id*. at pp. 581-582.)

The published appellate opinion in *North Kern* noted that appropriative rights holders, junior in priority to the forfeited Kern Delta rights, had the right to the water freed up by the forfeiture judgment to the extent and in the order of seniority of their appropriative rights. (*North Kern, supra,* 147 Cal.App.4th at p. 583.) If the forfeiture of rights resulted, however, in water that exceeded the claims of those junior appropriators, such water would be "unappropriated" and would be subject to appropriation through respondent's statutory permitting process. (*Id*. at pp. 583-584; see also § 1206.) The *North Kern* opinion concluded that the determination whether a forfeiture resulted in unallocated water—that is, whether the forfeited water exceeded the claims of existing rights holders—was a matter within respondent's administrative jurisdiction and would not be determined in the first instance by the courts in the forfeiture proceedings. (147 Cal.App.4th at p. 583.)

The determination whether forfeited water rights results in unappropriated water is governed by the statutory procedure established in the Water Code. Prior to the 1987 enactment of sections 1205 through 1207 (see Stats. 1987, ch. 788), respondent was required to "consider and act upon all applications for permits to appropriate water and to do all things required or proper relating to those applications." (Legis. Counsel's Dig., Sen. Bill No. 1485, 4 Stats. 1987 (1987-1988 Reg. Sess.) Summary Dig., p. 244.) The 1987 legislation permitted respondent to adopt a declaration that a river was fully appropriated when, based upon previous water rights decisions, respondent determined "that no water remains available for appropriation." (§ 1205, subd. (b).) Once a river system has been designated by respondent as "fully appropriated," the governing statutes

prohibit respondent from accepting and processing applications for new permits to appropriate water from the river (with certain exceptions not relevant here). That was the case concerning the Kern River at the time of the published appellate opinion in *North Kern*. (See *North Kern, supra,* 147 Cal.App.4th at p. 583.) As a result, the first step in determining whether the adjudicated forfeiture of Kern Delta's rights resulted in unappropriated water involves invocation of the statutory process by which respondent reevaluates the fully appropriated status of a river system. While the Water Code prohibits respondent from accepting applications for permits to appropriate water from fully appropriated rivers, the code permits respondent to accept petitions to *revoke or revise* the "fully appropriated" designation of a river system, or to make such a determination on its own motion, after notice and hearing. (§ 1205, subd. (c).)

The Present Case

On the same day the Supreme Court denied review of the *North Kern* decision, April 25, 2007, appellants North Kern and City of Shafter filed a petition with respondent to consider the propriety of revoking or revising the declaration that the Kern River was fully appropriated. In the following weeks and months, City of Bakersfield (Bakersfield), Kern Water Bank Authority, and the remaining appellants filed similar petitions. Appellants' petitions were based on similar theories: They contended the Kern River probably remained fully appropriated but the *North Kern* forfeitures presented a reasonable basis for respondent to examine in a formal hearing whether the forfeitures freed additional water for appropriation. Appellants sought to appropriate such water if it was found to exist, but they urged respondent to limit its inquiry to the availability of forfeited water. Bakersfield's petition contended, as the city has throughout these proceedings, that all water rights forfeited through the *North Kern* proceeding became available as unappropriated waters notwithstanding any claims by entities with junior

water rights.[3] In addition, Bakersfield alleged that water was being taken in excess of various appropriators' rights, requiring respondent's intervention in the allocation of water from the river.[4] Kern Water Bank Authority's petition contended that the *North Kern* decision constituted a change in circumstances that justified revocation or revision of the "fully appropriated" designation. In addition, the petition contended that "[s]ince at least 1986" the Kern River Watermaster[5] has been permitting any person or entity to divert from the river any abnormally high water flow that otherwise would be diverted into the California Aqueduct pursuant to the formal policy and agreement among all the holders of appropriative rights to the Kern River, with the implication that such water is in excess of the rights of all such rights holders.[6] The physical structure through which flood water from the Kern River is diverted into the California Aqueduct is a federal flood control project known as the Intertie. The purpose of diversion of water into the Intertie is to prevent flooding in the Kern River basin. The water is transported for use in Southern California; at times of such diversion from the Kern River, the operator of the California Aqueduct reduces the flow of water into the aqueduct from rivers further north

---

[3] The *North Kern* opinion expressly rejected that contention by Bakersfield. (See *North Kern, supra,* 147 Cal.App.4th at p. 583.)

[4] Bakersfield was named in the petition for writ of mandate as a real party in interest. It has filed a separate brief in this appeal in the same capacity, seeking affirmance of the judgment.

[5] The watermaster, as the name implies, is charged with allocation of water, resolution of disputes among water claimants, maintenance of records of distribution, and serving as a clearing house for daily orders for water by various rights holders. In this case, an employee of the Bakersfield Water Resources Department serves as watermaster. An employee of Buena Vista Water Storage District serves as watermaster for diversions from the lower part of the river.

[6] Kern Water Bank Authority joined in the petition for writ of mandate in the lower court, but is not a party to the present appeal.

in California, in order to create capacity to receive Kern River flood waters. In our discussion of this flood water, we will refer to it as "Intertie water."

After review of materials submitted by the various petitioners, respondent's Chief, Division of Water Rights, determined there was reasonable cause to conduct a hearing on the question of whether the Kern River remained a fully appropriated stream system. (See Cal. Code Regs., tit. 23, § 871, subd. (c)(1), (4).[7]) The memorandum supporting the reasonable cause determination stated the forfeiture decision in *North Kern* "can be considered a change in circumstances" since the previous designation of the river as fully appropriated. However, the primary basis for recommending a hearing was that the diversion of Intertie water "on numerous occasions since its construction in 1977 confirms that there has been a change in circumstances since D1196," the 1964 declaration of fully appropriated status.

The hearing on the petition occurred on October 26 and 27, 2009, before a member of the state water board, appointed as hearing officer for the proceeding. Respondent's Order No. WR-2010-0010, removing the designation of the Kern River as fully appropriated, was adopted by respondent on February 16, 2010. The various parties' petitions for rehearing were denied in Order No. WR-2010-0016, adopted on May 4, 2010.

Order No. WR-2010-0010 reached two conclusions: First, "the evidence presented by the parties did not clearly resolve whether the partial forfeiture of Kern

---

[7] California Code of Regulations, title 23, section 871, subdivision (c)(1) provides in relevant part that a petition to revoke or amend fully appropriated status shall include relevant information from which "the Chief, Division of Water Rights, may determine that reasonable cause exists to conduct a hearing on the question whether the fully appropriated status of the stream system should be revoked or revised." Subdivision (c)(4) provides: "If the Chief determines that the petition shows reasonable cause to conduct a hearing …, the Chief shall notice a hearing on the issue. The board may thereafter adopt an order changing the declaration [of fully appropriated status] or declining to do so."

Delta's rights itself created any additional unappropriated water." Second, the evidence showed that "in nine separate years since 1978" water in excess of water claimed by Kern River rights holders had been diverted into the Intertie as a flood control measure. Because of the evidence that "whenever water has been released into the Intertie in the past, all Kern River water right claims had already been satisfied," "[t]his water is, by definition, unappropriated water." Respondent therefore amended the Declaration of Fully Appropriated Streams "to allow for processing the applications to appropriate water from the Kern River in accordance with the provisions of the Water Code and other applicable law." Order No. WR-2010-0010 expressly recognized that respondent had not determined "the specific amounts of water available for appropriation under the applications, the season of water availability, the public interest in approval or denial of the applications, and any conditions to be included in any permits that may be issued on the applications." The order stated the focus of the board's inquiry "was on the relatively narrow task of determining if the evidentiary record supports revising the fully appropriated status of the Kern River."

The petitions for reconsideration contended that, if there was insufficient evidence to demonstrate that the *North Kern* decision did not result in unappropriated water beyond the claims of existing rights holders, then the petitions to revoke the fully appropriated designation should have been denied. In the alternative, the reconsideration petitions requested that respondent reopen the hearing to receive further evidence concerning the effects of the *North Kern* decision on the fully appropriated status of the Kern River. Finally, with respect to the Intertie water, the petitioners requested that respondent amend the order to "'clearly state that occasional flood flows are not the basis for amending the [fully appropriated stream] declaration absent an application' to place such waters to beneficial use …."

Respondent denied the petitions for reconsideration by Order No. WR-2010-0016. Respondent determined it was under no statutory mandate to determine the availability of

unappropriated water based on the *North Kern* decision "at this stage." All that was required to justify revocation of the fully appropriated designation was a "change in circumstance" that "demonstrates that there is unappropriated water on the Kern River." "[T]he determination whether sufficient unappropriated water is available for the diversion and use proposed under an application can best be decided in proceedings to issue or deny a permit on that application."

Appellants filed a petition for writ of administrative mandate on June 2, 2010. The petition contended respondent acted in excess of its jurisdiction because the water that was the basis for revocation of the fully appropriated designation was flood water lawfully diverted under other laws, and was not unappropriated water over which respondent has jurisdiction. In addition it contended respondent lacked jurisdiction because it had not properly acted on respondent's own motion and it had not actually granted any party's petition for revocation of the declaration. (§ 1205, subd. (c).) The petition asserted that respondent abused its discretion by adopting findings that were not supported by substantial evidence. Finally, the petition claimed that respondent abused its discretion by failing to declare the Kern River continued to be fully appropriated, arguing there was no evidence presented that the *North Kern* decision resulted in any unappropriated water in excess of the rights of junior appropriators.

After receiving points and authorities and holding a hearing on the petition, the trial court denied the petition for writ of administrative mandate. The court rejected Bakersfield's contention that appellants lacked standing to bring the writ petition. It determined any person or entity permitted by section 1205 to file a petition to revoke or revise a fully appropriated declaration retains that statutory standing in any proceeding "to test before a court of law the legality of [respondent's] final decision." The trial court determined respondent was not required under the terms of the *North Kern* decision to resolve in the present proceeding whether the decision resulted in unappropriated water. The court determined respondent had jurisdiction to conduct the hearing under

section 1205, subdivision (c). The trial court concluded substantial evidence supported respondent's determination that the water diverted into the Intertie was unappropriated and that this determination supported further proceedings on applications for new appropriations of that water. After receiving written objections to the ruling, the trial court issued a final judgment on July 21, 2011, adopting the court's June 14, 2011, statement of decision and denying the petition for writ of administrative mandate.

DISCUSSION

At the trial court hearing, respondent and Bakersfield contended appellants had not demonstrated any manner in which they were adversely affected by respondent's Order Nos. WR-2010-0010 and -0016. In their initial briefs on appeal, no party renewed this contention. Pursuant to Government Code section 68081, this court requested appellants address this issue by supplemental brief. (See *Walton v. City of Red Bluff* (1991) 2 Cal.App.4th 117, 129 [appellate court may raise issues on its own motion if it complies with Gov. Code, § 68081].)

Code of Civil Procedure section 1086 provides that a writ of mandate "must be issued upon the verified petition of the party beneficially interested" when an administrative board has denied the petitioner "use and enjoyment of a right or office to which the party is entitled …" (*id*., § 1085). (See also *id*., § 1094.5 [standards for issuance of properly filed writ after final administrative order or decision]; *Sacramento County Fire Protection Dist. v. Sacramento County Assessment Appeals Bd.* (1999) 75 Cal.App.4th 327, 331 ["beneficial interest" requirement applies both to ordinary mandate and administrative mandate proceedings].) A party is "'beneficially interested'" for these purposes if the party has "'some special interest to be served or some particular right to be preserved or protected over and above the interest held in common with the public at large.'" (*People ex rel. Dept. of Conservation v. El Dorado County* (2005) 36 Cal.4th 971, 986.) This standard, the Supreme Court has stated, "'is equivalent to the federal "injury in fact" test, which requires a party to prove by a preponderance of the evidence

that it has suffered "an invasion of a legally protected interest that is [both] '(a) concrete and particularized, and (b) actual or imminent ….'"' [Citation.]" (*Ibid.*; see also *Save the Plastic Bag Coalition v. City of Manhattan Beach* (2011) 52 Cal.4th 155, 165.)

Savient Pharmaceuticals, Inc. v. Department of Health Services (2007) 146 Cal.App.4th 1457, provides an example of the "beneficial interest" requirement. Savient was the manufacturer of a drug used in certain instances to treat a condition related to HIV. The Department of Health Services (the department) had a program under which certain HIV drugs were provided to persons not eligible for Medi-Cal. At various times, due to the cost of Savient's drug and the budgetary restrictions on the program, the drug was listed and delisted for use on certain male patients. (*Id*. at pp. 1461-1463.) The program was administered by Ramsell Corporation under a contract with the department. The department, however, was the only entity involved in the decision to delist Savient's drug. (*Id*. at p. 1463.) After the department delisted Savient's drug, Savient filed a petition for writ of mandate in which it sought "to invalidate the delisting and to nullify the Department's contract with Ramsell." (*Id*. at p. 1461.) The trial court, among other rulings, concluded Savient lacked standing to challenge the contract between the department and Ramsell. The Court of Appeal affirmed this ruling. (*Id*. at p. 1465.) After setting forth the requirements for "beneficial interest" established in prior Supreme Court cases, the *Savient* court concluded that "[n]othing done by virtue of the Ramsell contract hurt Savient. Because the contract did not specially aggrieve Savient, it lacks standing to attack the contract." (*Ibid*.)

The Water Code provides a similar standard specifically applicable in the present case: "Any party aggrieved by any decision or order may, not later than 30 days from the date of final action by the board, file a petition for a writ of mandate for review of the decision or order." (§ 1126, subd. (b).) In *State Water Resources Control Bd. Cases* (2006) 136 Cal.App.4th 674, the Court of Appeal concluded the language of section 1126 incorporated the same requirements of a direct and immediate injury that is encompassed

in the "beneficial interest" standard of the general mandamus statute. (136 Cal.App.4th at pp. 829-830.) In addition, the court concluded the "'aggrieved'" requirement of section 1126 adopted the same standards of direct and immediate injury encompassed in the statutory requirement that only an "'aggrieved'" party is permitted to appeal from a civil judgment. (136 Cal.App.4th at p. 829.)

In the relevant portion of *State Water Resources Control Bd. Cases*, *supra*, 136 Cal.App.4th, owners of land outside the designated geographic area for use of irrigation water supplied by certain appropriators (*id*. at p. 821, fn. 60), contended on appeal that the board had erred in imposing environmental impact measures when it expanded the geographical service area to include the owners' land in an expanded-use area. (*Id*. at p. 828.) The Court of Appeal noted the mitigation measures were applicable only to the original appropriator, the United States Bureau of Reclamation (Bureau), as operator of the Central Valley Project. (*Id*. at pp. 829-830; see *id*. at pp. 687-688.) The court found that because the board had not imposed any mitigation measures on the land owners and "there [was not] any evidence in the record the Bureau intended to pass on the cost of mitigation" to the land owners, they were not aggrieved by the board's order. (*Id*. at p. 830.) The owners also contended they were aggrieved by the uncertainty created by the possibility the Bureau would impose fees for mitigation in the future, and the prospect of "'the expense, delay and risk of going through another prolonged and expensive administrative proceeding'" to prove their lands were not subject to the mitigation requirements. (*Ibid*.) The court concluded this speculative injury did not constitute an "immediate, pecuniary, and substantial injury" that supported standing to pursue the appeal. (*Id*. at p. 831.)

In the present case, respondent has not even purported to adjudicate water rights. Instead, Order No. WR-2010-0010 specifically provides that no determination has been made concerning the amount of water that will be taken by existing rights holders, and that this will be an issue only in future proceedings in which applicants for new water

permits will be required to prove "when and how much available water there is for appropriation." Further, no permit for new appropriation of water will affect the holders of nonstatutory appropriative rights. (*North Kern, supra,* 147 Cal.App.4th at pp. 583-584; see *Allen v. California Water & Tel. Co.* (1946) 29 Cal.2d 466, 489.)

The trial court ruled that any party with standing to initiate *administrative* proceedings as an "'interested person'" under section 1205 must also be entitled to initiate *judicial* proceedings to review "the legality" of any resulting administrative decision. In the cases cited for that proposition, however, the party who sought judicial review was in fact aggrieved by the outcome of the administrative hearing. Thus, in *Bodinson Mfg. Co. v. California Emp. Com.* (1941) 17 Cal.2d 321, an employer sought review of an administrative order awarding unemployment benefits to its former employee. (*Id*. at p. 324.) First, the court noted that an employer was specifically permitted by the statute to intervene in an unemployment compensation hearing as an "interested party." Second, although the court did state that, "it seems to us that elemental principles of justice require that parties to the administrative proceeding be permitted to retain their status as such throughout the final judicial review by a court of law, for the fundamental issues in litigation remain essentially the same," this statement was dicta. (*Id*. at p. 330.) The issue before the court was not whether a party which had not been adversely affected by the administrative order could petition for mandamus review. Instead, the court noted that the employer's reserve account—its required contribution to the unemployment compensation fund—would be affected by the compensation award; accordingly, "it seems apparent that the employer whose reserve account is affected is the only person having sufficient incentive to challenge a decision awarding benefits. Action by this employer provides the only procedural guarantee that the commission can be held by legal process to comply with the requirements of the statute under which it operates." (*Ibid*.) Thus, in *Bodinson*, the party which sought judicial review was aggrieved by the administrative order.

In *Temescal Water Co. v. Department of Public Works* (1955) 44 Cal.2d 90, the board issued a water appropriation permit to a conservation district allowing it to take water from a creek. The appellants were appropriators with existing rights; they filed a petition for writ of mandate to challenge the administrative order. Judgment for the board was granted after its demurrer to the petition was sustained. (*Id*. at p. 93.) The primary issue in the case was the appellants' claim that the board was not entitled to determine, in the course of considering an application for a new appropriation permit, that there was unappropriated water in a stream, in other words, that the determination of unappropriated water was a judicial function in the first instance, not a matter for administrative order. (*Id*. at p. 94.) The court rejected this contention, and held that the board was permitted to determine whether unappropriated water exists as part of its consideration of an application for a new permit. (*Id*. at p. 106.) "If the [board] erroneously concludes that unappropriated water is available to supply an applicant when there is no reasonable expectation of such a supply, the error may be corrected upon a review of the determination. But a holding that such a danger is so imminent as to justify an independent judicial proceeding to determine the availability of unappropriated water before the [board] considers an application, would deprive the administrative proceeding of all of its proper functions in the issuance of a permit." (*Ibid*.) After concluding the issue was properly addressed in the administrative proceedings, the court briefly addressed the board's claim that the appellants were not interested parties in the administrative hearing nor parties with a beneficial interest sufficient to support mandamus relief. (*Id*. at p. 107.) In permitting the appellants to amend their petition to allege they had appeared in the administrative hearing and had objected to the application for a new permit, the court stated: "[S]tatutory authority allows them to present a protest to the application before the [board] … and, if upon amendment to their petition they show their participation as interested parties in that proceeding, they *may* establish *as well* their interest in a judicial proceeding to review the [board's] determination." (*Ibid*.,

italics added.) The clear implication of the quoted passage, which cites to *Bodinson Mfg. Co. v. California Emp. Com., supra,* 17 Cal.2d at page 330, as its sole supporting authority, is that the appellants might, upon filing an amended complaint, be able to allege a beneficial interest that was adversely affected by the order granting the new permit; the court did not hold that, merely by participating in the administrative hearing, the appellants automatically were entitled to maintain a petition for writ of mandamus.

The mere fact that a party has standing to participate in a proceeding in the original tribunal does not mean the party is entitled to appeal from that proceeding no matter what the result in the proceeding. There is an additional requirement that the party be "aggrieved," in a civil proceeding or under section 1126, subdivision (b) of the Water Code, or a party be "beneficially interested" under Code of Civil Procedure section 1086. A party who has received essentially the relief it sought in the trial court is not permitted to appeal from the resulting order, even though the order, in the abstract, is an appealable order. (*Hensley v. Hensley* (1987) 190 Cal.App.3d 895, 898.) There is no logical reason the same rule should not apply to review of administrative orders. (See *Save the Plastic Bag Coalition v. City of Manhattan Beach, supra,* 52 Cal.4th at p. 165.) Unlike *Consolidated Irrigation Dist. v. City of Selma* (2012) 204 Cal.App.4th 187, 206, there is no potential that respondent's administrative order will reduce, directly or indirectly, the water available to appellants under existing appropriative rights.

In rare instances, courts may grant "public interest" standing to a party who seeks review of an administrative decision. (*Save the Plastic Bag Coalition v. City of Manhattan Beach, supra,* 52 Cal.4th at p. 166.) Such standing is permitted when the issue involves a "'public right'" and the mandate petition seeks enforcement of a "'public duty.'" (*Ibid.*) "No party … may proceed with a mandamus petition as a matter of right under the public interest exception," however, and permitting a party to proceed on that basis is an exception to the usual "beneficial interest" requirement. (*Id*. at p. 170, fn. 5.) Even when the requirements for public interest standing are met, "'[t]he policy

underlying the exception may be outweighed by competing considerations of a more urgent nature.'" (*Ibid*.) In the present case, respondent generally recognizes the requirement that any permits it grants for appropriation of water will be subordinate to the existing interests of pre-1914 appropriators. Accordingly, there is no significant need for judicial intervention at this time to restrain the acts of an administrative agency that will, or is poised to, overstep its statutory authority. In the unlikely event respondent does issue permits that somehow impinge upon existing nonstatutory rights of appropriation, the injured parties at that point will have ample opportunity to obtain judicial review of respondent's actions. (See *Sacramento County Fire Protection Dist. v. Sacramento County Assessment Appeals Bd., supra,* 75 Cal.App.4th at p. 334 ["This is not a situation where the issue raised by the District will be removed from judicial review if standing is denied."].) Accordingly, we conclude the present case, at this preliminary stage of the administrative proceeding, is not an appropriate case in which to confer public interest standing upon these appellants.

We wish to emphasize one further point. Throughout these proceedings, the parties and the board have used the words "appropriated" and "unappropriated" in two different senses, producing some confusion. In water law, "appropriated" refers to water to which a nonriparian owner asserts an enforceable right to take or use water. "Unappropriated" water is that water flowing in the streambed in excess of the rights claimed by appropriative and riparian users. (See §§ 1202, 1205, subd. (b).) In other words, "appropriated" and "unappropriated" refer only to the right to take or make use of water for a beneficial purpose. In common usage outside the realm of water law, "appropriated" means actual possession of or use of, whether with or without claim of right. (See American Heritage Dict. (3d college ed. 2000) p. 67, col. 1 [second meaning of "appropriate"].) Similarly, in common usage, something that is "unappropriated" has not actually been taken by anyone. Actual usage, rather than the right to use, is at the core of this common meaning of the terms.

Both of these meanings of "appropriated" and "unappropriated" have been used in the present case.[8] The evidence was clear, and essentially uncontroverted, that during occasional flood years water that is unappropriated—not physically claimed by any entity with a right to the water—has been diverted into the California Aqueduct and has been used, without claim of right, by Southern California water interests. Nevertheless, there was no evidence, and respondent's administrative orders do not conclude, that the nonuse of flood water has resulted in the loss of the enforceable right to take or use. Forfeiture of the right to appropriate water occurs only upon the failure of a rights holder to beneficially use water in five consecutive years (§ 1241; *North Kern, supra,* 147 Cal.App.4th at p. 560). There is no evidence of this, and respondent has not determined there is unappropriated water resulting from such continued lack of beneficial use.

Respondent has neither asserted nor exercised the power to reduce the appropriative rights pursuant to which appellants now receive water. Accordingly, appellants are not aggrieved parties with a beneficial interest to support their petition for writ of administrative mandate, nor are they aggrieved parties entitled to maintain an appeal from the judgment denying their petition.

---

[8] For example, at the hearing in this case, the trial court asked: If "[n]ot all [appropriative] rights are exercised all the time," is the resulting water unappropriated? Respondent's counsel answered: "It's unappropriated, absolutely. 'Unappropriated' means it's -- it hasn't been used." Similarly, respondent's counsel stated later in the hearing: "There is no determination in this order about water rights, who has water rights, who has what. It's about the physical availability of water."

DISPOSITION

The appeal is dismissed. As a result, the judgment affirming the administrative decision is affirmed. Respondents are awarded costs on appeal. (Cal. Rules of Court, rule 8.278(a)(2).)

_____
DETJEN, J.

WE CONCUR:

_____
CORNELL, Acting P.J.

_____
PEÑA, J.

A0316716

DOWNEY BRAND LLP
KEVIN M. O'BRIEN (CA Bar No. 122713)
MEREDITH E. NIKKEL (CA Bar No. 254818)
DAVID E. CAMERON (CA Bar No. 278061)
621 Capitol Mall, 18th Floor
Sacramento, CA 95814-4731
Telephone: 916.444.1000
Facsimile: 916.444.2100
kobrien@downeybrand.com
mnikkel@downeybrand.com
dcameron@downeybrand.com

Attorneys for Complainant,
KERN WATER BANK AUTHORITY

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

KERN WATER BANK AUTHORITY, Complainant, v. BUENA VISTA WATER STORAGE DISTRICT and DOES 1 through 100 Respondent.	**COMPLAINT FOR (1) UNAUTHORIZED DIVERSION OF WATER; (2) FORFEITURE OF WATER RIGHTS; (3) ABANDONMENT OF WATER RIGHTS; AND (4) VIOLATION OF ARTICLE X, SECTION 2 OF THE CALIFORNIA CONSTITUTION AND CAL. WATER CODE SECTION 100**

Complainant KERN WATER BANK AUTHORITY ("Authority") alleges against Respondent BUENA VISTA WATER STORAGE DISTRICT ("Buena Vista") and DOES 1 through 100 as follows:

INTRODUCTION

1. The Kern River originates in the Sierra-Nevada mountains. The river is regulated by Isabella Dam and Reservoir, which are located approximately 1.5 miles below the confluence of the North and South Forks of the Kern River, roughly 50 miles northeast of the City of Bakersfield. Below Isabella Reservoir, the Kern River flows through a canyon and then to the floor of the San Joaquin Valley. The total drainage area of the Kern River watershed upstream of Isabella Dam is approximately 2,075 square miles. Key features of the Kern River system are depicted on the map attached hereto as Exhibit "A" and incorporated herein.

///

2. Diverters of water from the Kern River have historically been divided into three groups: (i) those that divert from the First Point of Measurement, located approximately 45 miles downstream of Lake Isabella; (ii) those that divert from the Second Point of Measurement, located another 23 miles downstream; and (iii) those that utilize "Lower River" rights. These points of measurement and categories of diverters originated in the 1888 Miller-Haggin Agreement, as described below. However, neither the Miller-Haggin Agreement nor any other contract can or do establish the scope, nature or extent of a water right. The scope, nature and extent of all water rights on the Kern River can be determined only through the application of California water rights law.

3. The flow of the Kern River is highly variable from year to year, with the annual natural flow at First Point ranging from a maximum of nearly 2.5 million acre-feet in 1983, to a minimum of approximately 139,000 acre-feet in 2015. The average annual natural flow at First Point over the 125-year period of record is approximately 714,500 acre-feet, and the median annual natural flow is approximately 538,500 acre-feet.

4. Buena Vista is the successor-in-interest to Miller & Lux, Incorporated ("Miller & Lux") as to certain pre-1914 appropriative water rights established by Miller & Lux to divert and use water from the Kern River. The scope, nature and extent of the pre-1914 rights established by Miller & Lux and subsequently acquired by Buena Vista is the central issue in this Complaint proceeding.

5. Buena Vista has recently asserted that it holds the right to *all* Kern River water that reaches Second Point of Measurement, regardless of the source or character of such water.[1] In furtherance of this assertion, Buena Vista has recently substantially increased the quantity of water it diverts from the Kern River. The quantities of Buena Vista's recent diversions, as reported to the State Water Board, are described in paragraph 37 of this Complaint. Buena

[1] On January 14, 2019 Buena Vista filed a Petition for Writ of Mandate and Complaint for Declaratory Relief ("Petition") in Kern County Superior Court challenging the adequacy of the Authority's Final Environmental Impact Report for Water Right Application No. 31676. In that Petition, Buena Vista alleges in relevant part that "in a year of Kern River surplus...Buena Vista will use all available 2nd priority recharge capacity in the KWB before water is offered to the Intertie…Thus Buena Vista would utilize all available recharge capacity in the KWB before 'high flow water' would become available to the KWB." (Petition at ¶59.)

Vista's recent diversion amounts are unprecedented in the long history of Kern River operations by Buena Vista and its predecessor, Miller & Lux.

6. The Authority is informed and believes and thereon alleges that the recent substantial increase in Buena Vista's Kern River diversions is related to the recent enactment of the Sustainable Groundwater Management Act ("SGMA"). The Authority is informed and believes and thereon alleges that Buena Vista desires to claim as much Kern River water as possible so that it may profit from the sale and transfer of Kern River water to other water users within the Kern subbasin as such water users seek to comply with the requirements of SGMA.

7. In Orders WR 2010-0010 and WR 2010-0016, the State Water Board amended the Declaration of Fully Appropriated Streams ("FAS") for the Kern River "to allow for processing of applications to appropriate water from the Kern River." (Order WR 2010-0010, ordering para. 2, p. 7.) Orders WR 2010-0010 and WR 2010-0016 were adopted following an evidentiary hearing and were upheld by the Kern County Superior Court and the Fifth District Court of Appeal. Orders WR 2010-0010 and 2010-0016 are now final for all purposes.

8. In determining that the FAS Declaration should be amended "to allow for processing of applications to appropriate water from the Kern River," (Order WR 2010-0010, p. 7) the State Water Board cited, among other things, the following evidence presented at the evidentiary hearing by the "North Kern Petitioners," a group comprised of the Kern Water Bank Authority, Buena Vista Water Storage District, North Kern Water Storage District, Kern County Water Agency and the City of Shafter (*id.* at 2):

> Likewise, the North Kern Petitioners presented a graph; exhibit JE 67, showing Kern River water "undistributed to existing entitlements" in several years. Daniel Easton, witness for the North Kern Petitioners, explained in his written and oral testimony that there was what he calls "undistributed release" water in at least eight months since 1964. Mr. Easton testified that water diverted into the Intertie is in excess of traditionally held and exercised rights and claims of right to Kern River water, and that whenever water has been released into the Intertie in the past, all Kern River water right claims had already been satisfied. This water is, by definition, unappropriated water.

(*Id.* at 4-5; citations omitted).

///

9. Based on the historical use of Kern River water by Buena Vista and its predecessor, Miller & Lux, Buena Vista's pre-1914 appropriative water right to the Kern River is no more than that which can reasonably and beneficially be used for irrigation purposes on approximately 50,000 acres of land. The annual volumetric quantity and other parameters of Buena Vista's pre-1914 appropriative right to the Kern River will be determined based on evidence to be presented at the adjudicatory hearing on this Complaint.

10. Buena Vista's recent Kern River diversions in excess of its water rights constitute an unauthorized diversion and use of water in violation of Cal. Water Code section 1052 and other applicable law.

11. Through this Complaint, the Authority seeks a determination by the State Water Board as to the scope, nature and extent of Buena Vista's pre-1914 appropriative water right on the Kern River. In addition, the Authority seeks a determination by the State Water Board that Buena Vista (i) has forfeited a substantial portion of its Kern River water rights according to proof at the adjudicatory hearing on this Complaint; (ii) has abandoned a substantial portion of its Kern River water rights according to proof at the adjudicatory hearing on this Complaint; and (iii) has violated Article X, section 2 of the California Constitution and Cal. Water Code section 100 by diverting and using Kern River water in a wasteful and unreasonable manner as alleged in paragraphs 38-39 and 45-47 of this Complaint. The Authority respectfully requests that the State Water Board issue a cease and desist order barring Buena Vista from the diversion and use of Kern River water in excess of its water rights, and preventing Buena Vista from using, or employing methods of diversion for using, Kern River water in a wasteful and unreasonable manner.

12. The Authority asserts no claim that First Point diverters are diverting or using Kern River water in excess of their water rights.

JURISDICTION

13. The State Water Resources Control Board ("Board") has jurisdiction over this proceeding under Article X section 2 of the California Constitution, Cal. Water Code sections 1240, 1831, and 1052, and section 856 of Title 23 of the California Code of Regulations.

THE PARTIES

14. The Authority is a joint exercise of powers authority formed in 1995 pursuant to Cal. Gov. Code section 6500, *et seq*.

15. The Authority stores available surface water underground and provides that water to its members in dry and critical years. During periods of storage the Authority not only conserves water for later use; it also provides exceptional wetland habitat that is utilized by wildlife and waterfowl, including migratory birds utilizing the Pacific Flyway.

16. On or about September 26, 2007, the Authority filed with the State Water Board an application to appropriate unappropriated water (later denominated Application No. 31676). Application No. 31676 also seeks an appropriative water right to store up to 500,000 AFY, with the total direct diversion and storage right not to exceed 500,000 in any year.

17. Buena Vista is a water storage district formed in 1924 pursuant to Cal. Water Code section 39000, *et seq*.

18. Each of the respondents identified as DOES 1 through 100, inclusive ("DOES 1-100") are persons other than the named respondent who, whether as individuals, corporations, unincorporated associations, partnerships, trustees, executors, guardians, or otherwise, claim some right, title, estate, lien, or interest in beneficially using Kern River water diverted at or downstream of Second Point as defined herein. The Authority is unaware of the true names and identities of DOES 1-100 and therefore sues DOES 1-100 by fictitious names. The Authority will amend this pleading to reflect the true identifies and capacities of Does 1-100 once ascertained.

GENERAL ALLEGATIONS

A. The Miller-Haggin Agreement

19. In 1879, Henry Miller and Charles Lux initiated litigation against defendant James Ben-Ali Haggin related to the diversion of Kern River water. Miller and Lux owned land downstream of Haggin and asserted riparian rights to the natural flow of the river. Haggin, on the other hand, owned land away from the Kern River and claimed appropriative rights to divert water upstream from Miller.

///

20. After extensive litigation, including a California Supreme Court opinion, *Lux v. Haggin* (1886) 69 Cal. 255, Miller and Haggin reached a private settlement agreement in 1888. The 1888 Miller-Haggin Agreement provides that Kern River water shall be divided pursuant to certain terms and measured at two specific locations entitled First Point of Measurement ("First Point"),[2] located and Second Point of Measurement ("Second Point").[3]

21. The Miller-Haggin Agreement provides that all Kern River natural flow is to be measured at First Point, and all flows up to and including 300 cubic-feet per second ("cfs") measured there are allocated to certain specific First Point diverters. All flows above 300 cfs are divided 1/3 to the Second Point diverters (without losses) and 2/3 to the First Point diverters, except during the period of September through February, when all the flow over 300 cfs is allotted to the First Point diverters. The Miller-Haggin Agreement provides that all water of the First Point diverters reaching the Second Point of Measurement is available for use by the Second Point diverters.

22. The Miller-Haggin Agreement was amended in 1930, 1955 and 1964. As amended, the Miller-Haggin Agreement provides that for the six-month period of September through February ("Non-Miller-Haggin Season") when the flow at First Point is over 1,500 cfs, the waters of the Kern River shall be apportioned each day between the First Point Diverters and Second Point diverters, with First Point diverters being entitled to two-thirds of the total flow and Second Point Diverters being entitled to one-third of the flow over 1,500 cfs. As alleged above, Buena Vista holds rights solely to that portion of water that reaches Second Point that is within the scope of its pre-1914 appropriative rights, as established and maintained in accordance with California water law. Stated differently, neither the Miller-Haggin Agreement nor any other contract can create a water right under California law.

B. Buena Vista Lake

23. The Miller-Haggin Agreement outlined a plan to develop a storage facility known as Buena Vista Lake. In this regard the Miller-Haggin Agreement provides in relevant part:

[2] Located in Section 35, Township 28 South, Range 28 East.
[3] Located in Section 24, Township 30 South, Range 25 East.

> "levees should be constructed around a large lake known as Buena Vista Lake, into which a part of the water of the Kern River naturally ran, so as to make of said lake to some extent an artificial reservoir in which should be confined the waters of the river flowing at the second point, at times when there was more than was then in use by the [First Point diverters], to be there stored for use subsequently by the [Second Point diverters]."

(*See, Miller & Lux v. Kern County Land Co.* (1908) 154 Cal. 785, 786.)

24. Following construction of Buena Vista Lake, Buena Vista and Miller & Lux entered into an agreement dated October 14, 1964 entitled Kern River Storage and Use of Water Agreement (the "BV Lake Agreement") that governed use of Buena Vista Lake.

25. The Authority is informed and believes, and based thereon alleges, that the principal purpose of the BV Lake Agreement was to set forth the terms by which water may be stored in Buena Vista Lake. The Buena Vista Lake storage facilities are described as having three surface water storage cells: (1) Cell 1 having a capacity of 18 thousand acre-feet ("TAF"); (2) Cell 2 having a capacity of 12.6 TAF; and (3) Cell 3's capacity is undescribed. Under the BV Lake Agreement, the order of use of BV Lake is that Buena Vista's share of storage at Isabella must first be fully utilized, then BV Lake Cell 2 is utilized, and only thereafter is Cell 1 to be utilized. (BV Lake Agreement ¶8.) Pursuant to the BV Lake Agreement, Buena Vista *abandoned* any claim to store any water in BV Lake Cell 3 (located south of Cells 1 and 2). (BV Lake Agreement ¶11; emphasis added).

C. <u>The Shaw Decree</u>

26. On August 6, 1900, certain individual appropriative water rights of the First Point diverters were adjudicated by Judge Lucien Shaw of the Kern County Superior Court. The resulting Shaw Decree established the quantities available for diversion and appropriation among diverters at First Point.

27. The Shaw Decree provides that when there is not sufficient water available to satisfy all of the rights of the First Point diverters, the order of priority stated in the Shaw Decree shall be followed. Since 1900, the individual appropriative rights of the First Point diverters have been administered according to the rights and priorities stated in the Shaw Decree.

///

28. Kern River Flow and Diversion Records—daily records of the diversion of Kern River water at First Point which have been kept since 1894—presently lists twenty-six diversion rights and a total instantaneous flow of 3,162.5 cubic-feet per second. First Point rights are satisfied when the river is running over 3,162 cfs at First Point, and any flow over that amount is released to Second Point.

D. Lower River Rights

29. Before the development of Isabella Dam in 1953, during times of high flow Kern River water was available for diversion far downstream of Second Point (e.g. north of Highway 46) in the Tulare Lake basin. As recognized in Water Rights Decision 1196, landowners in that area diverted and used this high-flow water for beneficial purposes. These "Lower River Rights" were also recognized and accounted for in the 1962 Kern River Water Rights and Storage Agreement, which was an agreement among First Point diverters, Second Point diverters and Lower-River diverters entered that apportioned storage in Lake Isabella. Under that agreement, Lower River Rights were measured as various percentages of calculated natural flow at First Point, as well as all water that passed north of Highway 46.

30. The Authority is informed and believes and thereon alleges that Hacienda Water District and the Tulare Lake Basin Water Storage District historically were the major entities diverting under the Lower River Rights. The Authority is informed and believes and thereon alleges that, in 2001, the Kern County Water Agency purchased the Lower River Rights, and they today are held and exercised by the Kern County Water Agency by diversion at First Point. Notwithstanding all rights on the Kern River, including the Lower River rights, water has still historically entered into the California Aqueduct through the Intertie during high flow periods on the Kern River.

E. Kern River Mandatory Release

31. Since approximately 1986, the Kern River Watermaster has implemented a "*Policy of the Parties to 1962 Kern River Water Rights and Storage Agreement Re-Utilization of Isabella Reservoir Flood Releases*" (hereinafter "Flood Policy"). The Authority is informed and believes and thereon alleges that the Flood Policy was put in place for the principal purpose of accounting

for Kern River flows in excess of rights on the river. The Flood Policy generally provides that when certain conditions are met, anyone may divert the excess Kern River water. Specifically, when (1) abnormal flow is being released from Isabella Reservoir by order of the Corps of Engineers (also called "mandatory release conditions"), and (2) such flow is entering into the California Aqueduct through the Intertie:

> [w]ater will be made available to any person, interest or group in Kern County who wish to divert that water, up to the amount of water flowing into the Intertie, provided such interest, person or group acknowledges their desire to divert said water by executing an "Order" which shall include, among other things, a description of the point they wish to divert such flow, the rate of flow they wish to divert and provide a schedule such that the request may be honored by the operating Kern River entity. This policy is without prejudice to the rights of any of the Parties.

(*Policy of the Parties to 1962 Kern River Water Rights and Storage Agreement Re-Utilization of Isabella Reservoir Flood Releases*.)

32. Historically, various parties including the Authority have diverted and used surplus Kern River water when mandatory release conditions were in effect.

F. The Scope of Buena Vista's Pre-1914 Appropriative Water Rights

33. Buena Vista has recently asserted, purportedly based on the 1888 Miller-Haggin Agreement, that it holds the right to all water that reaches Second Point of Measurement. Specifically, Buena Vista has asserted that it holds pre-1914 appropriative water rights as reported to the Water Board in Statement of Diversion and Use Numbers S004666, S015611, S015612, S015613, and S015614. For each of the referenced Statements, Buena Vista has asserted that its rights are pre-1914 appropriative rights and that diversions commenced in the year 1870.

34. The scope of a pre-1914 water right equals the amount of water actually appropriated for a beneficial use within a reasonable period of time. (*De Necochea v. Curtis* (1889) 80 Cal. 397, 402.) Title to the right vests when the appropriator actually applied the full amount of the diverted water to a beneficial use, and the priority date is established as of the date the appropriation commenced. (*Maeris v. Bickness* (1857) 7 Cal. 261, 263.) The initiation of an appropriation is demonstrated by some overt act that made it clear that an appropriation of water

was intended, such as posting a notice at the proposed point of diversion, conducting surveys, or construction of project works.

35. A pre-1914 appropriative right may be initiated and then prosecuted with diligence for a reasonable time according to a pre-determined plan of development. In circumstances where a pre-1914 appropriative right is initiated and prosecuted with diligence for a reasonable time according to a pre-determined plan of development, the initial priority date may attach to the entire water supply developed. (*But see, e.g., Haight v. Costanich* (1920) 184 Cal. 426, 432; *Senior v. Anderson, supra,* 115 Cal. 496 [holding that right holder could not continue expanding right by bringing additional lands under cultivation after expiration of reasonable time]; *see also* Water Code § 1202(b) and State Water Board Order WR 2006–0001 at 8-9.) After a right is fully developed, however, the diversion of additional water would require the initiation of a new right with a junior appropriation date. (*See, e.g., Butte Canal & Ditch Co. v. Vaughn* (1858) 11 Cal. 143, 152-54.)

36. Based on the historical use of Kern River water by Buena Vista and its predecessor, Miller & Lux, Buena Vista's pre-1914 appropriative water right to the Kern River is no more than that which can be reasonably and beneficially used on approximately 50,000 acres of land. Neither Buena Vista nor its predecessor, Miller & Lux, had a pre-determined plan of development that contemplated diversions of Kern River water in the quantities recently made by Buena Vista. The annual volumetric quantity and other parameters of Buena Vista's pre-1914 appropriative right to the Kern River will be adjudicated in this proceeding based on evidence to be presented at the adjudicatory hearing on this Complaint.

G. Buena Vista has Diverted in Excess of its Pre-1914 Appropriative Water Rights.

37. Notwithstanding the limited scope of Buena Vista's pre-1914 appropriative water rights, Buena Vista has, in recent years, diverted quantities of water far in excess of historical diversions. As reported by Buena Vista in its annual Supplemental Statements of Diversion and Use for Statement Numbers S004666, S015611, S015612, S015613, and S015614, Buena Vista has diverted up to 563,384 AF annually, hundreds of thousands of acre-feet in excess of its right. Buena Vista's historical diversions, as reported to the Water Board, have been as follows:

Buena Vista Water Storage District

Supplemental Statement of Water Diversion and Use Summary (acre-feet)

Statement of Diversion and Use	S004666[a]	S015611[b]	S015612[c]	S015613 [d]	S015614 [e]	Total Use Reported from Statements of Water Diversion and Use
1984	87,000					87,000
1985	63,800					63,800
1986	191,500					191,500
1987	18,400					18,400
1988	9,200	No Data	No Data	No Data	No Data	9,200
1989	8,800					8,800
1990	6,200					6,200
1991	61,600					61,600
1992	20,500					20,500
1993		800	-	26,200	0	27,000
1994		0	-	33,900	0	33,900
1995		12,500	-	91,400	8,300	112,200
1996		4,000	-	43,400	0	47,400
1997		1,400	-	120,700	12,800	134,900
1998	No Data	1,500	-	133,700	65,000	200,200
1999		0	-	12,300	0	12,300
2000		0	-	15,700	0	15,700
2001		2,400	-	33,100	0	35,500
2002		3,600	-	8,600	0	12,200
2003		800	-	17,400	0	18,200
2004		0	-	21,200	0	21,200
2005	0		70,871	--	0	70,871
2006	4,439	No Data	88,859	--	28,297	121,595
2007	866		21,182	--	0	22,048
2008	8,223	18,517	46,090	0	0	72,830
2009	40,056	21,442	2,799	3,000	0	67,297
2010	13,529	56,904	59,428	25,185	0	155,046
2011	12,461	193,732	96,911	53,156	19,321	375,581
2012	8,212	25,343	12,650	0	0	46,205
2013	38	21,384	1,018	0	0	22,440
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	20,848	615	0	0	21,463
2017	16,080	296,757	117,685	74,916	57,946	563,384

(a) Supplemental Statement of Diversion and Use S004666 reports use at the Main Canal Intake, Alejandro Canal Intake and Kern River Outlet (Waste) Weir and flow at Second Point of Measurement. No reports are on file for 1993 through 2004 and locations are reported on S015611, S015612, S015613 and S015614. Starting in 2005, S004666 reports use at the Kern Water Bank Intake. Flow at Second Point of Measurement for 1984 through 1992 is not included in the table, since it is a measurement location, not a diversion location.

(b) Reporting for Supplemental Statement of Diversion and Use S015611 starts in 1993. No reports are available for 2005 through 2007.

(c) Reporting for Supplemental Statement of Diversion and Use S015612 starts in 1993. The location is listed as Second Point of Measurement for 1993 through 2004, a measurement location not a diversion location, so these values are excluded from this table. After 2004 the reporting methodology changed, and it is not clear what location is being reported.

(d) Reporting for Supplemental Statement of Diversion and Use S015613 starts in 1993. Reports for 2004, 2005 and 2006 list the diversion location as Second Point of Measurement, a measurement location, not a diversion location, so these values are excluded from the table. After 2006, the reporting methodology changed, and it is not clear what location is being reported.

(e) Reporting for Supplemental Statement of Diversion and Use S015614 starts in 1993.

H. Buena Vista's Use and Method of Diversion of Kern River Water in the 2016-2017 Water Year Constituted Waste and Unreasonable Use of Water.

38. In the 2016-2017 water year—before Governor Brown declared an end to California's recent drought emergency—Buena Vista utilized Buena Vista Lake to cause the waste and unreasonable use of water. During this time, the Authority is informed and believes, and thereon alleges, that Buena Vista diverted approximately 40,000 AF water into Cells 1, 2, and 3 in Buena Vista Lake. A substantial portion of this water ultimately evaporated and was not utilized for any beneficial purpose. The Authority is informed and believes and thereon alleges that Buena Vista did not report these diversions to storage to the State Water Board.

39. The Authority is informed and believes thereon alleges that Buena Vista diverted and wasted Kern River water, as alleged in paragraph 38 of this Complaint, for the principal purpose of avoiding mandatory release conditions on the Kern River under the Flood Policy, which would have allowed others (including the Authority) to divert and use Kern River water. Further, the Authority is informed and believes and thereon alleges that Buena Vista diverted and wasted this water for the purpose of preventing its beneficial use by others on the Kern River.

FIRST CAUSE OF ACTION

(Unauthorized Diversion of Water)

40. The Authority incorporates by reference the allegations in paragraphs 1 through 39 above as though fully set forth herein.

///

///

41. Buena Vista's diversion and use of Kern River water in excess of its pre-1914 appropriative rights is not authorized under any valid water right held by Buena Vista and therefore violates Cal. Water Code section 1052 and other applicable law.

42. The Authority is informed and believes thereon alleges that unless it is ordered by the State Water Board to cease doing so, Buena Vista will continue to claim and divert the full flow of the Kern River that reaches Second Point of Measurement.

SECOND CAUSE OF ACTION

(Violation of California Constitution, Article X, section 2 and Water Code Section 100)

43. The Authority incorporates by reference the allegations in paragraphs 1 through 42 above as though fully set forth herein.

44. The California Constitution and the Water Code require that "water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented." (Cal. Constitution, Art. X, § 2; Water Code § 100.) The California Constitution and the Water Code further prohibit "waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water." (*Id.*)

45. The Authority is informed and believes and thereon alleges that Buena Vista's diversion of water into Buena Vista Lake during the 2016-2017 water year, the subsequent evaporation of a substantial portion of that water, and Buena Vista's failure to put the water to any beneficial use constitute an unreasonable and wasteful use and method of diversion of water in violation of Article X, section 2 of the California Constitution and Section 100 of the Water Code.

46. As a direct and proximate result of Buena Vista's unreasonable use and waste of water and unreasonable method of diversion, the Authority has incurred and will incur harm to its rights and interests.

47. The Authority is informed and believes and thereon alleges that Buena Vista's actions in unreasonably using and wasting water, and its unreasonable method of diversion, described above were willful, wanton and malicious in that Buena Vista intended to cause the

waste of water for the purpose of preventing mandatory release conditions on the River under the Flood Policy and the diversion of that water by other persons including the Authority on the Kern River.

48. The Authority has an inadequate remedy at law for the harm Buena Vista's unauthorized diversions and taking of water have caused. Unless ordered by the State Water Board to cease and desist, the Authority is informed and believes and thereon alleges that Buena Vista will continue the unauthorized diversion and taking of water and cause irreparable injury to the Authority and other water users by, among other things, impairing and continuing to impair the ability of the Authority and other water users to divert and use water from the Kern River.

THIRD CAUSE OF ACTION

(Forfeiture of Pre-1914 Appropriative Water Rights)

49. The Authority incorporates by reference the allegations in paragraphs 1 through 48 above as though fully set forth herein.

50. Buena Vista has alleged that it holds a right to divert all Kern River water that reaches Second Point of Measurement. Although the Authority is not aware of any right that entitles Buena Vista to divert and use Kern River water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres, the Authority alleges that to the extent that such right may have existed in the past, Buena Vista has forfeited a substantial portion of such rights due to non-use.

51. The Authority's Application No. 31676, which was filed with the State Water Board on or about September 26, 2007, constitutes a competing claim for Kern River water diverted by Buena Vista including but not limited to that reported under Statement Nos. S004666, S015611, S015613, and S015614.

52. Buena Vista did not divert any water from the Kern River in excess of that which can be reasonably and beneficially used on approximately 50,000 acres at any point in the five years prior to September 26, 2007, thereby forfeiting any claim to divert water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres.

///

53. The Authority is informed and believes and thereon alleges that without a determination by the State Water Board that Buena Vista has forfeited a portion of its claimed pre-1914 appropriative rights to all water from the Kern River in excess of that which can be reasonably and beneficially used on approximately 50,000 acres, Buena Vista intends to continue to claim and divert the full flow of Kern River water that reaches Second Point of Measurement. The Authority is informed and believes and thereon alleges that if Buena Vista did not divert the full flow of Kern River water that reaches Second Point, water would be available for beneficial use by the Authority and other water users on the Kern River.

FOURTH CAUSE OF ACTION

(Abandonment of Pre-1914 Appropriative Water Rights)

54. The Authority incorporates by reference the allegations in paragraphs 1 through 53 above as though fully set forth herein.

55. Buena Vista has alleged it holds a right to divert all Kern River water that reaches Second Point of Measurement. Although the Authority is not aware of any right that entitles Buena Vista to Kern River water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres, the Authority alleges that to the extent such right may have existed in the past, Buena Vista has abandoned such right to Kern River water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres.

56. Water was available for diversion at the Second Point of Measurement in the following years: 1906, 1909, 1916, 1952, 1969, 1978, 1980, 1982, 1983, 1984, 1986, 1997, 1998, 2006, and 2017.

57. The Authority is informed and believes and thereon alleges that prior to 2007, and during the years of 1906, 1909, 1916, 1952, 1969, 1978, 1980, 1982, 1983, 1984, 1986, 1997, 1998, and 2006, Buena Vista did not divert water from the Kern River in excess of that which can be reasonably and beneficially used on approximately 50,000 acres. Buena Vista's failure to divert water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres when water was available demonstrates Buena Vista's intent to abandon any

///

claimed right to Kern River water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres.

58. Pursuant to the BV Lake Agreement, Buena Vista, on October 14, 1964, abandoned any claim to store any water in BV Lake Cell 3. Buena Vista's act of abandoning Cell 3's storage capacity further demonstrates Buena Vista's intent to relinquish possession and enjoyment of its claimed right to Kern River water in excess of that which can be reasonably and beneficially used on approximately 50,000 acres.

59. The Authority is informed and believes and thereon alleges that without a determination by the State Water Board that Buena Vista has abandoned any claimed rights to all water from the Kern River in excess of that which can be reasonably and beneficially used on approximately 50,000 acres, Buena Vista intends to continue to claim and divert the full flow of Kern River water that reaches Second Point.

PRAYER FOR RELIEF

WHEREFORE, the Authority respectfully requests that the State Water Board:

1. Notice and conduct an adjudicatory hearing regarding the allegations of this Complaint in accordance with applicable law;

2. Find and determine that Buena Vista's pre-1914 appropriative water right is limited to the total quantity that can be reasonably and beneficially used on approximately 50,000 acres of land, the precise quantity of the right to be determined based on evidence to be presented at an adjudicatory hearing on this Complaint;

3. Find and determine that Buena Vista has partially forfeited its pre-1914 appropriative water right, the precise quantity of the right to be determined based on evidence to be presented at an adjudicatory hearing on this Complaint;

4. Find and determine that Buena Vista has partially abandoned its pre-1914 appropriative water right, the precise quantity of the right to be determined based on evidence to be presented at an adjudicatory hearing on this Complaint;

5. Find and determine that Buena Vista has unlawfully diverted and used water from the Kern River in violation of applicable law;

6. Find and determine that Buena Vista has violated Article X, section 2 of the California Constitution and Cal. Water Code section 100 by using and employing methods of diversion of Kern River water that are wasteful and unreasonable as alleged herein;

7. Issue a cease and desist order barring Buena Vista from (i) diverting Kern River water in excess of its rights; and (ii) engaging in the wasteful or unreasonable use or methods of diversion of Kern River water.

8. Award the Authority such other relief as the State Water Board deems just and proper.

DATED: August 8, 2019

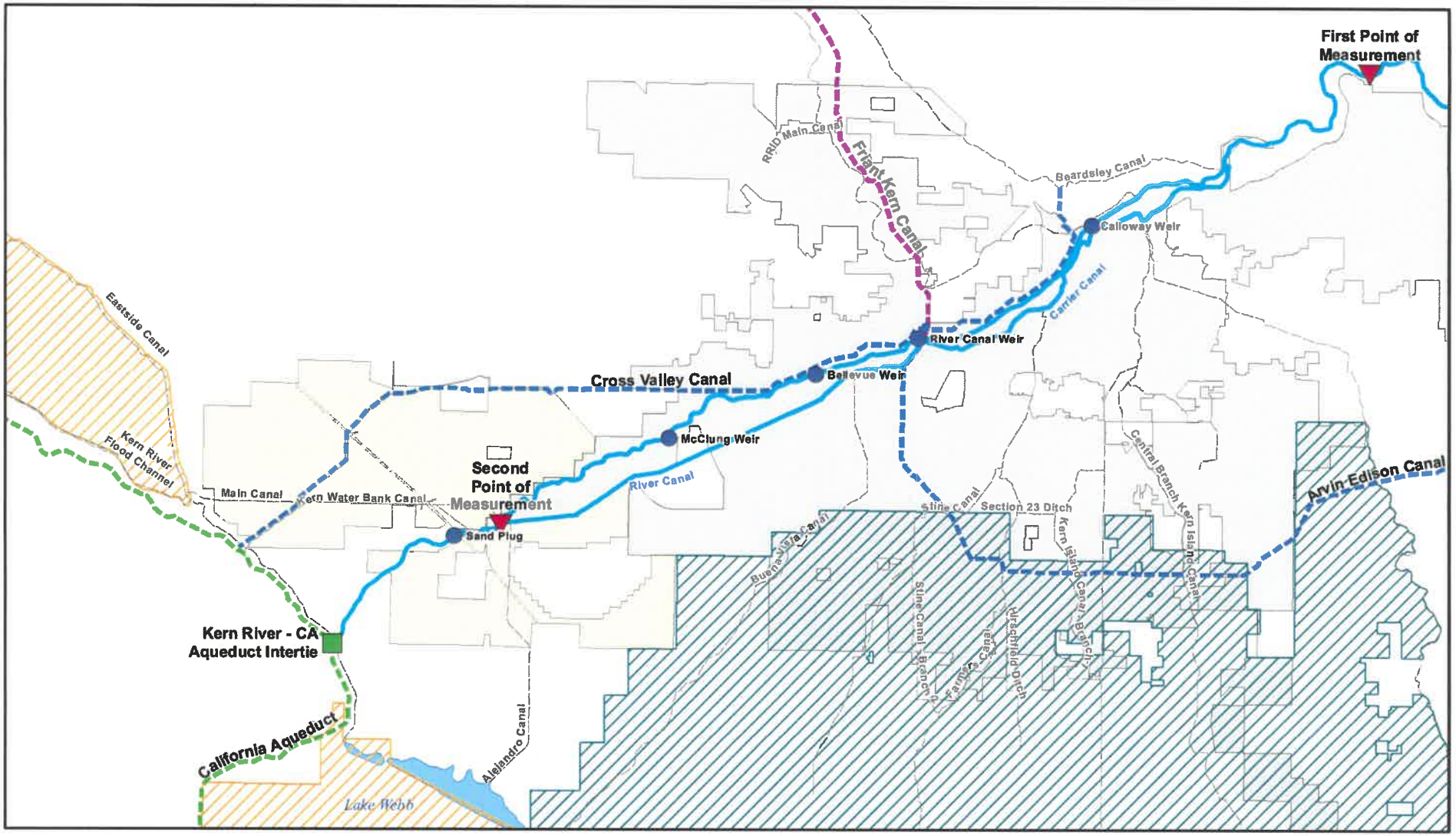
DOWNEY BRAND LLP

By: _____ FOR
KEVIN M. O'BRIEN

Attorneys for Complainant,
KERN WATER BANK AUTHORITY

DOWNEY BRAND LLP

EXHIBIT A



- Kern River - California Aqueduct Intertie
- Point of Measurement
- River Weir
- Federal Canal
- Local Canal
- Local Distribution Canal
- Kern River Facilities
- Kern Water Bank
- Buena Vista Water Storage District
- Kern Delta Water District
- City of Bakersfield

N

0 1.5 3

Miles

WEST YOST ASSOCIATES

Exhibit A

Kern River Key Facilities

State Water Resources Control Board

Alan C. Lloyd, Ph.D.
Agency Secretary

Division of Water Rights
1001 I Street, 14th Floor ♦ Sacramento, California 95814 ♦ 916.341.5300
Mailing Address: P.O. Box 2000 ♦ Sacramento, California 95812-2000
FAX: 916.341.5400 ♦ www.waterrights.ca.gov

Arnold Schwarzenegger
Governor

APPLICATION NO. _____
(Leave blank)

UNDERGROUND STORAGE SUPPLEMENT to APPLICATION TO APPROPRIATE WATER BY PERMIT

1. State amount of water to be diverted to underground storage from each point of diversion in item 3b of form APP.

   a. Maximum Rate of diversions (1) _____ (2) 650 (3) 150 cfs
   b. Maximum Annual Amount (1) _____ (2) 360,0000 (3) 50,000 acre-feet

2. Describe any works used to divert to offstream spreading grounds or injection wells not identified in item 7 of form APP.
   N/A

3. Describe spreading grounds and identify its location and number of acres or location of upstream and downstream limits if onstream.
   See Maps 2 and 3. The Kern Fan Projects (POD #2) available to Buena Vista are approximately 30,000 in gross acres with more than 10,000 acres of recharge ponds. POD#3 to the Buena Vista service areas offer more than 50 miles of canals and sloughs.

4. State depth of groundwater table in spreading grounds or immediate vicinity:
   91 feet below ground surface in September 2006 measured at a point located within the NW ¼ of NE ¼ of Section 23, T 30 S, R 24 E, MD B&M

5. Give any historic maximum and or minimum depths to the groundwater table in the area.
   Location 30/24/23B Maximum 155 feet below ground surface on 12/04 (date)
   Location 31/26/29L Maximum 199 feet below ground surface on 6/03 (date)

6. Describe proposed spreading operation. Whenever water is available in excess of demands or available surface storage then water is diverted into spreading areas for underground storage for later extraction.

7. Describe location, capacity and features of proposed pretreatment facilities and/or injected wells.
   N/A

8. Reference any available engineering reports, studies, or data on the aquifer involved.

USGS, Water Supply Paper 1618, Use of Ground-Water Reservoirs for Storage of Surface Water in the San Joaquin Valley, CA 1964.

USGS, Water Supply Paper 1469, Groundwater Conditions and Storage Capacity in the San Joaquin Valley, CA 1959.

USGS, Water Supply Paper 1999-H, Subsurface Geology of the Late Tertiary and Quanternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, CA 1972.

USGS, Hydrologic Investigations Atlas HA-489, Base of Fresh Ground Water in the San Joaquin Valley, California, 1972.

USGS, Professional Paper 1401-C, Geology of the Fresh-Water Basin of the Central Valley, California, with Texture Maps and Sections, 1986.

Crewdson, Robert A., 15 November, 2004, An Evaluation of Representative Hydrologic Periods for Basin and District Water Balances for the Kern County Water Agency, Sierra Scientific Services, Bakersfield, Ca.

Crewdson, Robert A., Fall 2007, A Baseline Water Quality Evaluation of the Kern Fan Groundwater Aquifer for the Rosedale - Rio Bravo Water Storage District, Sierra Scientific Services, Bakersfield, Ca.

Crewdson, Robert A., Fall 2007, An Evaluation of the State of the Basin for the Kern County, Ca Portion of the Southern San Joaquin Valley, for the Buena Vista- and Rosedale - Rio Bravo Water Storage Districts, Sierra Scientific Services, Bakersfield, Ca.

Croft, M.G., 1972, Subsurface geology of the Late Tertiary and Quaternary water-bearing deposits of the southern part of the San Joaquin Valley, California, USGS WSP 1999H, 29p.

Dale, R.H., J.J. French, H.D. Wilson, Jr., 1964, The story of ground water in the San Joaquin Valley, California, USGS Circ. 459.

Dale, R.H., J.J. French, G.V. Gordon, 1966, Ground-water geology and hydrology of the Kern River alluvial fan area, California, USGS WRD OF Report.

Fryer, Lloyd, August 27, 2001, Kern County Water Agency Initial Water Management Plan, Public Review Draft, KCWA, Bakersfield, Ca.

Frink, J.W., H.A. Kues, 1954, Corcoran clay - A Pleistocene lacustrine deposit in the San Joaquin Valley, California, AAPG Bull. v. 38, pp. 2357 - 2371.

Manning, J.C., 1967, Report on ground water hydrology in the southern San Joaquin Valley, AWWA Jour v. 59, pp. 1513 - 1526.

Negrini, Robert, M., [illegible]l, May 12, 2005, Kern Water Bank A[illegible]ority and California State University, Bakersfield 3-D Characterization and Monitoring of Aquifer Attributes in the Kern Water Bank, Local Groundwater Assistance Act of 2000 Final Report, CSUB.

Negrini, R., Baron, Gillespie, Horton, Blake, Huff, Meyer, Powers, Draucker, A., Draucker, S., Durham, Hilton, Mondrian, O'Rear, Philley, Register, 2005, A middle Pleistocene lacustrine delta lobe in the Kern River alluvial fan and its close association with groundwater arsenic concentrations: One outcome of USDA-CREES Grant #2001-01170, USDA-CREES National Water Quality Conference, La Jolla, Ca, Feb.

Shelton, Jennifer, L., Pimentel, Fram, and Belitz, 2006, Ground-Water Quality Data in the Kern Basin, California, 2006: Result s from the California GAMA Program, Preliminary USGS-Water Resources Data Report CA-XXXX, subject to revision, USGS.

Spear, Michael, J., 2003, California's Groundwater, Bulletin 118 - Update 2003, California Department of Water Resources (pp. 175 - 182).

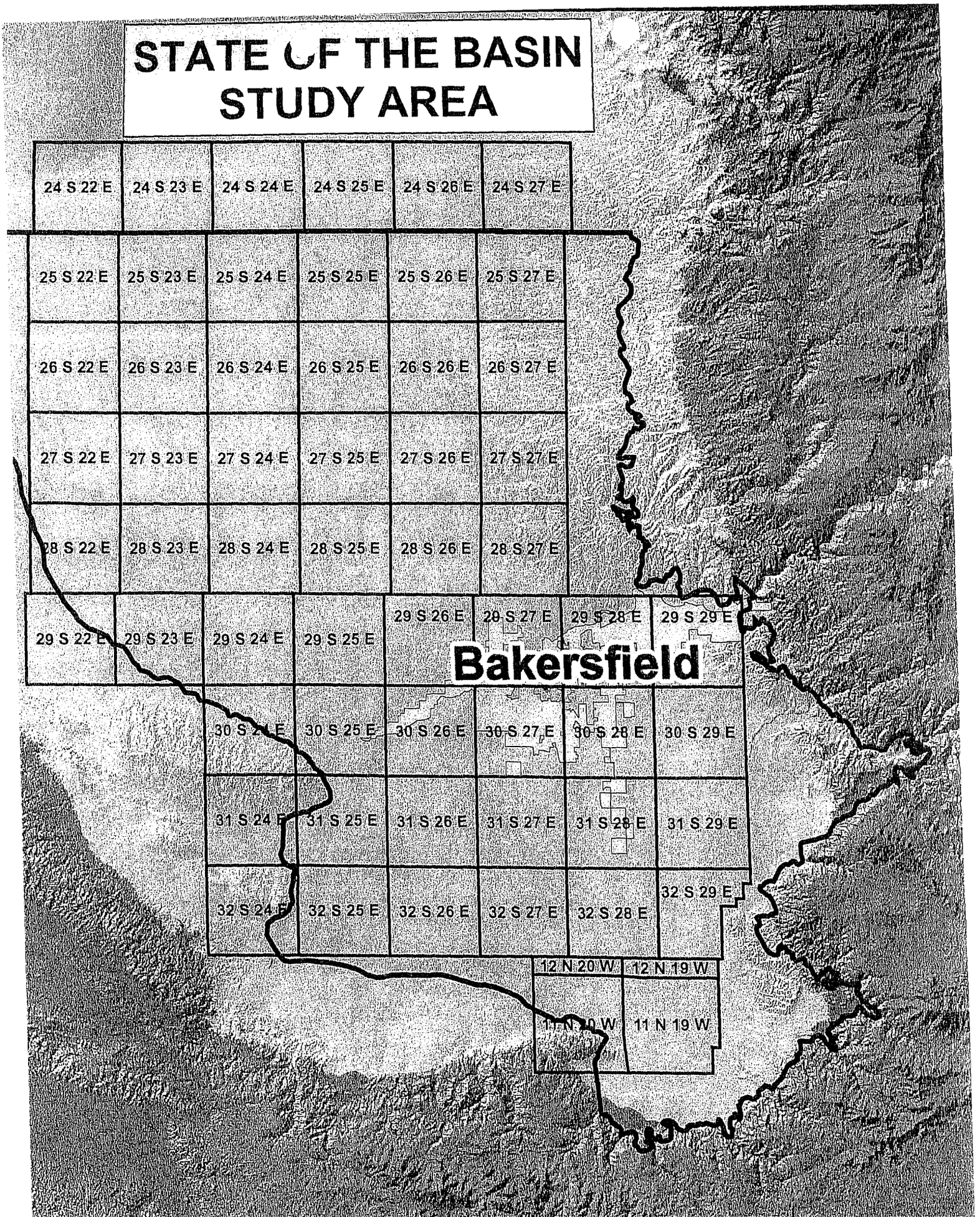
Swartz, R.J., 1995, A study of the occurrence of arsenic on the Kern Fan element of the Kern Water Bank, southern San Joaquin Valley, Ca., MSC thesis, CSUB, 138p.

9. Describe underground reservoir and attach a map or sketch of its location. The reservoir area of interest underlies approximately 20 townships (approx. 720 sq. mi or approx. 461,000 ac) within Kern County, Ca. The entire area is underlain by a 500- to 1000-ft thick, semi-confined aquifer comprised of medium- to coarse-grained fluvial/alluvial sediments deposited by the Kern River within the southern San Joaquin Valley within the last million years. The aquifer is a prolific water producer with excellent storage and transmissive properties. The native groundwater is good quality potable water derived from approximately 740,000 af/yr recharge from the Kern River which drains the southern Sierra Nevada mountain range to the east of Bakersfield, Ca.

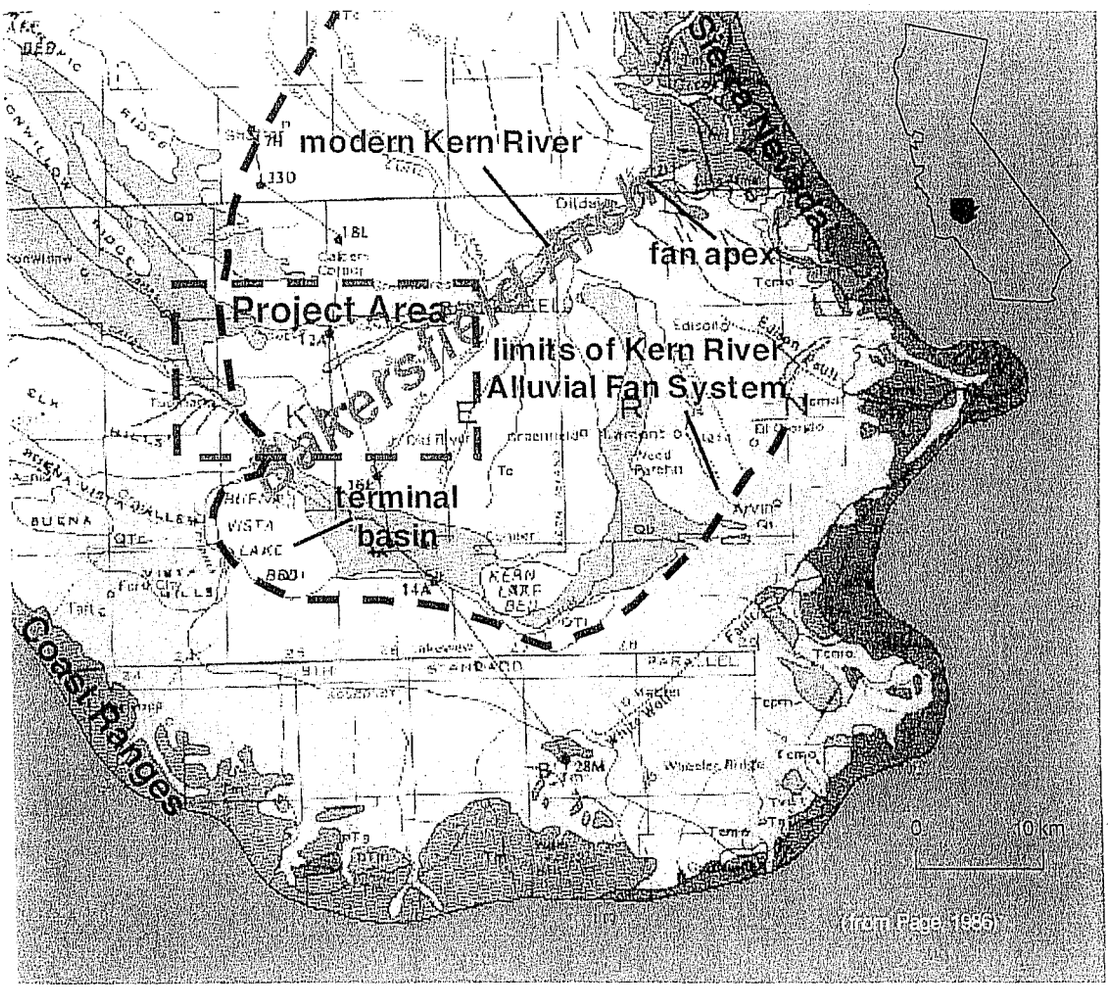
10. State estimated storage capacity of underground reservoir. Based on measurements and analyses reported by R. A. Crewdson, January, 2003, the storage capacity of the area of interest exceeds 10 million af, assuming the following parameters: average depth to water of 150 ft over an area of 461,000 acres, with an average dewatered-aquifer storage capacity of 0.15 .

11. Describe existing use of the underground storage reservoir and any proposed change in its use. Currently the underground storage is used to store and recover Federal (CVP and Friant-Kern), State, and Kern River water for a wide variety of beneficial purposes.

12. Describe the proposed method and location of measurement of water placed into and withdrawn from underground storage. Since Buena Vista already operates and maintains a conjunctive use system it is well equipped with required infrastructure and staff. Relative to recovery, meters are placed on the well discharges and recorded regularly. Deliveries into the District service areas and recharge are measured by a wide variety of continuous recording measuring devices based on the application of the facility. Buena Vista's Hydrographer maintains Buena Vista records and acts as the Kern River Watermaster at 2nd Point diverting and recording all rights downstream of 2nd Point.


STATE OF THE BASIN
STUDY AREA
24 S 22 E
24 S 23 E
24 S 24 E
24 S 25 E
24 S 26 E
24 S 27 E
25 S 22 E
25 S 23 E
25 S 24 E
25 S 25 E
25 S 26 E
25 S 27 E
26 S 22 E
26 S 23 E
26 S 24 E
26 S 25 E
26 S 26 E
26 S 27 E
27 S 22 E
27 S 23 E
27 S 24 E
27 S 25 E
27 S 26 E
27 S 27 E
28 S 22 E
28 S 23 E
28 S 24 E
28 S 25 E
28 S 26 E
28 S 27 E
29 S 22 E
29 S 23 E
29 S 24 E
29 S 25 E
29 S 26 E
29 S 27 E
29 S 28 E
29 S 29 E
Bakersfield
30 S 24 E
30 S 25 E
30 S 26 E
30 S 27 E
30 S 28 E
30 S 29 E
31 S 24 E
31 S 25 E
31 S 26 E
31 S 27 E
31 S 28 E
31 S 29 E
32 S 24 E
32 S 25 E
32 S 26 E
32 S 27 E
32 S 28 E
32 S 29 E
12 N 20 W
12 N 19 W
11 N 20 W
11 N 19 W

M-4



Q_{Tc} Quaternary alluvium

Q_{lc} Quaternary lacustrine clays

Q_f Quaternary fluvial (stream) deposits

T_m Tertiary marine deposits

Figure S1. Location Map of Project Area and surrounding features discussed in the text. Bakersfield Arch is a broad, low-amplitude structural upwarp that has been active throughout most of the TertiaryPeriod (past 60-70 Myr).

Map 5

Environmental Defense Sciences

202 S. Lake Ave., Ste. 294, Pasadena, CA 91101 Tel: 626-744-1766 Fax: 626-304-9427

TECHNICAL MEMORANDUM

Date: January 14, 2021

To: Jonathan Parker
Kern Water Bank Authority

From: E. John List, Ph.D., P.E.
Principal Consultant

Subject : Draft Environmental Impact Report for the Palms Groundwater Recovery Project
State Clearinghouse Number 2020060315
FSI E217003

This memorandum will present the results of my review of the subject DEIR for the Palms Groundwater Recovery Project proposed by Buena Vista Water Storage District (BVWSD). The memorandum is in two parts: Part I presents my analysis of perceived deficiencies in the DEIR; Part II describes what in my professional opinion are problems with the proposed project as described and evaluated in the DEIR. I discuss the additional information and analysis that should be developed in order for the DEIR to inform the public of the water quality effects of the project.

Part I - Deficiencies in the DEIR Regarding Water Quality

The primary problem with the project description in the DEIR is that there is a paucity of data describing in detail the water quality issues that will be associated with the project. It is clear that the groundwater quality on the western side of the East Side Canal differs significantly from that on the east of the Canal, and this is acknowledged in the DEIR in general terms. However, the DEIR does not include any of the detailed, but still somewhat limited, presentation of data available in the GEI 2017 memorandum:

GEI Consultants, Inc. 2017. Memorandum: Water Quality Review of Groundwater Wells for "The Palms" Recovery Project, to Buena Vista Water Storage District, February 17.

This document describes significant problems with water quality, including arsenic, nitrate hardness, gross alpha activity and high levels of iron and manganese and concluded that:

> " Iron and manganese are issues in a majority of the BVWSD wells. All sample results for well 23B are extremely high: average iron is 14,082 ppb and manganese is 2,610 ppb. Since the sample results are consistently high, this data is considered representative of the aquifer. With the levels this high, it is unlikely that blending will provide adequate contaminant reduction and therefore will not be an acceptable treatment method."

The DEIR not only provides no discussion of these potential problems for the project, but on page 3-84 goes so far as to state:

"Overall, the water quality of the well locations in the Recovery Project area meets drinking water standards. However, monitoring wells that represent the shallow aquifer, generally less than 300 feet below ground surface (bgs) and the deeper aquifer, generally greater than 500 feet bgs show some constituents with exceedances. Constituents in the shallow and deeper aquifers tend to exceed chloride, conductivity, total dissolved solids, and sulfate. Table 3-8 presents the water quality constituents that were evaluated. These constituents either had noticeable detections or are part of the DWR's constituents of concern for non-SWP water that is pumped into the Aqueduct."

Table 3-8. Water Quality Constituents Evaluated

Antimony	Iron
Arsenic	Manganese
Boron	Nitrate
Bromide	Sodium
Chloride	Sulfate
Conductivity	Total Dissolved Solids
Gross Alpha	Total Organic Carbon
Hardness	Uranium

"To further evaluate the potential impacts of the Recovery Project water when it enters the Aqueduct, the average theoretical blend values were compared against the average values observed in the Aqueduct near the Recovery Project Area. Table 3-10 depicts the comparison between the two types of water. It is anticipated that the following mitigation measures identified will reduce these constituents that exceed the quality of the Aqueduct."

Table 3-10 was apparently derived from Table 3-5, which purports to describe the SWP Aqueduct water quality upstream and downstream of the project. The data in Table 3-5 are clearly incorrect. It simply would not be possible to reduce the arsenic, chloride, sodium, sulfate and TDS concentrations in the Aqueduct water between the upstream and downstream measurement locations. It is likely that it is the upstream measurements in the table that are incorrect, but it is not clear. The data from Table 3-5 are transcribed into Table 3-10, so that the upstream data in Table 3-10 are also incorrect.

A further problem with the data in Table 3-10 is that the "Project Water" projection is based upon a blend of waters from west and east of the East Side Canal with the west side waters represented by a single well in the west, as is discussed further below.

Table 3-5. Summary of Aqueduct Water Quality Upstream and Downstream of Project Area

Constituent	Drinking Water Standard	Upstream		Downstream	
		Average	Max	Average	Max
Antimony (ppb)	MCL = 6	0		0	
Arsenic (ppb)	MCL = 10	14	18	3.5	11
Boron (ppm)	NL = 1	0.1		0.2	0.4
Bromide (ppm)	N/A	No data		No data	
Chloride (ppm)	SMCL = 250	120	131	70	127
Conductivity (µS/cm)	SMCL = 900	736	758	465	740
Gross Alpha (pCi/L)	MCL = 15	No data		No data	
Hardness (ppm)	Very Hard > 181	74.5	77	107	141
Iron (ppb)	SMCL = 300	3	6	17	63
Manganese (ppb)	SMCL = 50	0		2	220*
Nitrate as N (ppm)	MCL = 10	1.3	1.4	2.6	5.3
Sodium (ppm)	DWR = 200	106	112	53	97
Sulfate (ppm)	SMCL = 250	96	103	40	121
Total Dissolved Solids (ppm)	SMCL = 500	416	436	263	434
Total Organic Carbon (ppm)	N/A	No data		No data	
Uranium (pCi/L)	MCL = 20	No data		No data	

*Indicates that result is over the drinking water standard
* parts per billion

Table 3-10. Comparison of Average Project Water and Aqueduct Water Quality

Constituent	Aqueduct Upstream	Project Water	Aqueduct Downstream
Antimony (ppb)	0	0.4	0
Arsenic (ppb)	14	1.5	3.5
Boron (ppm)	0.1	0.1	0.2
Bromide (ppm)	No data	0.75	No data
Chloride (ppm)	120	65	70
Conductivity (µS/cm)	736	905	465
Gross Alpha (pCi/L)	No data	6.2	No data
Hardness (ppm)	74.5	209	107
Iron (ppb)	3	63	17
Manganese (ppb)	0	28	2
Nitrate as N (ppm)	1.3	2.6	2.6
Sodium (ppm)	106	103	53
Sulfate (ppm)	96	281	40
Total Dissolved Solids (ppm)	416	613	263
Uranium (pCi/L)	No data	8.5	No data

Presuming that it is the downstream numbers in Table 3-10 that are correct it is difficult to see how the levels of iron, manganese, sulfate and total dissolved solids can be reduced by blending to meet a non-degradation standard for pumping into the Aqueduct. The required blend water would have to be of an even higher quality. i.e., lower concentrations, than the Aqueduct water. The only water seemingly available to accomplish the blending goals is the Kern River water (see Table 3-3 and the discussion in Part II below).

Table 3-3. Water Quality in the Kern River

Constituent	MCL	Minimum	Average	Maximum	Units
Chloride[2]	250	2.2	6.4	10	mg/L
Sodium[2]		4.5	15	30	mg/L
TDS[3]	500	40	129	227	mg/L
Arsenic[2]	10	ND	ND	ND	ug/L
Nitrate (as NO_3)[3]	45	ND	0.7	1.8	mg/L

[2] Source RWQCB 2015
[3] Source: Kern County Water Agency Water Supply Reports (2010; 2011, 2012; 2013)

The blending calculations offered in the DEIR have elected to use the analysis from a single monitoring well, DMW-13 Middle, but as is made clear in the foregoing analysis by GEI this single well is not representative of the wells in the project area west of the East Side Canal listed in Table 3-6. Even so the blending calculations do produce water exceeding drinking water standards. From page 3-60 of the DEIR:

> "In general, most constituents meet drinking water standards (Table 3-7). Due to limited water quality data for most of the wells west of the East Side Canal, BVWSD monitoring well 13 – middle zone, was used as a representative well. For wells located to the east of the East Side Canal, conductivity, sulfate, and TDS were exceeded. For wells located west of the East Side Canal, sulfate and TDS slightly exceeded the drinking water standards. Even though most constituents are below drinking water limits, it was observed that each side had varying constituent levels. For example, the west side does not have arsenic, however on the east side, the concentrations are about half the MCL at 5.6 parts per billion (ppb)."

Table 3-7. Water Quality of Wells in and Around Project Area

Constituent	Drinking Water Standard	West of East Side Canal	East of East Side Canal	
			Average	Max
Antimony (ppb)	MCL = 6	0	0.7	5
Arsenic (ppb)	MCL = 10	0	2.7	5.6
Boron (ppm)	NL = 1	0.1	0.2	0.5
Bromide (ppm)	N/A	No data	0.09	0.1
Chloride (ppm)	SMCL = 250	54	75	95
Conductivity (µS/cm)	SMCL = 900	922	891	976*
Gross Alpha (pCi/L)	MCL = 15	0	11.6	14.6
Hardness (ppm)	Very Hard > 181	243	179	289
Iron (ppb)	SMCL = 300	44	80	240
Manganese (ppb)	SMCL = 50	49	11	25
Nitrate as N (ppm)	MCL = 10	0.1	4.7	6.8
Sodium (ppm)	DWR = 200	107	99	123
Sulfate (ppm)	SMCL = 250	310*	257*	334*
Total Dissolved Solids (ppm)	SMCL = 500	641*	589*	808*
Total Organic Carbon (ppm)	N/A	No data	0.6	0.8
Uranium (pCi/L)	MCL = 20	5.5	11	15

*Indicates that result is over the drinking water MCL

Table 3-6. Wells used in Water Quality Analysis

West of East Side Canal	East of East Side Canal
BVWSD Production Well	BVWSD Private Landowner Well
DW01	D04
DW02	Kern Water Bank
BVWSD Monitoring Well	13D01, 13D02, 13D03
DMW 11A & 11B	West Kern Water District
DMW 12A & 12B	NW-1
DMW 13-Shallow, 13-Middle, 13-Deep	NW-2
BVWSD Private Landowner Well	NW-3
D15	NW-4
	NW-5

The blending analysis is therefore significantly biased in that despite Table 3-6 list of "Wells used in Water Quality Analysis" only the data from DMW-13 Middle was actually used and as is made clear in the GEI 2017 Memorandum the other wells west of East Side Canal have some serious contaminant problems.

Part II – Feasibility of the Project and Cumulative Impacts

As is apparent from the water quality and blending analysis, it will be extremely difficult for the Project to meet the State Water Project (SWP) standards for pumping groundwater production into the California Aqueduct, and additionally there is no evaluation of cumulative water quality impacts of the Project along with other banking projects' pumping non-SWP water into the Aqueduct and having to meet SWP water quality standards. The only water available for blending that would likely enable the water quality standards to be met is Kern River water. However, at a time when groundwater is being withdrawn from storage it is extremely unlikely that Kern River water would be available for blending, which highlights another major deficiency of the DEIR.

The DEIR assumes that the project would add 100,000 acre.ft to the aquifers in eight (8) months and 25,000 acre.ft/year would be recovered in a six month window for each of four years in a time of drought, but the analysis is very rudimentary. A more appropriate approach would have been to use the Kern River monthly flow rate record, for however long a period as is available, as a surrogate for climate and perform a series of simulations that would enable the most productive operating scenario to be developed that recognizes the ephemeral nature of Kern River flows. These simulation techniques are widely used in designing facilities that are dependent upon river flows that vary significantly. For example, Sacramento Regional Sanitation has used simulations to optimize the design of their wastewater treatment and storage because the ability to discharge to the Sacramento River is controlled by the river flows, which are not predictable, but for which a long record is available.

The DEIR for the Palms project has no discussion at all about the variability of the Kern River flow or the return frequency of possible recharge opportunities. The infiltration project and its associated wetlands will be very dependent upon the river flow and yet there is no discussion of the impact of the frequency of sustained drought on the constructed wetland. The issue is not even discussed in the DEIR.

Given that the only water available for use in blending of BVWSD water to meet water quality standards required for SWP pump in is only available during times of water surplus, it is not at all clear that the proposed project is even viable.

ERICSON JOHN LIST

Principal Consultant, Flow Science Incorporated

Principal Consultant, Environmental Defense Sciences

Professor *Emeritus* of Environmental Engineering Science,

California Institute of Technology

TEL: 626-233-6014 (cell), 626-304-1134 (office)

e-mail: ejlist@flowscience.com

PERSONAL

Citizenship:	U.S.A. Passport No. 527853475
	Global Entry No. 983556301
Birthdate:	March 27, 1939
Place of Birth:	Whakatane, New Zealand
Home Address:	59/210 Maranui Street, Papamoa Beach, New Zealand
Office Address:	202 S Lake Ave, Suite 294, Pasadena, CA 91101

EDUCATION

1965 Ph.D. California Institute of Technology (Applied Mechanics and Mathematics)

1962 M.E. (Civil Eng.) University of Auckland, N.Z.

1962 B.Sc. (Mathematics) University of Auckland, N.Z.

1961 B.E. (First Class) University of Auckland, N.Z.

POSITIONS HELD

Dr. List is currently Principal Consultant of Flow Science Incorporated and Environmental Defense Sciences. He was Professor of Environmental Engineering Science at the California Institute of Technology from 1978-1997. He joined the faculty at Caltech in 1969 as an Assistant Professor, after spending three years as a lecturer and senior lecturer at the University of Auckland. For the period 1980-1985, he was Executive Officer for the Environmental Engineering Science Graduate Program at Caltech.

TEACHING EXPERIENCE

Fluid mechanics, turbulent diffusion, density-stratified flow, flow in porous media, introductory oceanography and meteorology, classical applied mathematics, singular perturbations, non-linear waves, mathematical programming and simulation, probability and statistics, solid mechanics, hydrologic transport processes, environmental fluid mechanics.

RESEARCH INTERESTS

Turbulent diffusion, buoyancy-modified flows, particle coagulation, coastal ocean and estuarine processes, reservoir modeling, transient flows, flow in porous media.

INSTITUTE AFFAIRS

Professor List served on sixteen different administrative and faculty committees, including a term as Vice-Chair of the Faculty (1979-81), and chair of the following Faculty Committees: Athletics and Physical Education (1975-79), Curriculum (1981-84), Membership and Bylaws (1979-81), and Nominating (1978-79). He served on the Jet Propulsion Laboratory Classified Research Oversight Committee for a period of six years.

EDITOR

Journal of Hydraulic Engineering, American Society of Civil Engineers, 1984-1989

MEMBERSHIP

Member, American Consulting Engineers Council

Honorary Life Member and Fellow of American Society of Civil Engineers

Chair, Hydrologic Transport and Dispersion Committee, 1983-84

Chair, Awards Committee, Hydraulics Division, 1994

Co-Chair, Third International Symposium on Stratified Flows, 1987

Chair, Engineering Excellence Committee, 1989

AWARDS AND RECOGNITION

Fulbright Scholar, 1962

National Science Foundation Award for Special Creativity, 1982

Who's Who in America (20 years)

REGISTRATION

Professional Civil Engineer No. 36791, State of California

VISITING COMMITTEES

University of California, Irvine, School of Engineering, 1983, 1989

Stanford University, Palo Alto, Department of Civil Engineering, 1984

University of British Columbia, School of Engineering, 1990

CONSULTING

Professor List has consulted with more than 800 industrial organizations, consulting engineers and governmental agencies, including Southern California Edison, ChevronTexaco, ExxonMobil, Astra-Zeneca, Lockheed Martin, IBM, City and County of San Francisco, City of Los Angeles, City of Seattle, City of San Diego, City and County of Honolulu, Southern California Metropolitan Water District, Southern Nevada Water Authority, Los Angeles and Orange County Sanitation Districts. He has

authored reports in the following areas of work: geothermal flows, river control modeling, power plant cooling systems, brine and wastewater diffusers, dredge spoil disposal, river dispersion, solar heat storage systems, reservoir destratification and mixing, well testing and failure, pulsation control and water hammer, pipeline failure, groundwater mass balance, ocean current and temperature analysis, acoustic resonance in piping systems, gas transfer, ocean dispersion, and biodegradation of organo-chlorines.

PUBLICATIONS

Professor List is co-author of the texts *Mixing in Inland and Coastal Waters* (Academic Press, 1979), *Turbulent Buoyant Jets and Plumes* (Pergamon Press, 1983), and the award-winning *Handbook of Groundwater Development* (Wiley, 1990). In addition, he is the author or co-author of the following refereed publications:

[1] "Steady flow of precipitation to an infinite series of tile drains above an impervious layer," *J. Geophys. Res*., **29**: 3371-3381, 1964.

[2] "A quasi-stable density-stratified flow in a saturated porous medium," *Proc. 2nd Aus. Conf. Fluid Mech*., Auckland, N.Z., December 1965.

[3] "Lateral dispersion in saturated porous media," *J. Geophys. Res*., **72**: 2531-2541, 1967 (with N.H. Brooks).

[4] "A two-dimensional sink in a density-stratified porous medium," *J. Fluid Mech*., **33**: 529-543, 1968.

[5] "An exact solution for a diffusive flow in a porous medium," *J. Fluid Mech*., **36**: 17-19, 1969.

[6] "Laminar momentum jets in a stratified fluid," *J. Fluid Mech*., **45**: 461-574, 1971.

[7] "A technique for smoothing river flows during hydro-electric power production," *Water Resources Research*, **7**(6): 1437-1447, 1971 (with R.B. Tattle).

[8] "Energy and the environment in Southern California," *Engineering and Science*, **35**(2): 14-17, 1971.

[9] "A study on disposal of brine in an estuary," *J. Water Polln. Cont. Fed*., **45**(11): 2335-2344, 1973 (with A.B. Pincince).

[10] "Turbulent entrainment in buoyant jets and plumes," *J. Hyd. Div*., ASCE, **99**(HY9):1461-1474, September 1973 (with J. Imberger).

[11] "Turbulence measurements in a two-dimensional buoyant jet using laser-Doppler velocimetry," *Proc. LDA Symposium*, Tech. Univ. of Denmark, Copenhagen, August 1975 (with N.E. Kotsovinos).

[12] "Hydraulic modeling of thermal outfall diffusers - Interpretation of results," *Proc. XVI IAHR Congress*, Sao Paulo, Brazil, July 1975 (with R.C.Y. Koh).

[13] "Variations in coastal temperatures on the Southern and Central California coast," *J. Geophys. Res*., **81**(12):1971-1979, April 1976 (with R.C.Y. Koh).

[14] "Spreading of buoyant discharges," *Proc. 9th Intern. Conf. Heat and Mass Transfer*, Int. Centre for Heat and Mass Transfer, Dubrovnik, Yugoslavia, 171-182, September 4, 1976 (with J.-C Chen).

[15] "Plane turbulent buoyant jets - Part 1: Integral properties," *J. Fluid Mech*., **81**(1): 25-44, June 9, 1977 (with N.E. Kotsovinos).

[16] "Turbulent jets and plumes," *Ann. Rev. of Fluid Mech.*, **14**:189-212, 1982.

[17] "Formation of frontal waves in density-induced fluid spreading," *Symposium on Flows in Stratified Fluids*, ASME Winter Annual Meeting, Boston, MA,1983.

[18] "Monte Carlo simulation of particle coagulation in continuous size distributions, I: Brownian motion and fluid shearing," *J. Fluid Mech*., **143**: 367-385, 1984 (with H.J. Pearson and I.A. Valioulis).

[19] "Monte Carlo simulation of particle coagulation in continuous size distributions, II: Interparticle forces and the quasi-equilibrium hypothesis," *J. Fluid Mech*., **143**: 387-411, 1984 (with I.A. Valioulis and H.J. Pearson).

[20] "Numerical simulation of a sedimentation basin, I: Model development," *Env. Sci. Tech*., **18**: 242-247, 1984 (with I.A. Valioulis).

[21] "Numerical simulation of a sedimentation basin, II: Design application," *Env. Sci. Tech*., **l8**:248-253, 1984 (with I.A. Valioulis).

[22] "Collision efficiencies of diffusing spherical particles accounting for hydrodynamic, van der Waal's and electrostatic forces," *Adv. Colloid and Interf. Sci.*, **20**:1-20, 1984 (with I.A. Valioulis).

[23] "A numerical evaluation of the stochastic completeness of the kinetic coagulation equation," *J. Atmos. Sci*., **41**(16):2516-2529, 1984 (with I.A. Valioulis).

[24] "Statistical and spectral properties of tracer concentration in round buoyant jets," *Int. J. Heat and Mass Trans.*, **30**(10):2059-2071, 1987 (with P.N. Papanicolaou).

[25] "Turbulence structure near a sharp density interface," *J. Fluid Mech*., **189**: 189-209, 1988 (with I.A. Hannoun and H.J.S. Fernando).

[26] "Turbulent mixing at a shear-free density interface," *J. Fluid Mech*., **189**: 211-234, 1988 (with I.A. Hannoun).

[27] "Investigations of round vertical turbulent buoyant jets," *J. Fluid Mech*., **195**: 341-391, 1988 (with P.N. Papanicolaou).

[28] "The Third International Symposium on Density-Stratified Flows," *J. Hydr. Eng.*, *Proc. ASCE*, **114**(2):125-133, 1988 (with G. Jirka).

[29] "Large-scale structure in the far field of buoyant jets," *J. Fluid Mech*., **209**: 151-190, 1989 (with D. Papantoniou).

[30] "Diffusion and dispersion in coastal waters," *J. Hydr.Eng*., **116**(10):1158-1179, 1990 (with G. Gartrell and C.D. Winant).

[31] "Kinetic analysis of virus adsorption and inactivation in batch experiments," *Water Resources Research*, **29**(7):2067-2085, 1993 (with S. Grant and M. Lidstrom).

[32] "An experimental investigation of vertical mixing in two-layer density-stratified shear flows," *Oceans and Atmospheres*, **19**:147-174, 1993 (with G. Sullivan).

[33] "Transition from jet plume dilution to ambient turbulent mixing," *Recent Res. Advances in the Fluid Mechanics of Turbulent Jets and Plumes*, 1-11, 1994 Kluwer Publishers (with Regina Dugan).

[34] "On mixing and transport at a sheared density interface," *J. Fluid Mech*. **273:**213-239, 1994 (with G. Sullivan).

[35] "Sudden pressure drop and pipeline failure - Case studies," Hydraulics of Pipelines, ASCE, pp.339-355, 1994.

[36] "Environmental Fluid Mechanics" *Research Trends in Fluid Mechanics*, J.C. Lumley et al (Eds), American Institute of Physics, pp.148-166, 1996.

[37] "A novel approach for determining flow patterns in a reservoir," *Proc. North American Lake Management Society*, Minneapolis, Minn. Nov. 14-15, 1996 (with G. Pasek, I.A. Hannoun and S.C. Paulsen)

[38] "A study of transport and mixing in natural waters using ICP-MS: Water-particle interactions" *Water, Air and Soil Pollution*, **99**:146-156, 1997 (with S.C. Paulsen).

[39] "Tracing discharges in ocean environments using a rare earth tracer*" Proc. 27th IAHR Congress*, San Francisco, August, 1997 (with S.C. Paulsen).

[40] "Simulation of sludge pumping" *Water Env. Res*. **70**(2): 197-204, 1997 (with I.A. Hannoun and W-L. Chiang)

[41] "Using hydraulic modeling to optimize contact time*" J. AWWA,* **90**(8): 77-87, 1998 (with I. A. Hannoun and P. Boulos).

[42] "Vapor cavity formation and collapse: Field evidence for major pipeline damage" FEDSM99-6886, *Proc. 3rd ASME/JSME Joint Fluids Eng. Conf.*, San Francisco, July 18-23, 1999 (with R. Solbrig, J. Burnam and J. Hoggatt)

[43] "Modeling variability in ^{210}Pb and sediment fluxes near Whites Point Outfalls, Palos Verdes Shelf, California. *Env. Sci. Tech.,* **33**:3077-3085, 1999 (with S. C. Paulsen and P.H. Santschi)

[44] "Comment on ´In situ measurements of chlorinated hydrocarbons off the Palos Verdes Peninsula, California" *Env. Sci. Tech.,* **33**:3927-3928, 1999 (with S.C. Paulsen and P.H. Santschi).

(45) "Use of ELCOM and CAEDYM for Water Quality Simulation in Boulder Basin", In the *Proceedings of the NALMS 23rd International Symposium*, November 4 - 8,

2003, Mashantucket, CT (with I. A. Hannoun, K. Bowman-Kavanagh, W. Chiang, L. Ding, D. Karafa, I. Rackley).

(46) "Receiving Water Analysis for Regional Seawater Desalination Plant in Carlsbad, California", *Proceedings of the American Membrane Technology Association* (AMTA) 2006 Biennial Conference and Exposition, August 2, 2006, Anaheim, California (with I. A. Hannoun, L. Ding, B. Martin).

(47) "Joint Water Pollution Control Plant outfall modeling," *Proceedings, Marine Waste Water Discharge Organization Symposium*, October 27, 2008 (with I.A. Hannoun, L. Ding, and N. Hicks).

(48) "3D modeling of a treated effluent discharge off the Palos Verdes Shelf, California," *Proceedings, Marine Waste Water Discharge Organization Symposium*, October 31, 2008 (with I. A. Hannoun, L. Ding, and N. Hicks).

(49) "Development and application of a three-dimensional water quality model for Lake Mead," *Proceedings, North American Lake Management Society*, November 13, 2008 (with I.A. Hannoun, A. Preston, K. Bowman Kavanagh, L. Orphan, and P. Roefer).

(50) "Development and application of a three-dimensional water quality model to Lake Mead," *Proceedings, Lake Mead Science Symposium*, January 13, 2009 (with A. Preston, I. A. Hannoun, K. Bowman Kavanagh, L. Orphan, K. Turner, and P. Roefer).

(51) "Understanding nutrient limitations in Lake Mead," *Proceedings, Lake Mead Science Symposium*, March 6, 2012 (with with L. Ding, I. A. Hannoun, T. Tietjen and P. Roefer).

(52) "Predicting effects of reservoir expansion with three-dimensional modeling: Case study of Los Vaqueros Reservoir," *Lake and Reservoir Management*, 29:217-232, 2013 (with B. Martin, Li Ding, and I. A. Hannoun).

(53) "Three-dimensional management model for Lake Mead, Nevada, Part 1: Model calibration and validation," *Lake and Reservoir Management*, 30:285-302, 2014 (with A. Preston, I. A. Hannoun, I. Rackley, and T. Tietjen).

(54) Three-dimensional management model for Lake Mead, Nevada, Part 2: Findings and applications," *Lake and Reservoir Management*, 30:303-319, 2014 (with A. Preston, I. A. Hannoun, I. Rackley, and T. Tietjen).

(55) "Climate Change and Decreasing Levels in Lake Mead: Modeling Changes in Thermal Structure and Water Quality," *Proceedings, Nevada Water Resources Association Annual Conference*, February 4-6, 2014, (with A. Preston, T. Tietjen, and P. Roefer).

(56) "Development of a phosphorous budget for Lake Mead," *Lake and Reservoir Management*, 30:143-156, 2014 (with L. Ding, I. A. Hannoun, and T. Tietjen).

Memo

To:	Tim Ashlock, Assistant Manager and Maurice Etchechury, Engineer Manager Buena Vista Water Storage District
From:	Jackie Takeda and Stephanie Hearn, Water Quality Specialists
c:	Ginger Gillin and Stephanie Breeden, GEI Consultants, Inc.
Date:	February 17, 2017
Re:	Water Quality Review of Groundwater Wells for "The Palms" Recovery Project GEI Project No. 1506650

Introduction

Buena Vista Water Storage District (BVWSD or District) has engaged the services of GEI Consultants, Inc. (GEI) to provide California Environmental Quality Act (CEQA) compliance support services for the Palms Groundwater Bank – Recovery Phase (Project). As one of the task orders of the Project, Task 6B – Development of Water Treatment, an evaluation of existing groundwater quality in the Project area was conducted to develop a water treatment plan and to determine if groundwater in the Project area meets the water quality requirements for discharge into the California Aqueduct (Aqueduct), as defined in the Department of Water Resources (DWR) Policy.

GEI evaluated existing water quality data that represents production wells and monitoring wells throughout the District. While this data extends beyond the Palms Project boundaries, it provides insight toward potential challenges BVWSD may face in developing their Project. Wells that represent the Project area are District wells 01 and 02, and Monitoring Wells 10 at the northern Project boundary and 12 near the southern boundary.

This technical memorandum provides:

- Analysis of existing water quality from wells throughout the District.
- Assessment of what is needed to comply with DWR's Water Quality Policy for Acceptance of Non-Project Water into the Aqueduct (Pump-In Policy).
    - DWR Pump-in Policy requires review of historical data that is no more than 3 years old. Results must be available for all constituents listed in California Code of Regulations Title 22 drinking water standards and DWR's Constituents of Concern (COC) listed in their Policy.
    - Pump-in water must demonstrate that the water source is of consistent, predictable, and acceptable quality and will not impair water quality of the State Water Project (SWP).
- Recommends additional water quality sampling to characterize the Project groundwater quality.
- Provides a sampling and treatment plan that will effectively demonstrate to DWR and the State Water Resources Control Board – Division of Drinking Water (DDW) that water in

the Project area is of consistent, predictable, and acceptable quality that meet standards for pumping into the Aqueduct.

GEI has evaluated DWR's Pump-In Policy for the SWP and BVWSD's historical groundwater results to assess if the Palms Project meets the DWR's requirements. Findings that are detailed in this report are:

- Water quality data is only available for a limited number of District and Landowner wells, the majority of which are outside of the Project area, and the number of samples from each well vary substantially. This data is compared against monitoring wells which are representative of the aquifer with depths ranging from 200 to 700 feet below ground surface (bgs).
- Constituents that exceed Title 22 standards, or are showing increasing trends and are at risk of exceeding the standards (≥ 50% of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) are:
    - Primary Constituents: arsenic; nitrate; and gross alpha.
    - Secondary Constituents: iron; manganese; conductivity; sulfate; total dissolved solids; chloride; and hardness.
    - Notification Level Constituents: boron

Background

BVWSD is planning the Recovery Phase of the Project. GEI is assisting BVWSD in developing the Project description and the CEQA strategy. In a June 2016 workshop to review the results of the preliminary Groundwater Hydrogeologic Assessment conducted by Todd Groundwater, the Project team identified that some of the groundwater in the Project area does not meet the water quality requirement for discharge into the Aqueduct. Consequently, water quality review is an important component of this Project. GEI's review of the existing water quality data throughout the District provides insight to potential challenges with water recovered in the Palms Groundwater Bank. This preliminary assessment will provide a framework for a sampling and water treatment plan that will be required prior to pumping into the Aqueduct. Conceptually, the water treatment plan will include blending of higher and lower quality water with one centralized water treatment plant located near the Aqueduct.

Analysis of Water Quality from Groundwater Wells in Project Area

Water quality data available through BVWSD's electronic database includes historical sample results categorized as "District Wells," "BVWSD Wells," and "Monitoring Wells." An analysis of each set of data is discussed by constituent groups in the following sections.

Buena Vista samples landowner wells that are available for the District's use: these wells are referred to as District wells. Historical water quality data was available for seven District wells. Available data is fairly limited with only three to four sample results for most wells, many of them more than 3 years old. Buena Vista also has seven production wells with historical water quality data, referred to as BVWSD wells. Similar to the District wells, there is limited data available.

The greatest volume of data is available from the 14 monitoring wells located throughout District. In contrast to production well data, the available data and monitoring frequency is more expansive in the monitoring wells. Appendix A provides summary tables of water quality data: bolded red values in these tables indicate results that exceed applicable drinking water standards.

Primary Constituents

Primary drinking water standards are set by both federal (Environmental Protection Agency [EPA]) and state (DDW) agencies to protect public health by limiting the levels of certain constituents in drinking water.

Arsenic

Arsenic has a primary MCL of 10 parts per billion (ppb). The major source of arsenic in groundwater is erosion of natural deposits or leaching from anthropogenic sources (pesticides, insecticides, and algaecides). A study of pubic water sources throughout California shows that arsenic commonly occurs throughout the Central Valley, with higher prevalence in Kern County.

Of the 14 monitoring wells, seven exceed the MCL and two are near the MCL. Wells DMW02 and DMW04 have exceptionally high concentrations, near 100 ppb: both of these wells represent the aquifer between 250 and 300 feet bgs. DMW06 (410 to 440 feet bgs) has arsenic that ranges from 36 to 45 ppb. Moderate concentrations are found in wells DMW 01, 05 and 07 (arsenic ranges from 12 to 22 ppb). Generally, wells with the highest concentrations are located in the northern and central part of the District and are outside of the Project area, except for DMW12A, which is located in the southernmost part of the District.

Wells DMW12A and B show that arsenic highest in the deeper aquifer. Well 12A, screened from 600 to 700 feet bgs, contains~15 ppb arsenic and well 12B, screened from 355 to 455 feet bgs, does not contain any arsenic. These results appear to be in contrast with the wells in the northern part of the District. While there is no clearly defined aquifer zone with high -concentrations of arsenic, the highest concentrations appear to be near the surface in the northern wells. This inverse trend between depth and arsenic concentration may be an indicator of the source of arsenic. Anthropogenic arsenic will occur in the highest concentrations near the surface whereas naturally occurring arsenic concentrations will increase with depth.

Three of the seven District wells have arsenic slightly above the MCL: D01, D02, and D07. Wells D01 and D02, both within the Project area, have concentrations ranging from 7 to 14 ppb, and well D07 has higher concentrations ranging from 17 to 25 ppb.

Two of seven BVWSD wells exceed the MCL. Well 01H01 ranges in concentrations from 10 to 12 ppb. Well 23B arsenic concentrations are nearly two times the MCL, ranging from 16 to 24 ppb.

Nitrate

Nitrate has a primary MCL of 45 parts per million (ppm) as nitrate (NO_3) or 10 ppm as nitrogen (N). Most elevated concentrations of nitrate come from anthropogenic sources: typically from runoff and leaching from fertilizer or leaching from septic tanks and sewage. The State Water Quality Control Board considers nitrate a focus contaminant because of its acute health effects. Consequently, State regulatory agencies are taking a multifaceted approach of protecting consumers through drinking water programs and reducing the source of contamination through the Irrigated Lands Regulatory Program (ILRP). The ILRP program was initiated in 2003 to prevent agricultural runoff from impairing surface water and in 2012 the program was expanded to address impairment to groundwater.

Nitrate levels from District production wells showed increasing trends. Well D03 nitrate levels have been consistently increasing, exceeding the MCL in July 2014; well D05 shows an increasing trend with levels at slightly over one half of the MCL. Data reviewed for BVWSD wells show very low nitrate concentrations and no detectable levels were found in many wells.

Similar to BVWSD wells, most sample results show very low concentrations of nitrate, if any. There was an anomaly in April 1993 for wells DMW01, DMW02 and DMW04 with one unusually high result; wells DMW03 and DMW05 also had elevated nitrate levels but did not exceed the MCL. Other nitrate samples collected for these wells before and after April of the same year, were very low.

Gross Alpha

Gross alpha measures overall radioactivity in groundwater and has been detected in a few wells. The majority of its particles are composed of uranium, which has not been tested. Therefore, these results can only be considered an indicator of potential radiological contamination that may need to be addressed in the Project treatment plan. The MCL for gross alpha is 15 pico Curies per liter (pCi/L). The most common source of radioactivity in groundwater is erosion of natural deposits.

District wells were sampled for gross alpha in 2013 and for a majority of the wells, only one sample was collected. All wells, except for well D07, exceed the MCL. BVWSD wells 01H01, 11P, 14M02 had two samples for each well and in each case there was one sample that was below the MCL while the second, exceeded the MCL for gross alpha. This occurrence is fairly typical for constituents that leach into groundwater from erosion of natural deposits: when wells are most actively pumping, higher contaminant concentrations are expected. For the monitoring wells, gross alpha samples were collected from two wells, one sample each with both exceeded the MCL.

Gross alpha test methods are measuring particle activity, and thus, there is a possibility that the high levels of total dissolved solids (TDS) in BVWSD's groundwater may interfere with the analysis, resulting in falsely high results. While the high gross alpha results do not directly correlate to high TDS in the data, GEI recommends using a method that limits analytical interferences: EPA Standard Method 900.0 uses sample preparation techniques that compensate for high TDS waters.

Secondary Contaminants

Secondary MCLs (SMCL) apply to constituents that do not pose a health threat at the established limit but are provided as guidelines to assist water users in managing their water quality. SMCLs are set at levels that protect aesthetic quality of the water. With contaminant levels at or below SMCL's, the water is considered aesthetically pleasing (meets the users expectations for clean water).

Hardness

Hardness is a measure of the amount of minerals (predominately calcium, magnesium, and carbonate) the water contains. Water becomes hard as it passes over or through certain geological formations that contain calcium or magnesium. While there is no applicable standard or MCL for hardness, it is an important compound for BVWSD to consider as it could negatively impact their treatment plant performance. High levels of hardness results in solids loading and scaling on filter media, and equipment such as pumps, valves and injectors. To give perspective on hardness levels, water is considered soft if its hardness is less than 75 ppm; moderately hard at 75 to 150 ppm; hard at 150 to 300 ppm, and very hard at 300 ppm or higher. The average hardness of District wells ranges from 150 to 354 ppm. BVWSD wells average from 42 to 576 ppm. Wells within the Project area average from 273 to 2,800 ppm.

The water is very hard for all the wells except for BVWSD well 06B02 and monitoring wells DMW08 and DMW10B. Monitoring well data, particularly wells 10, 11, and 12 that have two screened intervals, indicate that hardness is highest in the upper aquifer and is significantly lower in the deeper aquifer.

Iron and Manganese

Iron and manganese are fairly common throughout District. The SMCL for iron and manganese are 300 ppb and 50 ppb, respectively. Typically, iron and manganese are naturally occurring as a result of

leaching from natural deposits. The greatest concern with high levels of these metals is staining on contact surfaces and clogging of plumbing fixtures from the precipitate they form.

While only two District wells have concentrations that exceed the MCL's, iron and manganese have been detected at BVWSD wells and monitoring wells in a substantial number of samples. District well D01 had unusually high concentrations in the two samples collected July 25, 2001; subsequent samples collected in 2004 and 2007, had very low sample results. This implies that either sampling conditions during the 2001 collections were not representative of the aquifer, or modifications were made to the well to mitigate this contamination. Without information about the sampling condition (i.e., well actively pumping) during the 2001 sample collection, GEI cannot provide insight to the appropriate level of concern for these wells.

Well D04 shows an increasing manganese trend reaching 50 ppb in June 2013. Well D07 has a single occurrence of high manganese; 230 ppb collected in June 2013. Single occurrences imply sloughing of corrosion or scale buildup from the casing, rather than representing the aquifer.

Iron and manganese are issues in a majority of the BVWSD wells. All sample results for well 23B are extremely high: average iron is 14,082 ppb and manganese is 2,610 ppb. Since the sample results are consistently high, this data is considered representative of the aquifer. With the levels this high, it is unlikely that blending will provide adequate contaminant reduction and therefore will not be an acceptable treatment method. Well 11P has iron levels approaching one half of the SMCL with an increasing trend; manganese is also increasing with the most recent sample over the SMCL. All other wells have fluctuating results over the SMCL with no discernable trend, potentially an issue related to well operation during sampling. Well 06B02 is an exception as it is the only well with trace levels of iron or manganese.

Monitoring well DMW04 had high manganese samples from 1991 to 2002, then it dropped below the SMCL, only to increase again from 2013 to 2015. Unlike other constituents, monitoring wells 10, 11, and 12 don't reveal any consistent insight towards depth of contaminants or general location.

- Wells 10A (270 - 450 feet bgs) has exceptionally high iron and moderately high manganese. In contrast, Well 10B (550 - 650 feet bgs) does not have any measurable levels.
- Wells 11A and 11B (560 - 660 feet; 370 - 470 feet bgs, respectively) both have exceptionally high concentrations of iron and manganese.
- Wells 12A and 12B (600 - 700 feet; 355 - 455 feet bgs, respectively) have moderately high iron levels, and manganese near the SMCL. In contrast to wells 10A and B, higher iron and manganese concentrations are found in the deeper aquifer (wells 10A and B showed high concentrations in the shallower aquifer).
- Well 02 (260 - 300 feet bgs) has low concentrations of iron and moderately high concentrations of manganese.

After reviewing the data, it's clear that iron and manganese are of concern for both production and monitoring wells. For some wells, limited data makes it difficult to see a trend, and in some cases, well operation at the time of sampling may have influenced the results. Additionally, there appears to be unit discrepancies that may have occurred during data entry and may be the reason that some results are extremely high. This concern is further discussed in the report conclusions.

Total Dissolved Solids: Conductivity, Sulfate and Chloride

Total dissolved solids (TDS) are primarily comprised of inorganic salts (calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter

that is dissolved in the water. Conductivity typically represents approximately 60 percent of the waters TDS. While TDS represent conductivity, sulfate and chloride, these constituents have SMCLs presented as consumer acceptance ranges, referenced in Table 1. DDW generally treats the Upper Limit as the SMCL.

Table 1. Consumer Acceptance Ranges for Secondary Constituents

Constituent, Units	Maximum Contaminant Level		
	Recommended	Upper Limit	Short Term
TDS, ppm	500	1,000	1,500
Conductivity, µS/cm	900	1,600	2,200
Chloride, mg/L	250	500	600
Sulfate, mg/L	250	500	600

Conductivity, sulfate, and TDS results for a majority of the production and monitoring wells are all over their respective Upper Limits. Overall, a majority of the production and monitoring well samples demonstrate increasing levels of these constituents to concentrations that exceed their respective limits.

These constituents are an important consideration for the Project as they are listed as DWR's COC and must be reported with BVWSDs Pump-in Proposal. BVWSD's levels exceed the drinking water standard consequently, treatment will be required to reduce these constituents to levels below their respective SMCLs. Treatment for these constituents is generally not a simple process as salts are only removed by high pressure membranes. Blending the wells and water from the Kern River and the Friant Unit of the Central Valley Project may also be an option but this option will be highly dependent on water quality of the Project wells, planned Project operation and availability of surface water. It will be important to thoroughly characterize the components of TDS in the Project area to identify the appropriate treatment train.

Since these constituents are monitored more closely in the Tulare Lake Basin, there is enough data available from the monitoring wells to make reasonable conclusions regarding their occurrence. Similar to other surface contaminants, the highest concentrations are found in the shallower part of the aquifer. When reviewing the production wells data, most conductivity, sulfate, and TDS levels were over the SMCL. The only BVWSD well that has levels below the SMCL is well 06B02.

BVWSD well 14M02 has chloride results above both the Upper Limit and Short Term acceptance limit. The historical max result was 2,230 ppm with an average was 886 ppm. Even though there were 12 samples, no clear visible trend was observed. District wells D03 and D04 show an increasing trend; wells D01 and D02 do not show a clear trend but are in ranges closer to the SMCL; and well D05 has a steady trend near the SMCL. Well D06 is trending down with results greater than the SMCL. Well D07 results are all below the SMCL, but there is a possible increasing trend in chloride levels.

Notification Level Contaminants

Notification levels (NL) are health-based advisory levels established for constituents in drinking water that currently do not have enforceable standards (primary or secondary MCLs). The only NL contaminant tested and detected in BVWSD wells is boron. While this may not be a constituent of concern with DWR's Pump-in Proposal (PIP), it is discussed in this report to provide a comprehensive discussion of water quality within BVWSD.

Boron

Boron is a regulated contaminant with a NL of 1 ppm. The most prevalent sources of boron in groundwater are from leaching of rocks and soils, wastewater, and fertilizers or pesticides. Boron is a potential issue for a majority of the production and monitoring wells. For all but one District well, results indicate an increasing trend of higher concentrations approaching the NL. Well D06 indicates levels over the NL. Wells D03, D04, and D05 are at levels one-half of the NL with an increasing trends. Historical samples indicate that boron may be a potential issue.

There are two BVWSD wells, 01H01 and 14M02, which had boron levels close to the NL of 1 milligrams per liter (mg/L). Well 01H01 had one of two samples at 0.9 mg/L. With limited data for well 01H01, no trend is available. Well 14M02 has a longer history of boron sampling since July 1998, however there is no conclusive trend. The most recent sample collected in 2008 was close to the NL.

Monitoring wells DMW02, DMW03, DMW04, and DMW06 have boron levels close to or over the NL. For DMW02, there are seven that are above 1 ppm, with the highest at 1.4 ppm. Graphing of these samples demonstrate an increasing trend. DMW03 has a similar increasing trend. DMW04 and DMW06 had a few, or just one, samples that were over the NL, recent samples however, indicate DMW04 and DMW06 are trending downward. The majority of boron monitoring results was conducted prior to 2008.

DWR Water Quality Policy and Implementation Process for Acceptance of Non-Project Water into the State Water Project

It is the DWR policy to assist with the conveyance of water to provide water supply and to protect the SWP water quality within the Aqueduct. In order to facilitate this policy, DWR provides an implementation process to accept Non-Project water into the Aqueduct. The policy provisions are as follows:

- DWR shall consider and evaluate all requests for Non-Project water that will be pumped into the Aqueduct. Non-Project water is considered to be any water input into the Aqueduct that is not directly diverted from the Sacramento-San Joaquin Delta or natural inflow into SWP reservoirs.
- A proposal for any Non-Project water shall demonstrate that the water is of consistent, predictable, and acceptable quality.
- DWR will consult with SWP, existing Non-Project participants, and State Water Resources Control Board –DDW on drinking water quality issues relating to Non-Project water as needed to assure protection of SWP water quality.
- DWR's policy does not authorize the objectives of Article 19 of the SWP water supply contracts or drinking water MCLs to be exceeded.
- The policy shall not constrain the ability of DWR to operate the SWP for its intended purposes and shall not adversely impact SWP water deliveries, operation, or facilities.

When evaluating Non-Project water proposals for input into the Aqueduct, DWR uses a two-tiered approach. Tier 1 PIP has water quality that is essentially the same or better than what is in the Aqueduct: PIPs deemed Tier 1 are approved by DWR. Tier 2 PIP has different and possibly worse water quality than what is in the Aqueduct. Tier 2 PIPs are referred and reviewed by a Non-Project Facilitation Group who, if needed, makes recommendations to DWR in consideration of the PIP. Tier 2 PIP must demonstrate that the lower quality water with constituents exceeding MCLs is either treated or blended with better quality water so that the SWP water will not be degraded.

BVWSD Pump-in Proposal

BVWSD's PIP needs to demonstrate that the Palms Project water is consistent, predictable, and of a reliable quality. This water quality assessment provides a better understanding on the quality of the groundwater wells and aids in building the foundation for writing the Palms PIP for DWR to review.

The Palms PIP should identify the water sources, planned operation, characterize the inflow water quality, and any anticipated impacts to SWP water quality and/or operations. A PIP is submitted at least 1 month prior to Project construction. The PIP also includes a water quality monitoring plan in order to continuously demonstrate that the water quality is consistent with the Aqueduct water.

GEI recommends BVWSD implement a water quality sampling program that includes all DDW Title 22 constituents and DWR's COCs. Current COCs are arsenic, bromide, chloride, nitrate, sulfate, organic carbon, and TDS. DDW Title 22 samples are constituents with federal and state regulatory limits (MCLs, SMCLs, and NL) stated in California Code of Regulations for drinking water. DDW enforces these regulatory limits.

The sampling program will consist of initial well sampling, periodic re-testing, and some routine frequency sampling for select parameters (i.e. quarterly arsenic testing). DWR's policy defines three monitoring options are: (1) Baseline tests for individual wells, (2) Baseline tests for representative wells, and (3) Self-directed. The recommended options for BVWSD would be either option 1 or 2. Table 2 shows the water quality monitoring required for options 1 and 2.

Option 3 would be for BVWSD to propose a monitoring program for DWR that includes COC, Title 22 sampling, and sampling at frequencies that demonstrate water entering the SWP is of consistent, predictable, and reliable quality. This is an option that will require detailed discussion based on the Palms operation and infrastructure.

Table 2: Water Quality Monitoring

	Option 1: Baseline tests for Individual Wells	Option 2: Baseline tests for Representative Wells [(1)]
Initial Sampling	• Title 22[(2)] testing for all wells • COC testing for all discharge locations to SWP	• Title 22[(2)] testing for all representative wells • COC testing at all wells participating • COC testing for all discharge locations to SWP
Well Re-testing	• Title 22 testing for all wells every 3 years	• Title 22 testing for all wells every 3 years
Routine Frequency[(3)]	• COC testing quarterly at each discharge point to SWP	• COC testing monthly at each discharge point to SWP • COC testing required annually at each well

Notes:

[(1)] Representative well monitoring means that a group of wells that are manifold together and discharge to one pipe. Representative wells are to be identified on a case-by-case basis to be representative of the manifold area, well proximity, and water levels.

[(2)] Title 22 results may not be more than 3 years old.

[(3)] New programs or those with constituents that may degrade the water quality of the SWP need to conduct sampling on a routine basis such as weekly, monthly or quarterly to demonstrate the Project water is of consistent, predictable, and reliable quality. After that is achieved, then can follow the frequency stated in "Ongoing Monitoring."

Initial Sampling is recommended for all wells in the Project area, regardless of existing data to develop a consistent dataset for the PIP. During review of existing data, GEI found that the following constituents have not been analyzed within the last 3 years, reference Table 3. In addition to the inorganic constituents listed in Table 2, organic compounds (volatile and synthetic) and complete radiologicals have not been analyzed.

Table 3: Constituents not analyzed historically or within the last 3 years

Aluminum	Chromium	Silver
Antimony	Hexavalent Chromium (newly added DDW MCL in 2014)	Zinc
Barium	Copper	Uranium
Beryllium	Mercury	Radium 226+228
Bromide	Nickel	Total Organic Carbon
Cadmium	Selenium	Organic Compounds

If historical data is used, the electronic dataset should be reviewed with laboratory packages to confirm the correct units of measure are recorded. Data was recorded for the following constituents: boron, copper, iron, and zinc with two different units of measure – mg/L (or ppm) and micrograms per liter (µg/L or ppb). For this analysis, the assumption was made that the units were recorded in ppb. GEI recommends reviewing original lab reports for these constituents to verify the units on the spreadsheets were accurately entered into BVWSDs electronic dataset.

DWR's review of PIP proposals should take no more than 1 month. Once DWR approves the water quality monitoring plan, and as long as BVWSD is participating in this PIP, DWR may conduct the following:

- Schedule periodic reviews of each operating Non-Project inflow
- Adjust changes in monitoring and testing as needed if:
    - Any new constituents are added to the list of drinking water standards by either EPA or DDW
    - Current MCLs are revised
    - In response to any:
        - New constituents of concern such as emerging contaminants
        - Changes in the water quality provided by the program
        - Changes in constituents background levels in the Aqueduct
- Conduct periodic water quality review of water quality monitoring results on the SWP from Non-Project water inflow

Recommended Sampling Plan

In order for BVWSD to provide a PIP demonstrating that the Palms Project water pumped into the Aqueduct will not degrade the water quality in the Aqueduct, routine sampling must to be conducted since most results are over 3 years old and several required constituents have not been tested. Table 3 identifies constituents that have no historical results. Additional testing required for the PIP includes

organic compounds such as Volatile Organic Compounds and Synthetic Organic Compounds, as well as regulated radiological compounds.

GEI recommends collecting the full set of samples for each well following the DDW Title 22 Water Quality Monitoring Schedule (Appendix B) along with the COCs that are listed in the DWR Pump-In Policy. Samples should be collected when wells are actively operating in an effort to obtain samples that are representative of the aquifer. It is highly recommended to initiate a sampling program as early as practicable to support appropriate treatment planning and to develop a defensible dataset. At a minimum, sampling frequencies will follow the DWRs requirements listed in Table 2.

Once sampling commences and there is more water quality data available, BVWSDs Project team will have a better understanding on the type of centralized water treatment plant that will be necessary. Additional data will also provide a foundation of developing a PIP for DWRs review. GEI recommends that data is thoroughly reviewed as the results become available. If any anomalies are found, the prompt review will allow BVWSD to address any issues and immediately take corrective actions. Additionally, if increased monitoring is deemed necessary to better characterize water quality, this monitoring can be implemented before the PIP is prepared.

Conclusion

This preliminary water quality assessment provides insight towards potential water quality issues BVWSD may face in developing a PIP. While the data represents a much larger geographic area than the Palms Project, increased awareness of potential issues enables the Project team to develop a comprehensive water quality study. Based on the sample results from Well 02 and monitoring well 12, iron and manganese are expected in the Project area. The sampling program should consider these key points that will apply to designing an appropriate water treatment system:

- With the Fe/Mn levels observed in BVWSD's historical data, it is unlikely that blending will provide adequate contaminant reduction and therefore will likely be an unacceptable treatment method.
- Additional issues with secondary constituents (conductivity/TDS and hardness) may complicate the treatment trains and should be identified early in the process.
- Historical samples indicate that boron may be a potential issue

It is highly recommended that BVWSD develop and coordinate a comprehensive water quality sampling program; review results; perform QA/QC on the laboratory packages; and make schedule adjustments based on sample results. This level of detailed water quality monitoring will aid in confidently identifying constituents that exceed drinking water standards, proposing the most appropriate centralized water treatment plant and developing the PIP for DWR review.

A list of required sample parameters (Title 22 and COC's), recommended test methods and the sample frequency. Some parameters are recommended for quarterly testing based on our finding in this data review, as well as DWR's requirements for a PIP. BC Laboratories provided a price list for analytical costs for the recommended sampling program. The estimated cost for each well is about $2,900 per well. Appendix B provides a breakdown of the sample information and estimated costs.

APPENDIX A

Table 1: Water Quality Summary of District Wells

Well	Arsenic (ppb)		Hardness (ppm)		Iron (ppb)		Manganese (ppb)		Nitrate (ppm)		Conductivity (µS/cm)		Sulfate (ppm)		Total Dissolved Solids (ppm)		Gross Alpha (pCi/L)	
	MCL = 10		N/A		SMCL = 300		SMCL = 50		MCL = 45		SMCL = 1600		SMCL = 500		SMCL = 1000		MCL = 15	
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
D01	-	**13**	230	270	**6839**	**20500**	**1395**	**4180**	0.3	0.4	**1102**	**1840**	**329**	**620**	**783**	**1360**	9.2	**17.1**
D02	6.75	**13.5**	327	390	0.08	0.12	7.5	30	3.9	5.4	511	572	152	164	320	370	-	-
D03	0	0	254	420	0.16	0.48	0.01	0.01	26	**46**	**953**	**1138**	234	**326**	**533**	**746**	-	-
D04	0.3	0.84	354	800	4.3	17	18	**50**	4.8	13	862	**1080**	226	**305**	**657**	**860**	**27**	**41**
D05	0.43	0.86	297	420	0.05	0.05	0.01	0.01	19	24.5	**3062**	**6480**	173	**450**	**2045**	**4760**	10	**16**
D06	1.1	1.4	352	430	0.06	0.07	0.01	0.01	38.8	**48.9**	**1475**	**5390**	242	**354**	**750**	**940**	-	10.7
D07	**17.3**	**25**	150	230	43.5	130	**76.7**	**230**	0.16	0.4	790	**1080**	229	**406**	**507**	**744**	0.6	0.93

Notes:

(-) no results available

Bolded red values indicates results over the respective MCL, SMCL, or NL

Table 2: Water Quality Summary of BVWSD Wells

Well	Arsenic (ppb)		Hardness (ppm)		Iron (ppb)		Manganese (ppb)		Nitrate (ppm)		Conductivity (µS/cm)		Sulfate (ppm)		Total Dissolved Solids (ppm)		Gross Alpha (pCi/L)	
	MCL = 10		N/A		SMCL = 300		SMCL = 50		MCL = 45		SMCL = 1600		SMCL = 500		SMCL = 1000		MCL = 15	
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
01H01	9.5	**12**	273	476	**500**	**680**	**380**	**730**	0.75	1.3	**1102**	**1840**	**329**	**620**	**783**	**1360**	9.2	**17.1**
06B02	-	3	42	52	73	90	5	5	0.1	0.2	511	572	152	164	320	370	-	-
06B03	-	-	197	305	-	-	-	-	0.2	0.5	**953**	**1138**	234	**326**	**533**	**746**	-	-
11P	1	1	304	390	75	120	43	**70**	3.2	5.4	862	**1080**	226	**305**	**657**	**860**	**27**	**41**
14M02	4.5	8	576	1600	221	**530**	38	**60**	0.2	0.12	**3062**	**6480**	173	**450**	**2045**	**4760**	10	**16**
14M03	-	1	292	1300	**643**	**1140**	20	30	0.2	0.5	**1475**	**5390**	242	**354**	**750**	**940**	-	10.7
23B	**16**	**24**	242	390	**14082**	**20500**	**2610**	**4180**	0.2	0.2	790	**1080**	229	**406**	**507**	**744**	0.6	0.93

Notes:

(-) no results available

Bolded red values indicates results over the respective MCL, SMCL, or NL.

Table 3: Water Quality Summary of Monitoring Wells

Well	Arsenic (ppb)		Hardness (ppm)		Iron (ppb)		Manganese (ppb)		Nitrate (ppm)		Conductivity (µS/cm)		Sulfate (ppm)		Total Dissolved Solids (ppm)		Chloride (ppm)		Gross Alpha (pCi/L)	
	MCL = 10		N/A		SMCL = 300		SMCL = 50		MCL = 45		SMCL = 1600		SMCL = 500		SMCL = 1000		SMCL = 500		MCL = 15	
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
DMW01	**20**	**22**	273	485	74	180	20	35	5	**56**	**2085**	**2640**	140	**470**	**1248**	**1900**	**610**	**813**	-	-
DMW02	**30.6**	**93**	851	2071	73	160	**174**	**260**	7	**84**	**4722**	**6920**	**803**	**1300**	**3388**	**5100**	**1222**	**1824**	-	-
DMW03	8	9	508	1050	94	210	**77**	**130**	2.7	17.5	**3118**	**6260**	**658**	**2250**	**1938**	**4710**	**704**	**1670**	-	-
DMW04	**89**	**100**	463	810	**442**	**3250**	**104**	**250**	3.7	**41.9**	**2568**	**4160**	223	**675**	**1663**	**2900**	**730**	**990**	-	-
DMW05	**11.75**	**12**	150	260	**419**	**1980**	30	**110**	2.3	21	893	**1290**	**257**	**373**	**605**	**830**	93	200	-	-
DMW06	**36**	**45**	120	230	35	50	43	**90**	0.8	3.4	688	**1150**	174	**320**	**537**	**2754**	47	91	-	-
DMW07	**11.3**	**14**	91	439	104	280	**167**	**670**	0.7	3.4	547	**1240**	106	**336**	338	**961**	48	114	-	-
DMW08	6.6	9	23	37	42	51	6	10	0.8	1.4	308	480	67	119	187	292	26	84	-	-
DMW10A	-	-	246	430	**3326**	**6600**	81	**160**	1.4	3.4	**967**	**1190**	**273**	**397**	**647**	**920**	55	125	-	-
DMW10B	2	2.4	45	73	61	90	0.5	1.6	4.6	24.7	511	664	160	220	**328**	470	39	52	-	**51**
DMW11A	-	1	91	280	**7153**	**19000**	**97**	**260**	0.4	1.1	**712**	**1150**	**234**	**470**	**491**	**840**	46	75	-	-
DMW11B	0.3	0.86	179	490	**17226**	**140000**	**377**	**1800**	0.8	3.4	**919**	**1320**	**342**	**510**	**600**	**940**	57	83	-	-
DMW12A	**15**	**16**	310	2800	**533**	**960**	44.3	**140**	0.8	3.4	**1837**	**8470**	**265**	**421**	**1459**	**9200**	**438**	**3100**	-	**16**
DMW12B	-	0.67	465	1600	**352**	**990**	45.5	**80**	1.11	3.6	**2389**	**6480**	**257**	**630**	**1340**	**4760**	**603**	**2230**	-	-

Notes:

(-) no results available

Bolded red values indicates results over the respective MCL, SMCL, or NL.

Table 4: Monitoring Well Depths

Well	Date Drilled	Slotted Interval (ft)
DMW01	Sep 1991	280 - 300
DMW02	Feb 1992	260 – 300
DMW03	Feb 1992	200 – 220
DMW04	Oct 1991	334 – 374
DMW05	Oct 1991	240 – 310
DMW06	Dec 1993	410 – 440
DMW07	Dec 1993	410 – 440
DMW08	Jan 1993	374 – 404
DMW10A	Jan 1993	370 – 450
DMW10B	Jan 1993	550 – 650
DMW11A	Dec 1992	560 – 660
DMW11B	Dec 1992	370 – 470
DMW12A	Dec 1992	600 – 700
DMW12B	Dec 1992	355 - 455

APPENDIX B

Table 5: Estimated Annual Sampling Costs

Test	Method	# per Year	$ per Sample	Extended Price
Title 22 GM/GP/IOC	---	1	250	250
[1]Hexavalent Chromium	218.6	1	30	30
Perchlorate	314.0	2	30	60
[1]Boron	---	1	7	7
N-Nitrosodimethylamine (NDMA)	521	1	264	264
[2]Volatile Organic Compounds	524.2	1	90	90
[2]1,2,3-trichloropropane	524.2sim	1	80	80
[2]Synthetic Organic Compounds	525.2	1	100	100
[2]EDB/DBCP	504.1	1	50	50
Gross Alpha	900.0	4	50	200
Uranium	---	4	50	200
Radium 226	---	4	195	780
Radium 228	---	4	143	572
Total Organic Carbon	---	4	30	120
Bromide	300.0	4	8	32
Quarterly Iron/Manganese	200.7	3	14.00	42
Quarterly Arsenic	200.8	3	7.00	21
Estimated Annual Sampling Cost Per Well:				**$2,835.00**
Extended Price for Sampling 25 Wells on the Recommended Schedule:				**$72,450.00**

Notes:

[1]If any results are greater than one-half the MCL, sampling should be increased to quarterly
[2]Annual monitoring is required for the first three years of operation
"---" means the analytical method was not specified to the lab

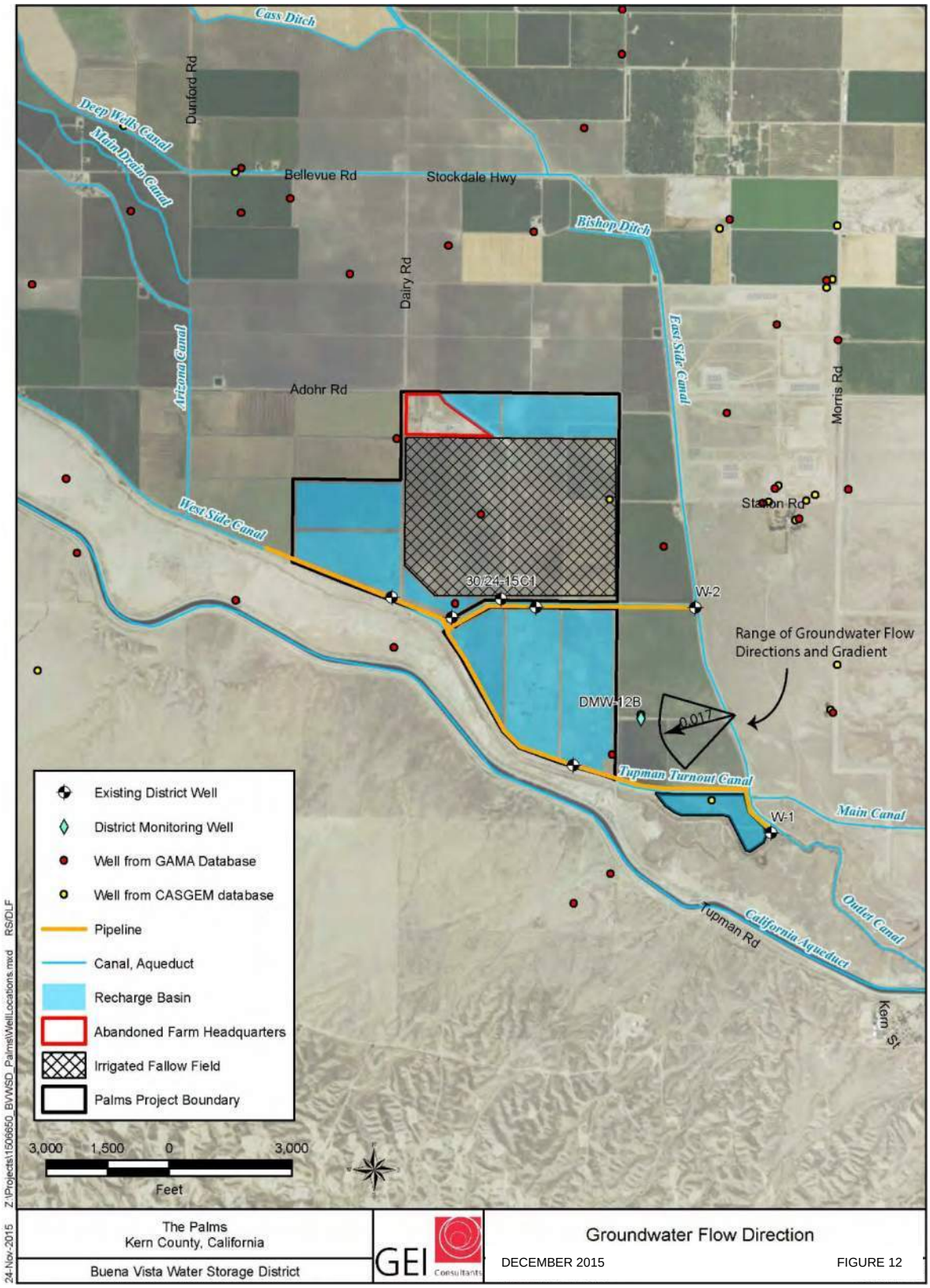


Figure 12: Groundwater Flow Direction 1994- 2013. The average gradient is 0.017 ft vertically/ft horizontally

Wood Environment & Infrastructure Solutions, Inc.
1281 East Alluvial Avenue, Suite 101
Fresno, CA 93720-2659
USA
T: 559-264-2535
www.woodplc.com

January 15, 2021
Project 8101

Jonathan Parker
Kern Water Bank Authority
1620 Mill Rock Way, Suite 500
Bakersfield, CA 93311

Subject: **Review of DRAFT EIR for the Palms Groundwater Recovery Project**
Kern County, California

Dear Mr. Parker:

Wood Environment & Infrastructure Solutions, Inc. (Wood), has prepared this review of the December 2020 *Draft Environmental Impact Report for the Palms Groundwater Recovery Project* (DEIR) prepared by GEI Consultants on behalf of the Buena Vista Water Storage District (BVWSD). The focus of this review is on the numerical modelling effort conducted on behalf of BVWSD by Todd Groundwater (Todd) in support of the DEIR. Specifically, this review evaluates the efficacy of the numerical modelling effort to effectively simulate potential impacts to groundwater related to the proposed Palms Groundwater Recovery Project (Palms Project). As explained below, the Palms Project numerical model was not calibrated to site conditions and is otherwise insufficient in several respects.

Numerical Modeling Review

The numerical model effort for the Palms Project is presented as a memorandum by Todd in Appendix D of the DEIR. Appendix D presents a summary of the proposed project, regional setting, geology, groundwater conditions (elevations and quality), and the development of a superposition model to evaluation potential groundwater impacts of the Palms Project. The development, validation, and use of the superposition model are discussed in the following sections. Each section contains a summary of the Todd memorandum followed by Wood's opinion on the text in italics.

Superposition Model Concept

Superposition models rely on Darcy's Law equation for groundwater flow and the principal of superposition. When applied to a groundwater system, the changes in an aquifer system affected by multiple hydraulic stresses (i.e. recharge and pumping) are equal to the sum of the individual hydraulic stresses applied to the aquifer system. Simply put, if Project A causes a 2-foot change in groundwater elevation (head) at some observation point, and Project B causes a 1-foot change in head at the same observation point, then Projects A and B together will result in a 3-foot change in head at the observation point. The results of a superposition modeling are calculated as a change in head, not absolute

groundwater elevations. Therefore, the starting groundwater elevations simulated are irrelevant and can be set to zero. Because the impacts of multiple hydraulic stresses on the aquifer system are additive, only the stresses of the project under evaluation are simulated. The resulting simulated change in head is intended to be a direct reflection of the impacts of the project.

Inherent in the principal of superposition is that the model used to calculate the change in head is well calibrated to site conditions and can accurately reproduce the observed change in head at known observations points to known hydraulic stresses. Superposition is strictly applicable to linear aquifer system problems only, that is, constant aquifer saturated thickness and linear boundary conditions. If the aquifer system is relatively linear, for example, the saturated thickness does not change by a significant portion, superposition can still provide reasonably accurate answers. If the aquifer system is non-linear (i.e. boundary conditions such as recharge and pumping are highly transient), then superposition models may yield unreliable results. Currently, superposition is used primarily in the simulation of aquifer tests, in that only changes due to the imposed change in stress (that is, the well discharge) are simulated, initial drawdowns are specified as zero, and boundary conditions are relatively constant.

Superposition Model Development

The superposition model for the Palms Project was developed using United States Geological Survey (USGS) numerical model code MODFLOW. MODFLOW is the defacto standard for numerical groundwater models and has been used world-wide for over 40 years. Development of the Palm Project MODFLOW model is documented in Appendix D, Attachment B.

The Palms Project model was derived from the 2009 USGS Central Valley Hydrologic Model (CVHM), a basin scale model of the entire Central Valley of California. The CVHM simulates the period 1962 through 2003, consists of 10 model layers using a relatively coarse model grid of 1-square mile, and simulates the Central Valley leaky aquifer system from ground surface to the base of fresh groundwater. Significantly, the CVHM does not include the extensive water banking recharge and recovery operations on the Kern River alluvial fan.

The Palms Project model is a subset of the CVHM, extending from slightly north of the Kern County line to the Tehachapi Mountains. In the vicinity of the proposed Palms Project, the model grid was refined from 1-square mile (640 acres) to about 40 acres. In addition, the Palms Project model combined several of the CVHM layer together to yield a 4-layer model. As a result, the hydraulic properties (horizontal and vertical hydraulic conductivity, storage coefficients, and specific yield) had to be averaged and re-districitized to the new Palms Model grid.

The model developed for the Palms Project is a subset of the CVHM that has been averaged and re-districitized to a refined model grid with fewer model layers. The Palms Project model is essentially a completely new MODFLOW model that should be calibrated to existing site conditions and hydraulic stresses prior to use for predictive simulations.

Superposition Model Validation

Following development, the Palms Project MODFLOW model was "validated" to three groundwater scenarios: 1) 2011 West Kern Water District (WKWD) Aquifer Test, 2) WKWD wellfield recovery from October 2012 through December 2014, and 3) Kern Water Bank recharge and recovery from 1993 through 1998 (see Appendix D, Attachment A). These are discussed in the following sections.

The term "validation" is mis-used here. Model calibration is the iterative process of comparing the model simulated response to a stress with the real aquifer system response to a stress, revising the model if necessary, and comparing again until the model results closely match the real aquifer system response. Model validation is the process of comparing the model and its behavior to the real aquifer system and its behavior to known stresses. Typically, model validation is conducted by taking a calibrated model and testing how well it can reproduce a unique set of stresses and observations that were not used to calibrate the model. For example, say Model A is calibrated to stresses and observed heads for the period 1980 to 2010. If Model A can then simulate the stresses and observed heads for period 2010 to 2020, without any recalibration of model hydraulic parameters, then Model A can be considered validated.

Superposition Model Validation Scenario 1

The Palms Project model was "validated" against the results of a 2-dimensional analytical element *WinFlow* model developed in 2009 to simulate a series of 24-hour aquifer pumping tests of five groundwater extraction wells located at the WKWD North Well Field. Observations of the change in head (drawdown) were recorded in up to six nearby monitoring wells during each 24-hour test. The 2009 WKWD *WinFlow* model was calibrated to simulate the drawdown observed at the end of each 24-hour test.

The WKWD *WinFlow* model was modified to simulate the hypothetical pumping of nine wells located around the WKWD North project. Each well was pumped at 2,000 gallons per minute (gpm) for 300 days. The Palms Project model was modified to simulate the same pumping scenario of the WKWD extraction wells. A comparison of the WKWD *WinFlow* model and Palms Project model simulated drawdown showed the Palms Project model under predicted drawdown at the well field. The Palms Project model was then modified (i.e. calibrated) to improve the match to the estimated drawdown by the WKWD *WinFlow* model. The drawdown simulated by the calibrated Palms Project model approximated the WKWD *WinFlow* model simulated drawdown at day 300 of pumping in the vicinity of the pumping wells (near-field), but under predicted drawdown further away from the pumping wells (far-field).

Numerical models (MODFLOW) are typically compared to an analytical model (WinFlow) to demonstrate that the numerical code can accurately reproduce the analytical solution. This is done using identical model construction (grid, layers) and hydraulic properties so the models are as similar as possible. This was not the case for the Scenario 1 simulations. The WKWD WinFlow model consists of a single uniform layer with homogeneous hydraulic properties. The Palms Project MODFLOW model consists of four layers with heterogenous hydraulic properties. Furthermore, the Palms Project model had to be calibrated to approximate the WKWD WinFlow solution after 300 days of pumping; and did not do so very well. It would be more appropriate to calibrate the Palms Project model to the drawdown observations (actual data) from the 24-hour pumping tests of the WKWD well field which were used to develop the WKWD WinFlow model.

Superposition Model Validation Scenario 2

The Palms Project model was also "validated" by simulating the recovery pumping of approximately 18,730 acre-feet (AF) of groundwater from five wells in the WKWD wellfield from October 2012 through December 2014. Preliminary simulation results indicated it was necessary to include the recovery pumping of approximately 1.8 million AF (MAF) from the Kern River Alluvial Fan Water Banking Projects (Kern River Projects) during this same period. The Palms Project model simulated drawdown was compared to observed drawdown in 11 observation wells around the WKWD well field. Hydrographs of observed and simulated drawdown showed that the Palms Project model simulated drawdown was more or less on trend with the observed drawdown in the pumping wells but did not reproduce the large changes in head due to well inefficiencies. The observed and simulated drawdown in nearby observation wells shows a poorer fit.

The need to include the Kern River Projects with the Palms Project model to approximate the observed drawdown in the WKWD well field from 2012 through 2014 demonstrates the underlying assumptions for use of a superposition model are not valid in the Palms Project area. The recharge and recovery operations of the Kern River Projects overwhelm the stresses induced by the recovery from WKWD wells. Furthermore, the Palms Project model did not evaluate the simulated drawdown in the numerous wells on and around the Kern River Projects. These data are readily available and could have made the Palms Project model calibration more robust.

Superposition Model Validation Scenario 3

The Palms Project model was also "validated" by simulating groundwater mounding associated with the Kern River Projectss from 1993 through 1998 when approximately 3.1 MAF of water were recharged. Monthly recharge volumes for each water banking project were imported at the approximate location of the recharge basins. The Palms Project simulated change in head was compared to observed change in head at 26 monitoring wells scattered across the Kern River Projects. Hydrographs of observed and simulated change in head were provided for only for 4 of the 26 wells used for "validation." The hydrographs show that the Palms Project model simulated change in head is generally on trend with the observed change in head; however, the model over predicts the change in head in the vicinity of the Palms Project and under predicts the change in head near the northern edge of the Kern Water Bank.

Again, the need to include the Kern River Projects with the Palms Project model to approximate the change in head resulting from the water banking recharge from 1993 to 1998 demonstrates the underlying assumptions for use of a superposition model are not valid in the Palms Project area. The recharge and recovery operations of the Kern River Projects will likely overwhelm the change in head induced by recharge and recovery stresses at the Palms Project. In addition, there is a significant amount of data generated by the Palms Project model (i.e. hydrographs) that were not presented for review. Furthermore, since it became necessary to simulate both recharge and recovery operations of the Kern River Projects, why wasn't a single, comprehensive model prepared simulating the entire history of water banking operations in the area?

Palms Project Recovery Scenarios A and B

The Palms Project model described above was then utilized to evaluate two hypothetical recharge and recovery scenarios at the Palms Project facility. Both scenarios were assumed to start in 2011, a period

when the Kern River Projects were all recovering groundwater. The Palms Project recovery scenario assumptions are shown below:

- 2011 – 100,00 AF recharge over 8 months
- 2012 – Idle
- 2013 – Year 1 recovery of 25,000 AF over 6 months
- 2014 – Year 2 recovery of 25,000 AF over 6 months
- 2015 – Year 3 recovery of 25,000 AF over 6 months
- 2016 – Year 4 recovery of 25,000 AF over 6 months
- 2017-2020 - Idle

The only difference between Scenario A and B is that Scenario B recovers only 15,000 AF in year four, leaving approximately 10 percent of the recharged water behind. Recovery pumping was assumed to be by 14 wells pumping approximately 2,200 gpm for 6 months. As stated in the Todd memorandum: "Because this is a superposition model, only the combined Palms {recharge} and Recovery Project operations were simulated."

As clearly shown by "validation" scenarios 2 and 3 described above, it was necessary to add the recharge and recovery operations of the Kern River Projects to the Palms Project model to obtain a reasonable fit to the observed change in heads during recharge and recovery periods. As such, there is no justification to remove the historical water bank recovery operation during the 2011 to 2020 simulation period from the Palm Project model. The Palms Project model simulated mounding during recharge and drawdown during recovery may underestimate mounding (because there was recharge by others during 2011) and underestimate drawdown during recovery (because there was also recovery by others during 2011 to 2019).

Summary and Opinion

Inherent in the principal of superposition is that the model used to calculate the change in head is well calibrated to site conditions and can accurately reproduce the observed change in head at known observations points to known hydraulic stresses. Superposition is strictly applicable to linear aquifer system problems only, with constant aquifer saturated thickness and linear boundary conditions. Non-linear boundary conditions, such as large-scale recharge and recovery operations, may result in unrealistic simulation results. The Palms Project superposition model derived from the USGS CVHM has a refined grid and fewer layers and utilizes averaged hydraulic properties. As such, the Palms Project model is a completely new model that should have been calibrated to historical site conditions.

The Palms Project model was "validated" by comparing simulated change in heads (drawdown) to drawdown calculated with an analytical *WinFlow* model using a hypothetical pumping scenario. The results did not match well, requiring further calibration of the Palms Project model. Rather than calibrate the Palms Project model to hypothetical drawdown results, the Palms Project model should have been

calibrated to the actual observed drawdown during the 24-hour pumping tests used to develop and calibrate the analytical *WinFlow* model.

The Palms Project model could not simulate long-term change in head associated with recovery pumping from the WKWD well field from 2011 to 2014 without adding the recovery operation of the Kern River Projects. Likewise, the Palms Project model could not simulate the long-term change in head associated with recharge operation from 1993 to 1998 without adding the recharge operation of the Kern River Projects. This demonstrates that the boundary conditions are non-linear, and simulation results are dependent on activities located away from the Palms Project site. The Palms Project model needs to include and be calibrated to the nearby recharge and recovery operations of the Kern River Projects.

It has been a pleasure to be of professional service to you. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,
Wood Environment & Infrastructure Solutions, Inc.

David M. Bean, PG, CHg
Principal Hydrogeologist

I:\8000s\8101.000\Archive\8101.005.docx

(Submitted Electronically)

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."

R E C I T A L S

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: _____

By: _____

SEMITROPIC WATER STORAGE DISTRICT

By: _____

By: Gen. Mgr.

HENRY MILLER WATER DISTRICT

By: _____

By: Joe Lutje

KERN COUNTY WATER AGENCY

By: Adrienne D. 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: _____

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:_____

REQUIRED ATTACHMENTS:

EXHIBIT A: MAP OF DISTRICT

EXHIBIT B: NARRATIVE DESCRIPTION OF PROJECT FACILITIES

EXHIBIT C: MAP OF KERN FAN AREA

banking MOU.wpd

EXHIBIT A

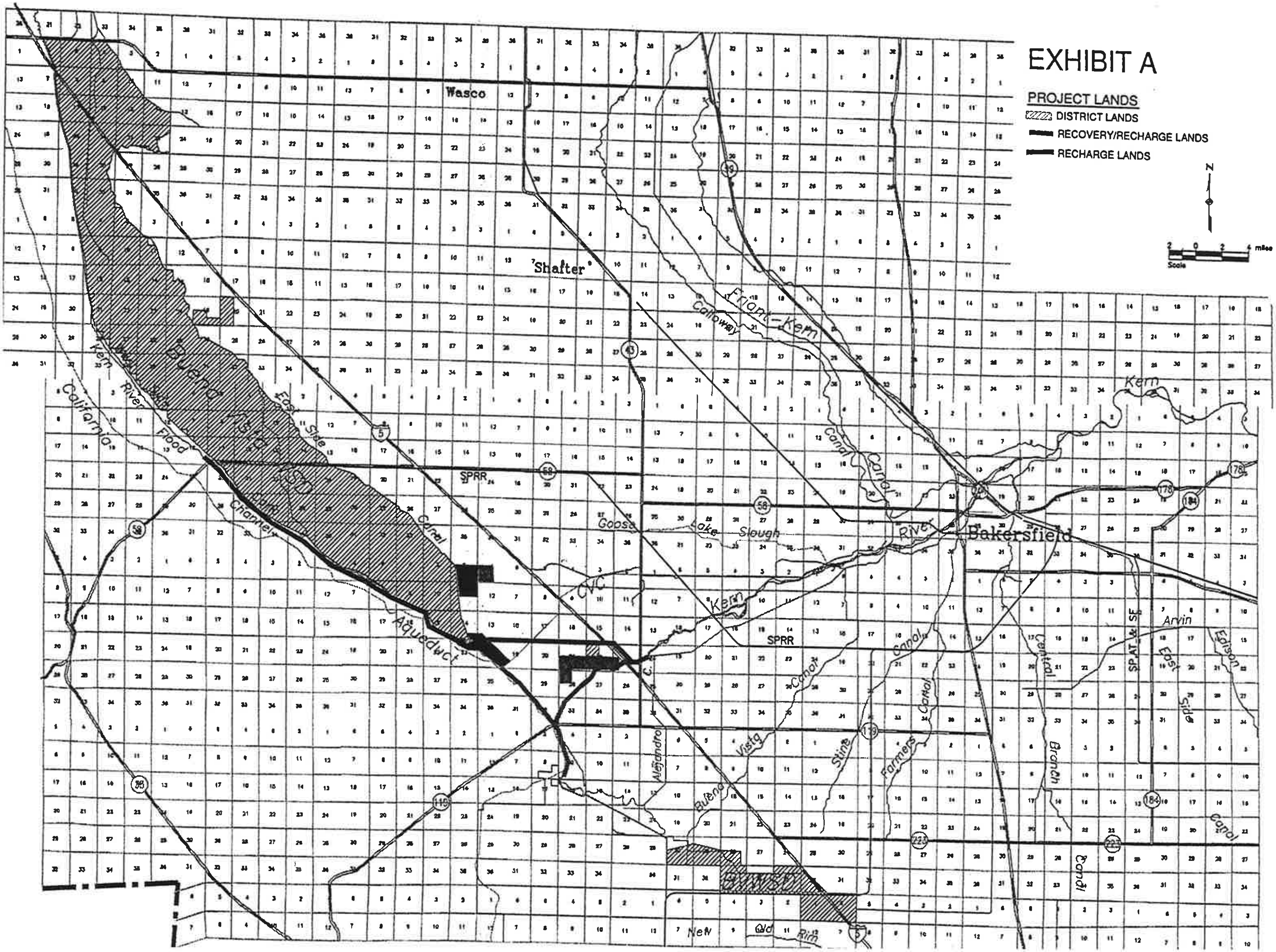

PROJECT LANDS
DISTRICT LANDS
RECOVERY/RECHARGE LANDS
RECHARGE LANDS
N
Scale
miles
Wasco
Shafter
Bakersfield
Friant-Kern
Calloway
Canal
Kern
River
Goose
Lake
Slough
CVC
SPRR
Aqueduct
California
Flood
Channel
East Side
Buena Vista
Alejandro
Stine
Farmers
Central
Branch
Arvin
SP.AT.&.SF
Edison
BVWSD
New
Old
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.

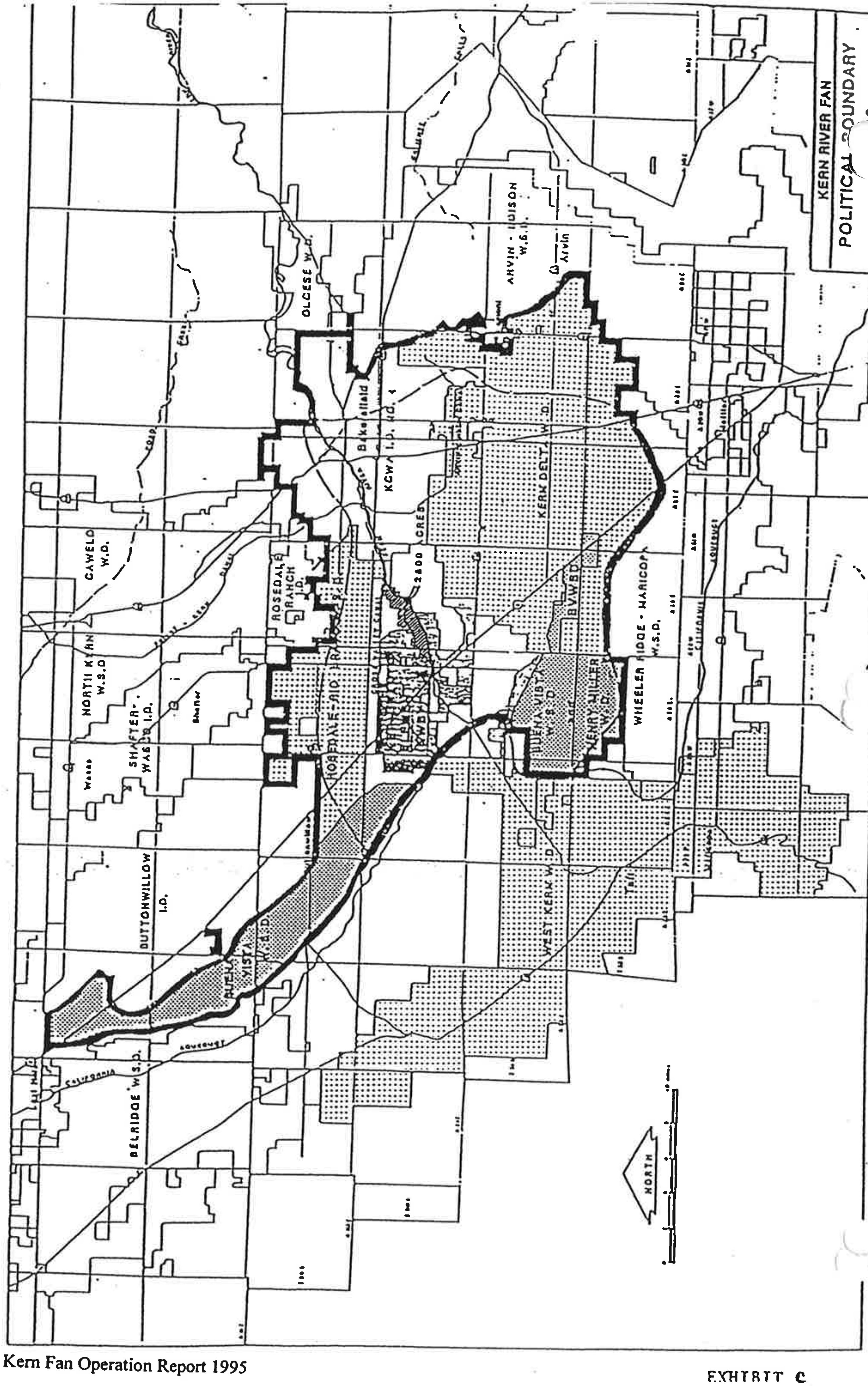
Buena Vista may construct additional recharge ponds, water conveyance facilities, and water wells. Currently the District has four District owned wells within the Buttonwillow service area. According to a 2000 survey, there are approximately 200 landowner wells. Another 20 District owned wells may be 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.


KERN RIVER FAN
POLITICAL BOUNDARY
2
NORTH
BELRIDGE W.S.D.
BUTTONWILLOW I.D.
BUENA VISTA W.S.D.
WEST KERN W.D.
SHAFTER-WASCO I.D.
NORTH KERN W.S.D.
CAWELO W.D.
ROSEDALE RANCH I.D.
KERN DELTA W.D.
KCWA I.D. NO. 4
2800 ACRES
BVWSD
HENRY MILLER W.D.
WHEELER RIDGE - MARICOPA W.S.D.
ARVIN - EDISON W.S.D.
OLCESE W.D.
Bakersfield

Initial Study and
Proposed Mitigated Negative Declaration
for
Buena Vista Water Storage District, Palms Groundwater Banking Project

Lead Agency: Buena Vista Water Storage District

For additional information
regarding this document contact:

Maurice Etchechury, Engineer-Manager
Buena Vista Water Storage District
525 North Main Street
P.O. Box 756
Buttonwillow, CA 93206
Phone: 661-324-1101

December 2015

Table of Contents

Section A. Environmental Checklist 2

Section B. Environmental Factors Potentially Affected 9

Section C. References 34

Section D. Technical Memos and Reports 36

Section E. Mitigation Measures 37

Section F. List of Preparers 44

List of Figures

Figure 1: Project Location 7
Figure 2: Proposed Palms Groundwater Banking Project 8
Figure 3: Typical View Shed in the Project Area 11

Section A. Environmental Checklist

1. **Project title:**

   Buena Vista Water Storage District, Palms Groundwater Banking Project

2. **Lead Agency/Project Sponsor:**

   Buena Vista Water Storage District
   525 North Main Street
   P.O. Box 756
   Buttonwillow, CA 93206

3. **Contact person and phone number:**

   Maurice Etchechury 661-324-1101

4. **Project location:**

   The project area is located within the Buena Vista Water Storage District (BVWSD), in the southern portion of the Buttonwillow Service Area, north of the California Aqueduct, south of Adohr Road, and west of the Tule Elk Reserve (Figure 1).

5. **General plan designation:**

   NA

6. **Zoning:**

   Exclusive Agriculture (A)

7. **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 sheets if necessary.)**

   The Palms Groundwater Banking Project (Palms Project) is a groundwater replenishment and water banking project that will cover approximately 1,160 acres and will include features needed to apply surface water for groundwater recharge as well as facilities needed for recovery and treatment of stored groundwater (Figure 2). The Palms Project construction would include activities consistent with digging, trenching, and excavation of soil to create water holding ponds and channels, and the installation new pipeline and wells for later recovery. The Project involves multiple stages: 1) construction of recharge facilities, 2) installation of pumps in existing wells and approximately 4 miles of pipeline, 3) construction and equipping additional recovery wells with associated piping, and 4) water treatment facilities if needed. Stages 3 and 4 primarily involve the recovery aspect and would be constructed at a later date. Construction of stages 1 and 2 would include activities consistent with digging, trenching, and excavation of soil to create water holding ponds and channels,

and the installation new pipeline. Linear trenches would be excavated around the perimeter of the water holding facilities to install approximately 16,500 feet of 24-inch-diameter pipe and another 5,000 feet of 36-inch pipe to convey water recovered from the Palms project area (Figure 2).

High quality water recharged by the Project will flow to aquifers that are sources for domestic and municipal wells providing water to residents of Taft, Tupman, and to the disadvantaged community of Buttonwillow, and to replenish groundwater under the Tule Elk Reserve.

Lands to be used by the Project have an established history of irrigated crop production. Retiring these lands from irrigated agriculture will enable water to be delivered to the area based on availability of water for recharge rather than in response to the pattern of crop demand. Therefore, the timing of the deliveries will differ in a way that results in important benefits to the Buttonwillow Sub-basin.

The District anticipates that removing irrigated land from production and converting this land to recharge facilities will reduce irrigation demand by approximately 3,300 acre-feet per year. While cessation of irrigation deliveries will eliminate deep percolation of irrigation water, the intentional recharge of high quality water will more than compensate for the reduction in deep percolation and will greatly reduce the potential of leaching of nitrates, salts and other contaminants.

Earthwork would include construction of low berms with material for these berms being generated on-site by removal of surface soil that overlies shallow, highly permeable river-borne sand deposits. Recharge would be encouraged by retaining water in the canals and natural channels which run through the Palms Project area.

Construction activity for recharge facilities would be completed within 6 months, while construction of recovery facilities would occur based on the rate of recovery and level of treatment needed to meet local needs and to fulfill banking agreements.

Project Objectives

The Project will have the following primary objectives:

- Increase conjunctive management on the west side of Kern County by expanding the area's ability to accept surface water for groundwater recharge during periods when surface water is available. Groundwater stored by the Project will be available to meet demands during periods when supply of surface water is limited.
- Reduce agricultural demand by replacing 1,160 acres of irrigated farmland with spreading grounds.
- Raise groundwater elevations in the Project area. Groundwater elevations will fluctuate between wet periods, when recharge raises groundwater elevations, and dry

periods, when elevations drop due to groundwater recovery. However, "The Palms" will be managed so that groundwater elevations will improve from those observed historically and anticipated based on groundwater modeling without the project. However, the amplitude of changes between wet periods and dry periods may increase.

Project Benefits

Project benefits will fall into following three primary categories: 1) benefits to groundwater users and prospective banking partners due to better management of groundwater elevations, 2) habitat benefits as a result of more availability for water transfers to the Tule Elk Reserve, and 3) water quality improvements due to reduced leaching of contaminants to groundwater. These benefits are described in greater detail below.

1) Water supply and energy savings will result from a general increase in groundwater elevations in the Project area. Although "The Palms" will function as a banking project with groundwater levels increasing during periods when water is recharged and declining when groundwater is pumped to meet local demands or for delivery to agricultural users, the Project will be operated so that it will provide a long term benefit to the basin. This will aid in regional compliance with the Sustainable Groundwater Management Act and will enable groundwater pumpers (both Project proponents and local domestic and municipal users) to reduce pumping costs and lessen the need to deepen wells.

2) Local habitat benefits in stream channels and wetlands will result from increased base flow in regional streams generated by greater water availability, particularly in the vicinity of the Tule Elk Reserve. Also the spreading ponds will act as a type of wetlands, as they will likely be operated during times of migratory bird flights.

3) In addition to aiding in management of groundwater elevations, the retirement of irrigated lands and construction of spreading grounds will reduce nitrates now conveyed to groundwater from deep percolation of irrigation applications. This will be accomplished by eliminating the application of nitrogen and other fertilizers. The resulting improvements in groundwater quality will benefit all groundwater users, particularly local users.

8. Surrounding land uses and setting:

The BVWSD lies in the trough of California's southern San Joaquin Valley, approximately 16 miles west of the City of Bakersfield. Aside from the small unincorporated towns of Buttonwillow and Tupman, there are no other population centers within the BVWSD. The BVWSD's Service Area comprises approximately 48,810 acres within the lower Kern River watershed, and can be divided into two distinct areas: the Buttonwillow Service Area and the Maples Service Area. The Buttonwillow Service Area comprises approximately 44,460 acres situated northwesterly of the Buena Vista Lake Bed. The Maples Service Area of BVWSD comprises approximately 4,350 acres situated easterly of the Buena Vista Lake Bed. The Henry Miller Water District (HMWD) is a part of BVWSD; however, HMWD is not a part

of BVWSD's Service Area and possesses its own water contracts with the Kern County Water Agency.

9. **Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement):**

    - California Water Resources Control Board Construction Activities Storm Water General Permit
    - San Joaquin Valley Air Pollution Control Board Dust Control Plan

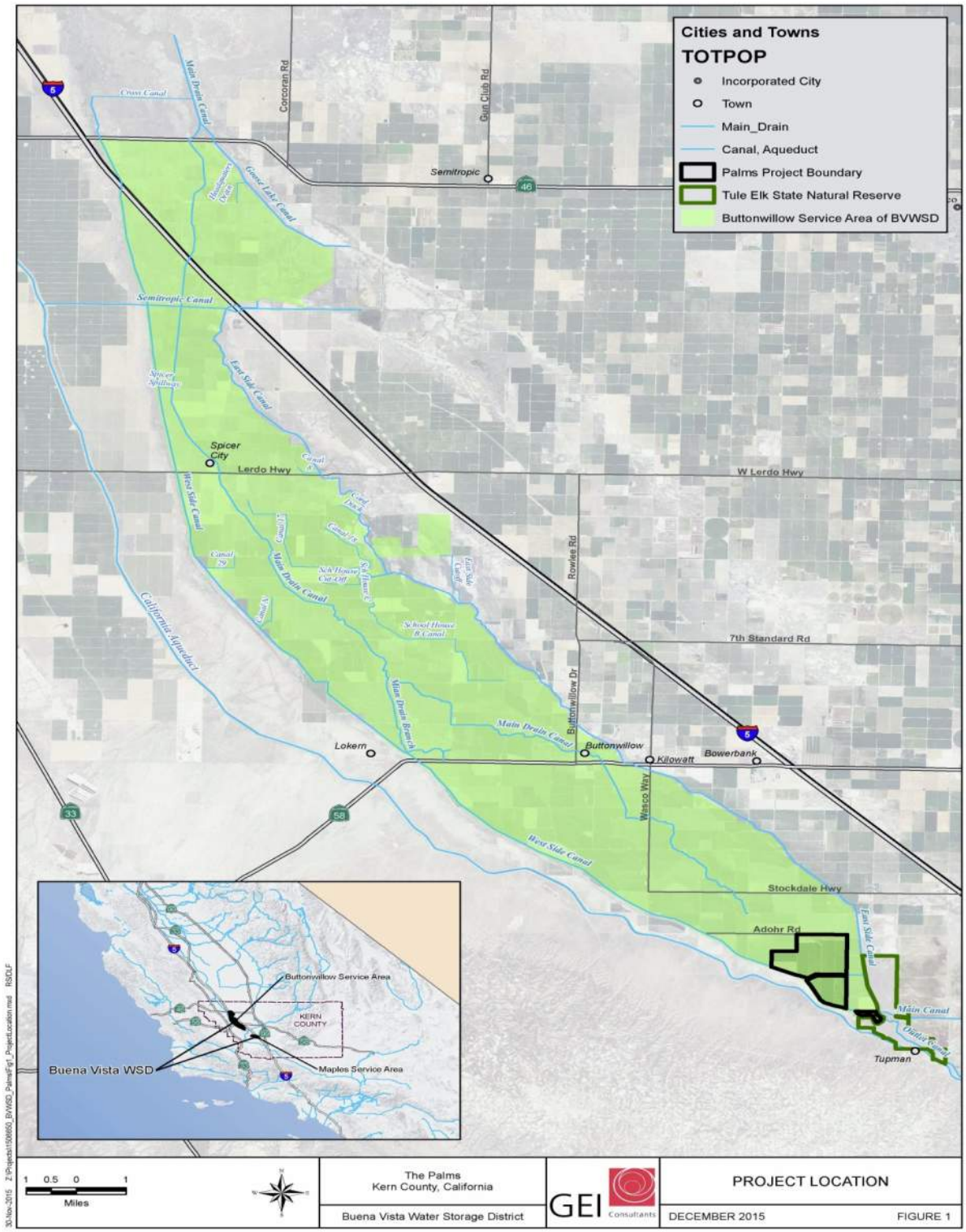


Figure 1: Project Location

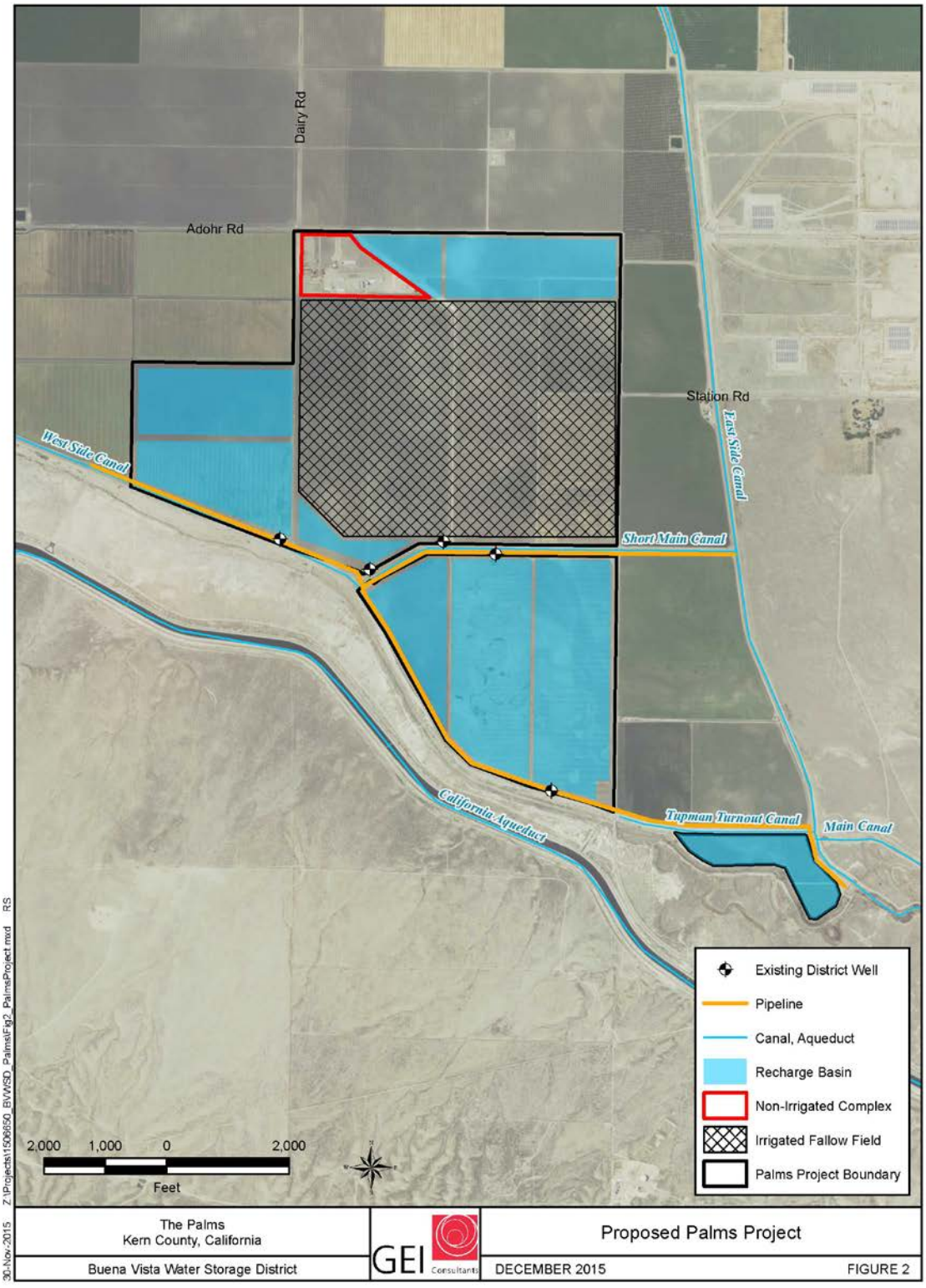


Figure 2: Proposed Palms Groundwater Banking Project

Section B. Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project.

☐ Aesthetics	☒ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Geology / Soils
☒ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☒ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☒ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation / Traffic	☐ Utilities / Service Systems	☒ Mandatory Findings of Significance

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 impact" 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.

Signature _____ Date 8 DEC 15

	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?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

(a-d) The project area is flat, comprising dirt roads, open water canals, and various agricultural crops. There are no significant view-sheds or scenic vistas (Figure 3). The proposed action would result in earthen canal facilities that hold water, much like the surrounding land use, buried pipes for conveying recovered water, and new well structures in an area that already contains wells. There would be little change to the existing view. The proposed project would not create any new sources of light.

The construction activities would last approximately 6 months and only occur during daylight hours. During construction, there would be a small number of construction vehicles at the site; however, this would not be substantially different than agricultural equipment normally used. Construction and operation of the proposed project would not appear different than current operations at the BVWSD. Therefore there would be no change to visual resources from the proposed project and thus no impact to aesthetics, buildings, or surroundings.

Figure 3: Typical View Shed in the Project Area

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FOREST RESOURCES – 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?	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☒	☐
a-e) The project is located on land designated as prime farmland although currently fallow. The project will take agricultural land out of production to create the groundwater banking facility. However, the project is expected to increase water supply and water quality, and therefore have a beneficial effect on agricultural production regionally. Therefore, the impact to agriculture is deemed to be not significant.				

	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?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

(a-e) The Project is located within the southern San Joaquin air-shed. This portion of the air-shed is in non-attainment (does not meet standards) for federal and state air quality standards for ozone and PM2.5 (particulate matter less than 2.5 micrometers in diameter). The air-shed is in nonattainment of the state PM10 (particulate matter less than 10 micrometers in diameter) standard (San Joaquin Valley Air Pollution Control District [SJVAPCD]) 2015. The Project would involve X construction vehicles during the 6-month project implementation phase for excavation of soils to create the ponding facilities and to bury the new pipe. The primary concern for construction of the proposed project is PM10 emissions from construction. The construction of the project would be subject to SJVAPCD Rule 8021 for dust control. An approved Dust Control Plan is required if the project involves disturbing more than 5 acres of earth or moving 2,500 cubic yards per day for any 3 construction days. With the implementation of the Dust Control Plan, the proposed project is not expected to contribute substantially to existing levels of PM10 or conflict with the SJVAPCD's air quality plan. There are no sensitive receptors in the area as it is remote and with very few residents.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☒	☐	☐
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 US Fish and Wildlife Service?	☐	☐	☐	☒
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
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?	☐	☐	☐	☒

(a-f) The habitat assessment conducted for the proposed BVWSD Palms Project found that no natural lands are present within the boundaries of the proposed project site. However, natural lands and native habitats are present in the buffer area, in undisturbed/uncultivated areas south and east of the proposed project boundary. Areas of habitat adjacent to the project site occur along the California Aqueduct to the south and on the Tule Elk Reserve to the east. Other natural lands in proximity include the Elk Hills Oil Field, the Coles Levee Ecosystem Preserve, and the Kern Water Bank. Riparian habitat is present southeast of the project site, along the Outlet Canal.

The proposed project would avoid directly impacting adjacent areas of saltbush scrub and annual grassland habitat, as they occur outside the boundaries of the proposed project site. Since the proposed project would be conducted in lands disturbed by agricultural use, project implementation would not result in impacts to natural lands. The project would not interfere with movements of wildlife species or with established native resident or migratory wildlife corridors. Native resident and/or migratory fish and known native wildlife nursery sites are not present within the proposed project site or buffer area.

No riparian, wetland, vernal pool, streams, or other sensitive community types were observed within the boundaries of the proposed project site during biological surveys. The proposed project would avoid riparian areas, designated wetlands, and potential wetland areas, as they occur outside the boundaries of the proposed project site. Based on a lack of suitable aquatic habitat in the project site, species including California red-legged frog, vernal pool fairy shrimp, Western pond turtle, delta smelt, least bittern, and marbled godwit are not expected to be present or exposed to the proposed project. Therefore, no specific measures are recommended for these species.

The proposed project is located outside the known range and current distribution of special-status species including California red-legged frog, giant garter snake, Delta smelt, California spotted owl, Lewis's woodpecker, Nuttall's woodpecker, and least bittern. Furthermore, based on a lack of suitable habitat with required elements, these species and others including vernal pool fairy shrimp, cactus wren, and bald eagle are not expected to be present or become established in the proposed project site or buffer area. Therefore, no specific measures are recommended for these species.

No suitable habitat for special-status plants is present within the boundaries of the proposed project site. No special-status plants were observed in the proposed project site during biological surveys. Based on the habitat requirements of targeted plant species and current land use, special-status plant species are not expected to be present or become established in the project site.

Increased human activity and vehicle traffic in the vicinity may disturb some wildlife species. However, common wildlife species have likely become acclimated to on-going agricultural activities and oil and gas exploration, development, and production activities. Because common wildlife species observed during biological surveys are locally and regionally common, potential impacts to these resources are considered less than significant. Therefore, no avoidance or minimization measures are proposed at this time.

Although the project site is located in agriculture, several special-status wildlife species may potentially be present during project activities, or have low potential to occur in the proposed project site. Certain migratory bird species, such as longbilled curlew and mountain plover, may forage in agricultural areas that contain low-growing vegetation and a potential insect prey base. As a result of mobility, there is

potential for certain species to occasionally pass through and/or to forage in the project site. Since natural land that represents potential habitat for several San Joaquin Valley upland species are present in areas adjacent to the project site, avoidance measures to protect special-status wildlife species including, but not limited to, San Joaquin kit fox, American badger, Western burrowing owl, special-status small mammal species, and blunt-nosed leopard lizard during construction and pipeline installation are described below. Implementation of the proposed project could potentially impact individual special-status small mammal species, including giant kangaroo rat, Tipton kangaroo rat, San Joaquin antelope squirrel, San Joaquin pocket mouse, and Tulare grasshopper mouse, should they be present in the proposed project site during project implementation. Should small mammal burrows become established in the project site prior to construction, the project could impact burrows that may be potentially used by these species. Impacts to special-status small mammal species or their burrows could occur through crushing by construction equipment or entombment below ground in burrows during project activities. These species' normal behavior could also be affected due to noise and vibration from project activities. Impacts to these species would be considered significant. In the event that special-status small mammal species are present or potential small mammal burrows become established in the proposed project site, measures to protect this species from potential impacts are included and described further in the Mitigation Measures, Section E.

Implementation of the proposed project could potentially impact individual blunt-nosed leopard lizards, should they be present in the proposed project site during project implementation. Should California ground squirrel burrows, or other small mammal burrows become established in the project site prior to construction, the project could impact burrows that may be potentially used by blunt-nosed leopard lizards. Impacts to blunt-nosed leopard lizards or their burrows could occur through crushing by construction equipment or entombment below ground in burrows during project activities. This species' normal behavior could also be affected due to noise and vibration from project activities. Impacts to this species would be considered significant. In the event that blunt-nosed leopard lizards are present in the proposed project site, measures to protect this species from potential impacts and avoid take are included and described further in the Proposed Avoidance and Mitigation Measures section.

Implementation of the proposed project could potentially impact individual San Joaquin kit fox, American badgers, or their dens, should they become established within the proposed project site prior to project implementation. Impacts to badgers or kit fox could occur through crushing by construction equipment during project activities. These species could also be affected due to noise and vibration from project activities if dens are located closer than 200 feet to the proposed project site; project related noise and vibration could cause the abandonment of occupied dens. Impacts to these species would be considered significant. Avoidance and minimization measures to protect this species from potential impacts are included and described further in the Mitigation Measures, Section E.

Implementation of the proposed project could potentially impact individual and nesting burrowing owls should they become established within the proposed project site prior to or during project implementation. Impacts to this species could occur through crushing by construction and drilling equipment during implementation of project activities. Actively nesting burrowing owls could also be affected due to noise and vibration from project activities if nests are located near the proposed project; project related noise and vibration could cause the abandonment of active nest sites. Impacts to this species would be considered significant. Preconstruction surveys are recommended to

detect species presence and/or use in the project sites.

In the event that burrowing owls become established in the proposed project site, measures to protect this species from potential impacts are described further in the Mitigation Measures, Section E.

Implementation of the proposed project could potentially impact individual and nesting migratory bird species, should they become established within the proposed project site prior to project implementation. Impacts to migratory bird species could occur through crushing by construction equipment during project activities. Actively nesting birds could also be affected due to noise and vibration from project activities, if nests are located closer than 250 feet to the proposed project site. Actively nesting birds could also be affected due to noise and vibration from project activities, if nests are located within 0.5 miles of the proposed project site. In the event that Swainson's hawks become established in or near the proposed project site, avoidance and minimization measures to protect the species from potential impacts are described further in the Mitigation Measures, Section E.

Direct mortality or injury to sensitive animal populations could occur from earth-moving activities, if sensitive animal populations become established prior to or during project implementation. Sensitive animals could also become trapped or buried in an open trench. Avoidance and minimization measures to protect sensitive animal species from potential impacts are described further in the Mitigation Measures section E. The complete Biological Assessment for the proposed Palms project is in Section D.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

(a-d) An archival records search, background studies, and an intensive, on-foot surface reconnaissance of the BVWSD Palms Project study area, Kern County, California, were conducted as part of a Phase I cultural resources survey. One prehistoric archaeological site, RABV-1, was recorded. This site is a small, sparse prehistoric lithic scatter. This site was identified and recorded on August 25, 2015. The age of the site is unknown. Mitigation for this site will be preservation in place, see Section E.

In addition to the archaeological site, 16 isolated artifacts were recorded within the Area of Potential Effect. The isolated artifacts are categorically not significant with their recording having exhausted any research potential they might contain. No further work on or consideration of these isolated resources will be undertaken. An archaeologist be contacted in the unlikely event that archaeological resources are discovered during the construction or use of the Project are, see Section E. The complete cultural resources report is found in Section D.

As of July 1, 2015, Public Resources Code Sections 21080.3.1 and 21080.3.2 require public agencies to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose mitigating impacts to tribal cultural resources. The NAHC sent BVWSD a list of tribes that have requested to be consulted regarding projects in Kern County in a letter dated September 17, 2015. BVWSD sent formal notification to the Tribes on that list on October 7, 2015. The letter included a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. No tribes have requested formal consultation.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒

(a-e) The proposed project does not lie within the Alquist-Priolo Earthquake Fault Zone nor is it in a liquefaction or landslide zone (California Department of Conservation 2014). The lack of topography in the project area precludes landslides.

The soils in the project area have been extensively farmed and managed for agricultural purposes. The proposed groundwater banking project consists of trenching and excavating to create channels and ponds that would hold excess water during times of high flow. Periodically, the District would need to excavate soils in the ponds and channels to maintain the berms. However, this would not lead to instability or excessive erosion. The area would not be used to support septic tanks or any other system to dispose of waste water.

See Section D for the complete soil assessment in the Groundwater Impact Report.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GREENHOUSE GAS (GHG) EMISSIONS – Would the project:				
a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?	☐	☐	☐	☒
(a-b) The Environmental Protection Agency's (EPA) mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO2 emitted annually (EPA 2015). This threshold is approximately the amount of CO2 generated by 4,400 passenger vehicles per year. Comparatively, emissions from seven construction vehicles during project implementation would be considerably lower. Because these activities would be similar to existing conditions, for both construction and operation, and will be far below the threshold level of emissions, the project GHG emissions would not represent a substantial change and would not conflict with the Kern county's GHG emissions reduction program.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. 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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
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?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency 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?	☐	☐	☐	☒
(a-h) No hazards are found on the site. No hazardous materials will be transported to or from the site. There are no sites on the Cortese list in the project area. Wildfires are not a significant risk from the project. The project will not impact any emergency evacuation plans or emergency response plans. There is not an airport land use plan in the project area.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
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)?	☐	☐	☐	☒
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☒	☐	☐
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?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
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?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

(a-j) The depth to groundwater Palms Project area is currently between 160 and 180 feet below ground surface (bgs). Before the current drought, levels were higher at between 120 and 140 feet bgs. The results of the analysis for the Groundwater Assessment (Section D) indicate that the proposed project will have the beneficial impact of locally raising groundwater levels in the vicinity of the groundwater recharge basins.

The recharge of surface water with groundwater through recharge operations will result in a blended water quality. The actual aquifer water quality resulting from the mixing of surface and groundwater will depend on the volume of water recharge, the duration of recharge and the distance away from the project. No adverse geochemical reactions are predicted based on the mixing of surface and groundwater quality at the Palms project. Because both surface water sources have lower levels of dissolved solids, trace minerals and major ions, the blended mix that results from recharge will result in lower levels of total dissolved solids, major ions and trace minerals in the mixing zone within the aquifer.

Phase I and II Environmental Site Assessments have been conducted in the project area (Appendix D). The Phase I ESA reported several potential sources of contamination to groundwater. Five underground storage tanks (USTs) which held diesel and gasoline fuels, an air strip for crop dusters where stained soils were observed, several above ground storage tanks (ASTs), and storage of agricultural chemicals. Additionally, the Phase II ESA collected soil samples of the shallow subsurface. TPH - Mineral Oil was detected at four sites and the pesticides dieldrin, endrin, and endosulfan were detected at seven sites. The pesticide concentrations were above industrial screening levels (RWQCB ESLs) but did not exceed other state or federal screening levels (CHHSLs or RSLs). BVWSD would mitigate the potential threat to groundwater quality resulting from the potential migration of fuel and farm chemicals from soil into groundwater. See Mitigation Measures in Section E.

The Palms project area is located on 1160 acres of flat and vacant lands. Berms would be construction around the project site to hold water and recharge the aquifer. Implementation of the water holding facilities would not increase flood risk to the project area as water would naturally seep through the soil layers to recharge the aquifer.

Surface water available to BVWSD for use in the Palms project may include water from the Kern River, from the Friant-Kern Canal, or the California Aqueduct.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
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?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
(a-c) The proposed project is located in an area zoned for agriculture and will serve existing farmland. The project is located outside of existing communities and is consistent with existing zoning. There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans or other approved local, regional, or state habitat conservation plans covering the proposed project site. There would not be a conflict with conservation plans or land use plans as zoning would not change in the project area.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. 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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
(a-b) The proposed project is not located in an area with mineral resources.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. 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?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
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 expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) 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?	☐	☐	☐	☒
(a-f) The project is located in an agricultural land use area with no known sensitive receptors. There would be no changes to existing operation and no change in existing noise levels. Construction is temporary, occurring during the day, and is located in a remote area, without a population center or many residences. Since the project is not located near any sensitive receptors, construction noise will not have a significant impact.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. 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 roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
(a-b) The proposed project is located in an agricultural area and away from population centers. The project will result in no new housing. In addition, the project will result in no new long-term employment. The construction phases would last approximately 6 months and no additional employees would be required to operation the new facilities. The expected increase in water due to the increase in groundwater supplies would be used in times of drought to increase available water supplies regionally.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. PUBLIC SERVICES –				
a) Would the project 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?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒
(a) The proposed project is located in an undeveloped area. The characteristics of the facilities pose no increase in fire risk. In addition, the construction phase will be relatively short with no construction activities occurring at night. The operation phase will require no additional employees to maintain and operate. Therefore the project will demand no additional public services.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. RECREATION –				
a) Would the project 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?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
(a-b) No recreational facilities exist in the project area. The proposed project will not increase the population nor otherwise affect local recreational facilities.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. TRANSPORTATION / TRAFFIC – Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
(a-f) The proposed project occurs in a rural area with lightly travelled roads. The project will result in no additional employees or transit routes. Construction traffic will utilize existing public roads to deliver equipment, supplies, and workers to the construction sites. Construction of the project will employ only a few individuals at a time. Therefore, changes in transportation reliability or access would not be significant.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
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?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒
(a-g) No wastewater treatment facilities occur in the project area. Storm water and agricultural runoff currently collects within certain existing ditches and canals. The proposed project will result in no new wastewater facilities or wastewater flow. Minimal waste will be generated during construction and no increase in waste production will occur during the operation of the project. The water holding facilities would be comprised of dirt and construction would not create a substantial amount of waste material. The project will be designed to capture and reuse storm water that collects within project facilities. The project will conserve existing water supplies and make them more readily available to existing water users. Therefore, the proposed project will not place constraints on the local utilities and services that would create adverse impacts.				

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE –				
a) Does the project have the potential to 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, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
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)	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

(a-c) The Palms will enable the District to better sustain groundwater levels and improve groundwater quality, two objectives of California's Groundwater Sustainability Management Act. California continues to be in the midst of a State of Emergency due to grossly diminished statewide supplies of water and prolonged drought conditions, including as declared and proclaimed by the Governor in his January 17, 2014 Proclamation and April 25, 2014 Proclamation, and his Executive Orders B-26-14, B-28-14, and B-29-15 the last of which was issued on April 1, 2015. The National Oceanic Atmospheric Administration (NOAA) and climatologists have recently and continue to report a high-probability of extreme wet weather occurring this winter in Southern California and the San Joaquin Valley due to El Niño conditions. Additionally, the surface water that would have been attributed to the project area will now be allocated to the balance of the District, providing all landowners an additional supply of surface water.

Past, present, and probable future projects include the Northern Area Project and the Brackish Groundwater Remediation Project. BVWSD prepared an Initial Study and Mitigated Negative Declaration as required under the California Environmental Quality Act for the Northern Area Project (NAP), which entailed the installation of approximately 20 miles of buried pipeline to convey water and reduce leekage from open earthen canals. The BVWSD has evaluated the environmental effects of the NAP and mitigation measures similar to measures established within the NAP have been established for the Palms Project. Construction of the Palms would not have a significant

cumulative effect to resources in the Proposed Action area if mitigation measures are followed during construction.

The Brackish Groundwater Remediation Program (BGRP) another future project that would mitigate for the increase in salt concentrations to the perched aquifer by installing approximately 60 wells, 200 feet apart, along the west side within the existing ROW of the NAP. The wells would extract brackish, unpalatable water from a shallow supply in the area. The brackish water would be blended with better quality water and supplied to local agricultural users (Figure 5). An Environmental Impact Report (EIR) for the BVWSD Water Management Program (State Clearinghouse No. 2009011008) was prepared in 2009 for the BGRP (in addition to three other proposed projects).

Portions of the NAP are under construction and the construction of the BGRP is in the planning phase. Construction for the Palms project would potentially occur concurrently with the NAP, but prior to the BGRP. Emission from the construction vehicles for the NAP and Palms projects would remain cumulatively less than significant.

Section C. References

California Department of Conservation. 2014. http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm.

CDFG (California Department of Fish and Game). 2004. Approved survey methodology for the blunt-nosed leopard lizard. Unpublished protocol, California Department of Fish and Game, Sacramento, California. 4 pp.

CDFG (California Department of Fish and Game). 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency, Department of Fish and Game. March 7, 2012. 34 pp.

San Joaquin Valley Air Pollution Control District (SJAPCD). 2012. http://www.valleyair.org/transportation/CEQA%20Rules/SPALTables61912.pdf.

San Joaquin Valley Air Pollution Control District (SJAPCD). 2014. http://www.valleyair.org/aqinfo/attainment.htm.

Swainson's Hawk Technical Advisory Committee. 2000. Recommended Timing and Methodology For Swainson's Hawk Nesting Surveys In California's Central Valley. May 31, 2000. 5 pp.

United States Environmental Protection Agency (EPA). 2015. Greenhouse Gas Reporting Program. http://www.epa.gov/ghgreporting/

USFWS (U.S. Fish and Wildlife Service). 2011. U.S. Fish and Wildlife Service Standardized Recommendations For Protection Of The Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance. Prepared by the Sacramento Fish And Wildlife Office, January 2011. 9 pp.

Section D. Technical Memos and Reports

Biological Assessment
Buena Vista Water Storage District
Palms Groundwater Banking Project
Kern County, California

Prepared for:

GEI Consultants, Inc.
700 NE Multnomah Street, Suite 230
Portland, Oregon 97232
Contact: Ms. Ginger Gillin
(503) 342-3777

Prepared by:

Robert A. Booher Consulting
Environmental Planning and Management
3287 Congressional Court
Fairfield, California 94534
Contact: Bob Booher, R.E.A.
(707) 399-7835

December 2015

INTRODUCTION

The Buena Vista Water Storage District (BVWSD) proposes to construct the Palms Groundwater Banking Project (Palms Project) in western Kern County, California. The Palms Project is a groundwater replenishment and water banking project that will extend over 1,160 acres and will include features needed to apply surface water for groundwater recharge as well as facilities needed for recovery and treatment of stored groundwater. The Project will facilitate conjunctive management in Kern County by expanding the capacity to capture excess surface water available from the Kern River and the State Water Project (SWP) and to retain these waters in local aquifers.

The Palms will enable the BVWSD to better sustain groundwater levels and improve groundwater quality, two objectives of California's Groundwater Sustainability Management Act. High quality groundwater recharged by the Project will flow to aquifers that are sources for domestic and municipal wells providing water to residents of the cities of Bakersfield and Taft, to the disadvantaged community (DAC) of Buttonwillow, and to replenish groundwater under the Tule Elk State Natural Reserve.

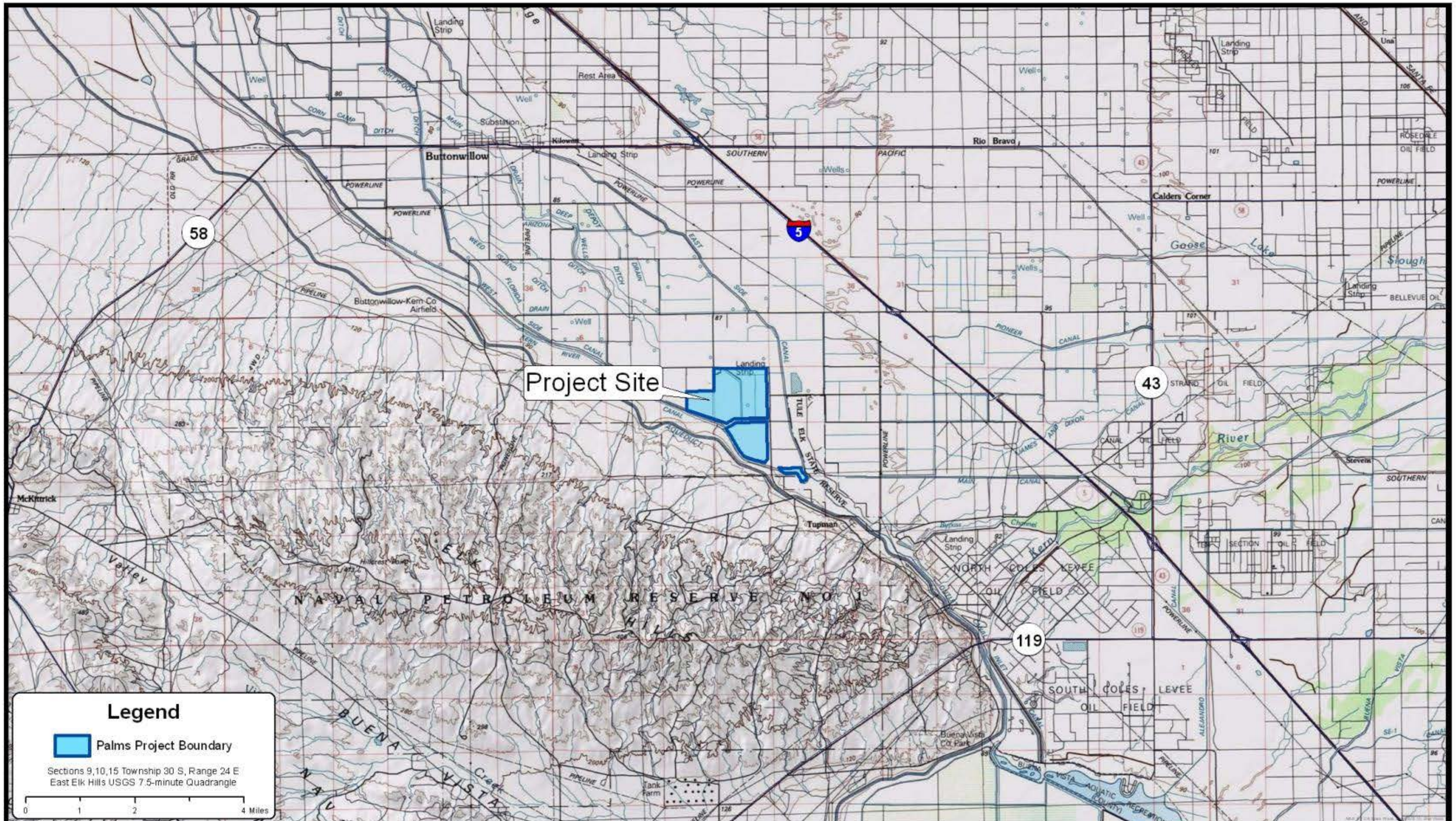
Land to be used by the Project has an established history of irrigated crop production. Retiring these lands from irrigated agriculture will enable water to be delivered to the area based on availability of water for recharge rather than in response to the pattern of crop demand. Therefore, while the volume of water to be used in the project area will remain based on the BVWSD's entitlements (and no water applied historically in the project area will be applied offsite), the timing of the deliveries will differ in a way that results in important benefits.

Robert A. Booher Consulting (RAB Consulting) was retained by GEI Consultants, Inc. (GEI) to conduct biological surveys and provide an assessment of the proposed Palms Project for submittal to GEI and the BVWSD. RAB Consulting conducted biological surveys for the proposed project to identify known or potential habitat for special-status wildlife and plant species. This report presents the results of our biological surveys and includes measures that would be implemented during the proposed project to avoid or minimize potential impacts to sensitive wildlife and plant species.

PROJECT LOCATION AND ENVIRONMENTAL SETTING

The Palms Project is proposed approximately 1.2 miles northwest of Tupman, in western Kern County, California (see Figures 1 and 2). The Palms Project will be located in the Buttonwillow Sub-basin area of the Kern Sub-basin and will lie on land that has already been acquired by the District. The proposed Palms Project occurs in the East Elk Hills U.S. Geological Survey (USGS) 7.5-minute quadrangle.

As illustrated in Figure 2, the Project site is bordered by Adohr Road to the north, the California Aqueduct to the south, and agricultural fields to the east and west. The California State Parks Tule Elk State Natural Reserve is adjacent to the east. Tupman Road provides access to the project site and existing dirt roads used for agriculture and water distribution (canals) provide

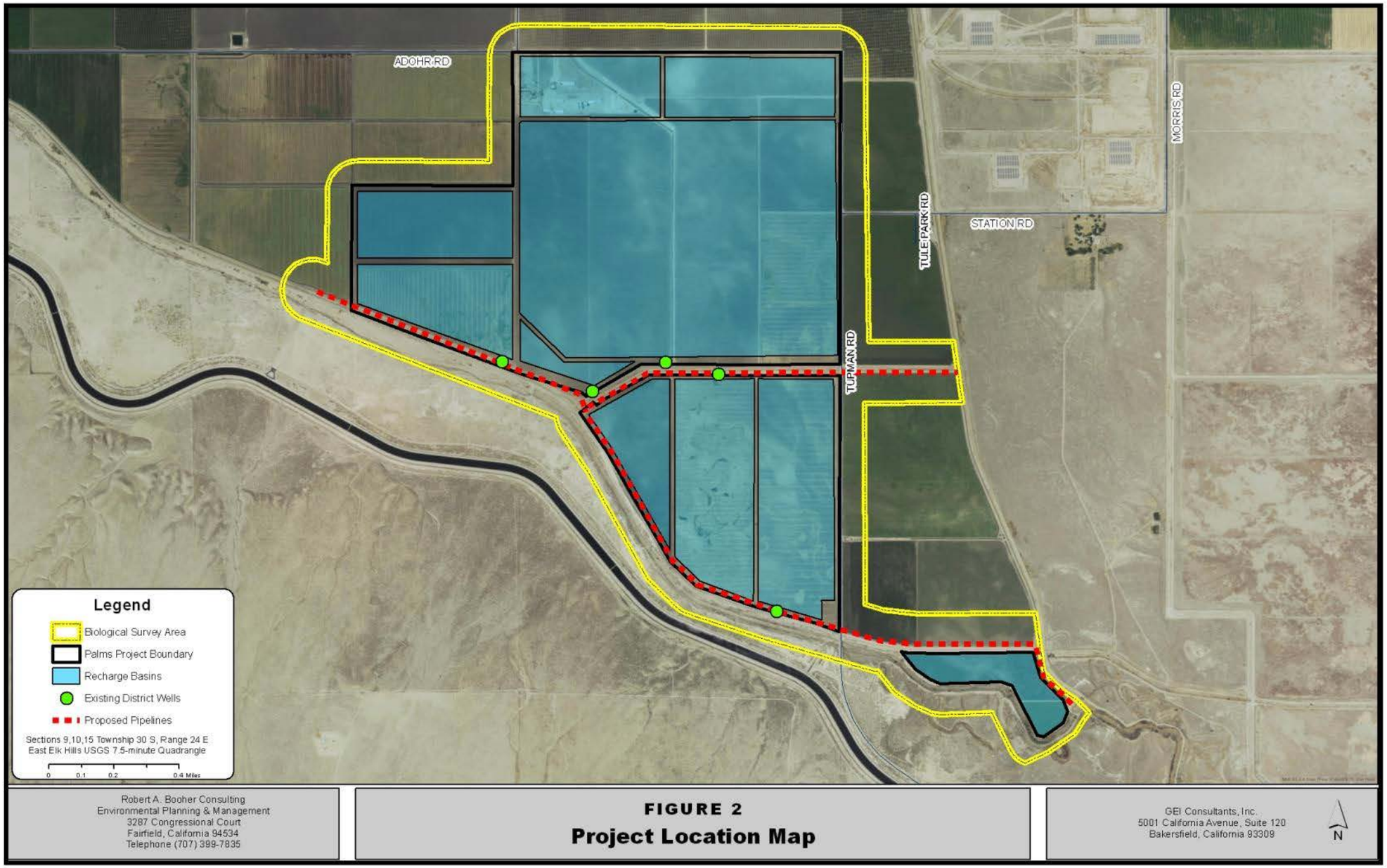


Robert A. Booher Consulting
Environmental Planning & Management
3287 Congressional Court
Fairfield, California 94534
Telephone (707) 399-7835

FIGURE 1
Project Vicinity Map

GEI Consultants, Inc.
5001 California Avenue, Suite 120
Bakersfield, California 93309

N


ADOHR RD
MORRIS RD
TULE PARK RD
STATION RD
TURMAN RD
Legend
Biological Survey Area
Palms Project Boundary
Recharge Basins
Existing District Wells
Proposed Pipelines
Sections 9,10,15 Township 30 S, Range 24 E
East Elk Hills USGS 7.5-minute Quadrangle
0
0.1
0.2
0.4 Miles
Robert A. Booher Consulting
Environmental Planning & Management
3287 Congressional Court
Fairfield, California 94534
Telephone (707) 399-7835
FIGURE 2
Project Location Map
GEI Consultants, Inc.
5001 California Avenue, Suite 120
Bakersfield, California 93309
N

access to existing BVWSD wells, proposed recharge basins, and proposed pipeline alignments within the project boundaries.

Topography in the proposed project site is generally flat, and much of the land in this region of the San Joaquin Valley has historically been used for agriculture. Based on aerial imagery, agricultural lands occur in the Project site, and extend approximately 30 miles north from the California Aqueduct. The proposed Palms Project area has been historically used for agriculture (alfalfa, cotton, onions) and includes a portion of the former Hydrogen Energy California (HECA) Project site (URS 2013). Surrounding land uses include agricultural production of cotton, alfalfa, and pistachios, and water distribution including canal operation and maintenance.

Undisturbed areas adjacent to the proposed Palms Project that are not under agricultural production were observed to support sensitive habitats including Valley Saltbush Scrub, Valley Sink Scrub, and Alkali Seep. Generally, these remnant areas of habitat are present in the California Aqueduct Right-of-Way (ROW) to the south, and to the east on the Tule Elk State Natural Reserve. In addition, riparian habitat persists in the Outlet Canal located southeast of the project site. No perennial or intermittent streams are present within the boundaries of the proposed Palms project site.

The term "project site" is used throughout this document to describe the specific area where a pipeline will be constructed and installed, or where pond areas will be created. Representative photographs of the proposed project site are presented in Appendix A.

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans or other approved local, regional, or State habitat conservation plans covering the proposed project site.

PROJECT DESCRIPTION

The Palms Project is a groundwater replenishment and water banking project that will extend over 1,100 acres and will include features needed to apply surface water for groundwater recharge as well as facilities needed for recovery and treatment of stored groundwater. The Project will facilitate conjunctive management in Kern County by expanding the capacity to capture excess surface water available from the Kern River and the State Water Project (SWP) and to retain these waters in local aquifers. The Project will be located in the Buttonwillow Sub-basin area of the Kern Sub-basin and will lie on land that has already been acquired by the District.

The Palms will enable the District to better sustain groundwater levels and improve groundwater quality, two objectives of California's Groundwater Sustainability Management Act. High quality groundwater recharged by the Project will flow to aquifers that are sources for domestic and municipal wells providing water to residents of the cities of Bakersfield and Taft, to the disadvantaged community (DAC) of Buttonwillow, and to replenish groundwater under the Tule Elk State Natural Reserve.

Land to be used by the Project has an established history of irrigated crop production. Retiring these lands from irrigated agriculture will enable water to be delivered to the area based on

availability of water for recharge rather than in response to the pattern of crop demand. Therefore, while the volume of water to be used in the project area will remain based on the District's entitlements (and no water applied historically in the project area will be applied offsite), the timing of the deliveries will differ in a way that results in important benefits.

The Project involves multiple stages: 1) construction of recharge facilities, 2) installation of pumps in existing wells and approximately 4 miles of pipeline, 3) construction and equipping additional recovery wells with associated piping, and 4) water treatment facilities if needed. Stages 3 and 4 primarily involve the recovery aspect and would be constructed at a later date. Construction of stages 1 and 2 would include activities consistent with digging, trenching, and excavation of soil to create water holding ponds and channels, and the installation new pipeline. Linear trenches would be excavated around the perimeter of the water holding facilities to install approximately 16,500 feet of 24-inch-diameter pipe and another 5,000 feet of 36 inch pipe to convey water recovered from the Palms project area.

Project Objectives

The Palms Project will have the following primary objectives:

- Increase conjunctive management on the west side of Kern County by expanding the area's ability to accept surface water for groundwater recharge during periods when excess surface water is available. Groundwater stored by the Project will be available to meet demands during periods when access to surface water is limited.

- Reduce agricultural demand by replacing 1,100 acres of irrigated farmland with spreading grounds.

- Raise groundwater elevations in the Project area. Groundwater elevations will fluctuate between wet periods, when recharge raises groundwater elevations, and dry periods, when elevations drop due to groundwater recovery. However, the Palms will be managed so that overall elevations will increase from those observed historically and the amplitude of changes between wet periods and dry periods will be regulated. The increase in groundwater levels and reduction in the amplitude of fluctuations will reduce pumping lifts for domestic and municipal wells in the area influenced by the Project.

Project Benefits

Project benefits will fall into following three primary categories: 1) benefits to groundwater users and prospective banking partners due to better management of groundwater elevations, 2) habitat benefits resulting from higher groundwater elevations, and 3) water quality improvements due to reduced leaching of contaminants to groundwater. These benefits are described in greater detail below.

1) Water supply benefits will result from a general increase in groundwater elevations in the Project area as well as a stabilization of these elevations. Although the Palms will function

as a banking project with groundwater levels increasing during periods when water is recharged and declining when groundwater is pumped to meet local demands or for delivery to banking partners, the Project will be operated so that the amplitude of these fluctuations will be regulated. This will aid in regional compliance with the Sustainable Groundwater Management Act and will enable groundwater pumpers (both Project proponents and local domestic and municipal users) to reduce pumping costs and lessen the need to deepen wells.

2) Local habitat benefits in stream channels and wetlands will result from increased base flow in regional streams generated by the higher groundwater elevations, particularly in the vicinity of the Tule Elk State Natural Reserve.

3) In addition to aiding in management of groundwater elevations, the replacement of irrigated lands with spreading grounds will reduce loadings of nitrates and salts now conveyed to groundwater from deep percolation of irrigation applications. This will be accomplished by eliminating the application of nitrogen and other fertilizers and by reducing the effect of evapotranspiration on concentrating the salinity of applied water. The resulting improvements in groundwater quality will benefit all groundwater users, particularly local users and banking partners supplying potable water. These water quality improvements are also expected to reduce the costs of treating all recovered water.

Project Facilities

Construction activity, including equipment staging, would be confined to the area within the 1,100 acre site acquired by the BVWSD. Construction would begin with earthwork needed to build recharge facilities. This would include construction of low berms with material for these berms being generated on-site by removal of surface soil that overlies shallow, highly permeable river-borne deposits. Recharge would also be encouraged by retaining water in the canals and natural channels which run through the Palms Project area. After completion of recharge facilities, the second stage of construction would include installation of wells, pumps, pipelines and treatment facilities needed for recovery of stored groundwater for use locally and for conveyance to banking partners.

The pipeline would run parallel to the West Side Canal, the Short Main Canal, and the Tupman Turnout Canal. The new pipeline would be installed largely within previously disturbed areas located adjacent to field roads. Palms Project construction would include activities consistent with digging, trenching, and excavation of soil to install the new pipeline. No disturbance in natural lands, designated wetlands, riparian areas, sensitive habitats, or other rare communities is planned for the proposed project.

Construction activity for recharge facilities would be completed within six months, while construction of recovery facilities would occur based on the rate of recovery and level of treatment needed to meet local needs and to fulfill banking agreements.

SURVEY METHODOLOGIES

A literature review was completed and field surveys were conducted to identify sensitive habitats and special-status wildlife and plant species that could potentially be present in the proposed project area. The following sections describe the literature and databases that were reviewed prior to conducting biological surveys and the survey methods that were used.

Literature Review: Prior to conducting biological surveys for the proposed project and during the preparation of this biological assessment, we reviewed RAB Consulting data files and records from the following sources:

- United States Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) (USFWS 2015a);

- United States Fish and Wildlife Service (USFWS) Environmental Conservation Online System (ECOS) (USFWS 2015b);

- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) RareFind 5 and Biological Information and Observation System (BIOS) (CDFW 2015a); and

- California Native Plant Society's (CNPS) online *Inventory of Rare and Endangered Vascular Plants of California, 8th Edition* (CNPS 2015).

From each review, a list of special-status species was generated for those that occur in or may be affected by projects in the East Elk Hills USGS 7.5-minute quadrangle, where the proposed project is located. Several special-status species which have been documented in proximity to (east of) the proposed project site occur in the Tupman quadrangle. Each quadrangle represents an area that measures approximately 70 square miles, so special-status species that have been recorded or may potentially occur in the 140 square mile area are identified in Table 1. This list also includes federally listed species and migratory birds identified in the USFWS IPaC Trust Resource Report (USFWS 2015a) that was obtained for the proposed project area. Special-status species are those taxa that are legally protected under the State or Federal Endangered Species Act (ESAs) or other regulations and considered sufficiently rare by the scientific community to qualify for such listing. Special-status species generally fall into one or more of the following categories:

- Plants or animals listed or proposed for listing as Threatened or Endangered under the Federal ESA (50 Code of Federal Regulations [CFR] 17.12 [listed plants], 1711 [listed animal] and various notices in the Federal Register [FR][proposed species]);

- Plants or animals that are candidates for possible future listing as Threatened or Endangered under the Federal ESA (61 FR 40, February 28, 1996);

- Plants or animals listed or proposed for listing by the State of California as Threatened or Endangered under the California ESA (14 California Code of Regulations [CCR] 670.5);

- Animal Species of Special Concern to the CDFW (Remsen 1978 [birds], Williams 1986 [mammals], Jennings and Hayes 1994 [reptiles and amphibians], Moyle et al. 1989 [fish]);

- Animals Fully Protected in California (California Fish and Game Code, Sections 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]);

- Plants listed as California Rare Plant Rank (CRPR) 1A are presumed extinct in California (CNPS 2015);

- Plants listed as California Rare Plant Rank (CRPR) 1B are considered rare, threatened, or endangered in California or elsewhere (CNPS 2015);

- Plants listed as California Rare Plant Rank (CRPR) 2 are considered rare or endangered in California, but more common elsewhere (CNPS 2015);

- Plants identified as California Rare Plant Rank 3 (former CNPS List 3) are those for which more information is needed; a review list (CNPS 2015); and

- Plants listed as California Rare Plant Rank (CRPR) 4 are of limited distribution, on a watch list (CNPS 2015). These taxa may be included as special-status species on the basis of local significance or recent biological information.

Sources consulted for information on distribution of special-status wildlife species, as well as local and regional sensitive fauna include Remsen 1978 [birds], Williams 1986 [mammals], Jennings and Hayes 1994 [reptiles and amphibians], and Moyle *et al*. 1989 [fish]. Background information for several listed wildlife and plant species (including biology, reasons for decline, limiting factors, etc.) that have potential to occur within and/or adjacent to the proposed project site and buffer area is found in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Williams *et al*. 1998). Species descriptions and information of the identification, life histories, and habitat requirements of listed and other special-status species were obtained through the USFWS Environmental Conservation Online System (ECOS), the CDFW California Wildlife and Habitat Relationships System (CWHR), NatureServe Explorer (NatureServe 2015), and the Cornell Lab of Ornithology website (All About Birds 2015). USFWS 5-Year Species Reviews were consulted for federally listed species including but not limited to San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, and Kern mallow. In addition, the draft Biological Assessment (BA) prepared for the former HECA project was reviewed, as the Palms Project area includes a portion of that former HECA project site (URS 2013). Relevant technical information from these databases, reports, literature sources and websites and are incorporated and referenced as appropriate.

Each species identified in the database queries and records searches were evaluated in terms of their likelihood to occur within the project site and buffer area. This evaluation considered the known distribution and habitat requirements of the species and the following findings were prepared:

- Known to Occur – species was observed within the project site or buffer area during biological surveys, or the species has previously been documented within or immediately adjacent to the project site.

- Potentially Present – species has not been documented within or immediately adjacent to the project site, but should be expected in areas of suitable habitat near the project site during the appropriate season and time of day.

- Low Potential – species has not been documented within or immediately adjacent to the project sites, nor is it likely to occur in the project site, but its presence cannot be completely discounted as a result of mobility, or due to incomplete information on the taxon's distribution or habitat requirements.

- No Potential – species does not occur within or immediately adjacent to the project site due to the lack of required habitat features for the species, or the known range of the species is well defined and does not include the project vicinity.

SENSITIVE WILDLIFE SPECIES SURVEYS

We surveyed the proposed Palms Project site and a 500-foot surrounding buffer area on August 14, 2015 and August 17-25, 2015 for special-status wildlife and plant species and sensitive habitats. We used standard agency approved guidelines to survey for special-status species. These methods are identified in the following references: CNPS (CNPS 2001 and 2015), CDFW (CDFG 1990, 1995, 2000, 2003, 2004, 2009, 2012, and CDFW 2015), Orloff (1987), Nelson (1987), The California Burrowing Owl Consortium (1993), Tollestrup (1976), and USFWS (1989, 1995, 1996, 1999, 2000, and 2011). Biological surveys were conducted to determine the following:

- Suitability of habitat(s) to support special-status wildlife species
- Presence of known and potential San Joaquin kit fox dens
- Presence of individual blunt-nosed leopard lizards (BNLL) and their habitat
- Sightings, burrows, and sign of sensitive small mammal species
- Sightings, burrows, and sign of Western burrowing owls and other sensitive bird species
- Presence of suitable nesting, roosting, and/or foraging habitat for migratory and other sensitive birds
- Vegetation association, habitat types, and special-status plant species
- Dominant plant canopy and ground cover species
- Habitat condition and quality
- On-site, adjacent, and surrounding land uses.

San Joaquin Kit Fox - We conducted diurnal surveys for San Joaquin kit fox and sign (dens, scat, tracks, prey remains, etc.) of species presence or use. Surveys were completed along transects spaced 30 to 50 feet apart following CDFW Approved Survey Methodologies for Sensitive Species (CDFG 1990) and by USFWS guidelines (USFWS 1989, 1995, 1999, and 2011). If San Joaquin kit

fox sign and/or dens were identified, they were recorded using GPS and mapped on USGS topographic maps and/or aerial imagery. Underground dens would be classified according to the following USFWS kit fox den definitions (USFWS 2011):

> ***Known Den*:** Any existing natural den or manmade structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records, past or current radiotelemetry or spotlighting data, kit fox sign such as tracks, scat, and/or prey remains, or other reasonable proof that a given den is being or has been used by a kit fox. The Service discourages use of the terms "active" and "inactive" when referring to any San Joaquin kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens so often, with the result that the status of a given den may change frequently and abruptly.
>
> ***Potential Den*:** Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox. Potential dens include the following: (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for San Joaquin kit fox use.
>
> ***Natal or Pupping Den***: Any den used by San Joaquin kit foxes to whelp and/or rear their pups. Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt and/or vegetation at one or more entrances. A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two, therefore, for purposed of this definition either term applies.
>
> ***Atypical Den:*** Any manmade structure which has been or is being occupied by a San Joaquin kit fox den. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

San Joaquin Antelope Squirrel - We surveyed for San Joaquin antelope squirrels, their scats and potential burrows while conducting surveys for other species with potential to occur in the project site, including San Joaquin kit fox and giant kangaroo rat (CDFG 1990). Surveys were conducted using daytime line transects at 30 to 50 foot intervals covering the area in a systematic manner. While walking transects, biologists scanned the area (including using binoculars) looking for the species and listening for the species vocalizations. Although burrow entrance sizes overlap with other rodents, SJAS burrows can usually be distinguished by the presence of irregularly-sized scats (CDFW Date Unknown).

Blunt-Nosed Leopard Lizard - We surveyed for potential presence of blunt-nosed leopard lizard (BNLL) and to evaluate suitability of habitat to support this species by walking parallel transects

spaced at 30 to 50 foot intervals in areas of potential habitat (Tollestrup 1976, as modified by CDFG 1990 and 2004). Emphasis was placed on the identification of small mammal burrows that may serve as potential for this species. Since the proposed project would not modify or result in impacts to habitat, protocol-level surveys for the species were not completed.

Other Sensitive Wildlife - During biological surveys, RAB Consulting searched for presence of habitat features (riparian areas, vernal pools, cliffs, roosting sites, nesting sites, nests, dens, burrows, etc.) that may be suitable for potential use by special-status wildlife species. We surveyed for evidence of Tipton kangaroo rat, giant kangaroo rat, Western burrowing owl, Swainson's hawk, and other targeted species of concern (see Table 1), which consisted of recording sightings of the species and/or their sign (i.e., tracks, scat, dens, nests, etc.).

SPECIAL-STATUS PLANT SURVEYS

Literature Review: Prior to conducting field surveys, we reviewed information from various sources to determine special-status plant species known to occur, or have potential to occur in the vicinity to the proposed project. Special-status plant species include species listed as Endangered, Threatened, or Rare by the USFWS, CDFW, and species ranked by the CNPS using the California Rare Plant Ranking (CRPR) system (CNPS 2015). Sources consulted for information on the distribution of special-status plant species include occurrence records and maps from the CNDDB (CDFW 2015a), the USFWS IPaC Species List (USFWS 2015a), and CNPS records (CNPS 2015) for the East Elk Hills and Tupman USGS 7.5 minute quadrangles. Sources consulted for information on the historic distribution of special-status plant species include regional and local floras (Abrams 1923, 1944, 1951, Abrams and Ferris 1960, Hickman 1996, Twisselmann 1956, 1967, Moe 1995, Munz and Keck 1968). In addition, the USFWS 5 -Year Species Review and Summary reports and Recovery Plans were consulted for locations of endemic San Joaquin Valley listed plant species that have potential to occur within or in proximity to the proposed project site (USFWS 2013a and Williams *et. al*. 1998).

Plant Species Surveys and Identification – Surveys for the proposed Palms Project were conducted on August 14, 2015 and August 17-25, 2014. These surveys were floristic in nature and were completed concurrent with surveys to detect sensitive wildlife species. The project site was walked systematically to ensure thorough coverage of areas subject to disturbance. Surveys were conducted consistent with the USFWS *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants* (USFWS 2000), CDFW *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009), and CNPS *Botanical Survey Guidelines* (CNPS 2001). These guidelines include recommendations for determining when a botanical survey is needed, and how surveys may be conducted when a proposed activity may affect special-status native plants and natural communities. Surveys were floristic in nature, meaning that plants observed were identified to the species or subspecies level, where appropriate. However, since the proposed project is located in agricultural lands, and project activities would not alter or otherwise modify natural vegetation, formal botanical surveys were not completed for the Palms Project.

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
Amphibians					
California red-legged frog	*Rana draytonii*	FT	SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11 to 20 weeks of permanent water for larval development. Must have access to aestivation habitat, consisting of small mammal burrows and moist leaf litter.	No Potential. No aquatic breeding habitat is present in the proposed project site or buffer area. No suitable upland aestivation habitat is present in the proposed project site. No individuals were observed during biological surveys. California red-legged frogs have not been documented within the boundaries of the proposed project site or within a 1-mile radius (CDFW 2015a). The proposed project site is not located in an area that has been designated as critical habitat for the species (USFWS 2015b).
Birds					
Tricolored blackbird	*Agelaius tricolor*	BCC	SSC	Freshwater emergent wetlands. This highly colonial species requires open water, protected nesting substrate, and a foraging area with insect prey within a few kilometers of the colony. The species is largely endemic to California and is most numerous in the Central Valley and surrounding foothills. A year-round resident commonly associated with dairy farms, which contain elements and resources they require.	Low Potential. No suitable aquatic or nesting habitat was observed in the proposed project site or buffer area. However, potential foraging habitat is present in the project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of the proposed project site (see Figure 3a). Tricolored blackbird has been recorded 2.3 miles southeast of the project site and 7.0 miles to the east (CDFW 2015a).
Bell's sparrow	*Amphispiza belli*	BCC	-	A year-round resident, found in desert, shrubland, and chaparral. Prefers semi-open habitats and shrubs for nesting, often in association with sagebrush or saltbush. Feeds on insects, spiders, and seeds.	Low Potential. No suitable (nesting) habitat is present in the proposed project site. Potential habitat was observed in the buffer area, south and east of the proposed project site. No individuals were observed during biological surveys. This species has not been documented in the CNDDB within the boundaries of or in

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					proximity to the proposed project site (CDFW 2015a).
Short-eared owl (Wintering)	*Asio flammeus*	BCC	SSC	Large expanses of open grassland. Nests on the ground and occasionally in hayfields and stubble fields. The species preys on small mammals and requires an abundance of prey, as they are active both day and night.	Potentially Present. Overwinter, potential habitat is present in the project site However, prey would be considered limited in the project site based on a lack of small mammal burrows in the project site that would support a suitable prey base. Potential habitat is also present in the buffer area south and east of the proposed project boundary. No individuals were observed during biological surveys. The species has not been documented in the CNDDB within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Western burrowing owl	*Athene cunicularia*	BCC	SSC	A year-round resident of open grasslands, prairies, farmlands, and deserts. Found in level to gently sloping areas with sparse vegetation or bare ground. The species also uses developed areas including agricultural fields, golf courses, vacant lots, airports, etc. Nests underground, commonly in ground squirrel burrows.	Potentially Present. Potential habitat is present in the buffer area, south and east of the project site. Furthermore, agricultural lands in the project site may be used as foraging habitat. No individual burrowing owls, occupied burrows, or sign of their presence (i.e., whitewash, castings, feathers, etc.) were identified during biological surveys. The species has not been recorded within the boundaries of the proposed project site. Numerous sightings of burrowing owls and several active burrows have been documented south of the project site (see Figure 3a). The species has been recorded 0.3 miles to the south, along the California Aqueduct, and in various locations east of Tupman Road, on the Tule Elk State Natural Reserve (CDFW 2015a).

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
Swainson's hawk	*Buteo swainsoni*	BCC	CT	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	Potentially Present. Potential foraging habitat is present in the project site and buffer area, in areas of agriculture planted to suitable crops (alfalfa, etc.). No suitable nesting habitat is present within the boundaries of the proposed project site. Potential roosting and nesting habitat was observed outside the project boundaries, in areas that support riparian vegetation, along the Outlet Canal to the south and the Tule Elk State Natural Reserve to the east. No individuals were observed during biological surveys. Swainson's hawks have been documented 0.7 miles and 5.6 miles to the east, on the Tule Elk State Natural Reserve, and Kern Water Bank Authority, respectively (CDFW 2015a).
Costa's hummingbird (Breeding)	*Calypte costae*	BCC	-	Desert riparian, desert and arid-scrub foothills and chaparral. Breeds in the Mojave and Sonoran Deserts of California and Arizona. During the hottest days, these birds move to chaparral, scrub, or woodland habitats.	Low Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, south and east of the proposed project site, and where riparian habitat is present along the Outlet Canal. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Cactus wren	*Campylorhynchus brunneicapillus*	BCC	-	Occurs in deserts of the southwest. Limited to regions where thorny bushes or trees offer nesting sites; typically sunny hillsides of mesas next to mountains, and along gravelly watercourses.	No Potential. The project site is outside the known range and current year-round distribution of the species. Furthermore, no suitable habitat is present in the proposed project site or buffer area.

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
Mountain plover (Wintering)	*Charadrius montanus*	BCC	SSC	Short grassland, freshly plowed fields or newly sprouting grain fields. Short vegetation or bare ground, in flat topography; prefers grazed areas with burrowing rodents.	Potentially Present. Potential foraging habitat (overwinter) is present in the project site and buffer area. No individuals were observed during biological surveys. This species has been recorded 0.6 miles east of the proposed project site (see Figure 3a). Mountain plover has also been documented 0.9 miles east of Tupman Road, on the Tule Elk State Natural Reserve (CDFW 2015a).
Peregrine falcon	*Falco peregrinus*	BCC	FP	A year-round resident that is more common along coasts. Peregrine falcons perch on tall features, and require cliffs, water towers, buildings, or other tall structures for nesting. Feeds on medium sized birds such as pigeons, shorebirds, and ducks.	Low Potential. Potential roosting and nesting habitat (palm trees, agricultural tanks, etc.) are present in the proposed project site; however, no suitable foraging habitat was observed. Forage in the project site would be considered limited based on a lack of suitable prey. No individuals or evidence of the species were observed during biological surveys. Peregrine falcon has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Bald eagle (Wintering)	*Haliaeetus leucocephalus*	BCC	CE, FP	Lakes, rivers, reservoirs, marshes, and coasts. Nest in forested areas near large bodies of water. Prefers tall, mature coniferous or deciduous trees for perching. Bald eagles typically steal fish from osprey or mammals, rather than catching it for themselves. Roosts communally in winter.	No Potential. No suitable habitat is present in the proposed project site or buffer area. No potential roosts were observed in the project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Least bittern	*Ixobrychus exilis*	BCC	SSC	A year-round resident in freshwater marshes and along the borders of ponds and reservoirs that provide	No Potential. No suitable habitat is present in the proposed project site or buffer area. No individuals were observed

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
				ample cover. Nests are usually placed in tules, cattails, and bulrushes, over water.	during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Loggerhead shrike	*Lanius ludovicianus*	BCC	SSC	A year-round resident that prefers open habitats with scattered shrubs and trees. Hunts from fence posts and utility poles, preying on insects, birds, lizards, and small mammals. The species is known for impaling its prey on barbed wire, thorns, or other sharp objects for later consumption.	Known to Occur. Potential foraging habitat is present in the proposed project site and buffer area. Potential nesting habitat occurs in the buffer area south of the proposed project site; however, no suitable nesting habitat is present within the boundaries of the proposed project site. One (1) individual loggerhead shrike was observed during biological surveys. The species has not been documented in the CNDDB in the proposed project site (CDFW 2015a).
Marbled godwit (Wintering)	*Limosa fedoa*	BCC	-	A large shorebird that occurs in wetland, riparian, tidal flat, and sand dune habitats, and in open shallow water along shorelines Feeds on crustaceans, mollusks, worms, grasshoppers and other insects, seeds and tubers.	No Potential. No suitable habitat is present in the proposed project site or buffer area. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Lewis's woodpecker (Wintering)	*Melanerpes lewis*	BCC	-	Open woodland habitats. Needs trees for cavity nesting. This species of woodpecker feeds in flight or gleans insects from the tree surface, rather than excavating wood for boring insects.	No Potential. No suitable habitat is present in the proposed project site or buffer area. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
Long-billed curlew (Wintering)	*Numenius americanus*	BCC	-	Sparse, short-grassland habitats and agricultural fields. In winter, migrates to the coast and interior Mexico, in wetlands, tidal estuaries, mudflats, and flooded fields. Migrates north from wintering grounds during March and April. These large shorebirds feed mainly on insects (grasshoppers, beetles), earthworms, marine crustaceans (shrimp), and marine invertebrates.	Potentially Present. Potential foraging habitat (overwinter) is present in the project site and buffer area. No long-billed curlews were observed during biological surveys; however, surveys were completed outside of their winter migration period. The species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Fox sparrow (Wintering)	*Passerella iliaca*	BCC	-	Breed in remote areas of coniferous forest, mountain scrub, and dense thickets. These sparrows may be seen over winter in tall chaparral, scrub and forest habitats, generally foraging on the ground and in leaf litter for insect prey.	Low Potential. No suitable habitat is present in the proposed project site. Potential foraging habitat is present in buffer area, south and east of the project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Nuttall's woodpecker	*Piccoides nuttallii*	BCC	-	A year-round resident confined to the oak woodlands of and riparian areas in California; rarely found in conifers. Requires trees for cavity nesting. This species of woodpecker consumes insects and arthropods, and occasionally fruit, but does not feed on acorns.	No Potential. No suitable habitat is present in the proposed project site or buffer area. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Brewer's sparrow	*Spizella breweri*	BCC	-	Arid scrub and desert grasslands. Found year-round in association with big sagebrush (*Artemesia tridentata*) and other large sagebrush species (>5 feet tall), including saltbush and creosote.	Low Potential. No suitable habitat is present in the proposed project site. However, potential foraging habitat is present in the buffer area south and east of the proposed project site. No individuals were observed during biological surveys. This species has not been documented

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
California spotted owl	*Strix occidentalis occidentalis*	BCC	SSC	One of three subspecies of spotted owl, found only in California. Found year-round in old-growth coniferous and other mature forests, and rocky canyons. Feeds on small mammals, mainly woodrats, flying squirrels, and bats.	No Potential. The proposed project site is located outside the known range of the species. No suitable habitat is present in the proposed project site or buffer area. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Le Conte's thrasher	*Toxostoma lecontei*	-/BCC	SSC	Alkali desert scrub and open desert wash, saltbush (*Atriplex* spp.) scrub, and succulent cholla (*Opuntia* spp.) scrub habitats. Nests in dense, spiny shrubs or densely branched cactus, usually 2-8 feet above the ground. Accumulated leaf litter is important as cover for the species' prey.	Known to Occur (Buffer Area). Le Conte's thrasher has been recorded in the buffer area, southeast of the proposed project (see Figure 3a) approximately 0.3 miles to the southeast (CDFW 2015a). No suitable habitat was observed in the project site. However, potential (nesting) habitat for this species is present in the buffer area south and east of the proposed project site, in areas that support a shrub component. No individuals were identified in the project site or buffer area during biological surveys.
Least Bell's vireo	*Vireo bellii pusillus*	FE	CE	Inhabits low dense riparian vegetation along water or dry parts of intermittent streams. Typically associated with willow, cottonwood, baccharis, wild blackberry or mesquite in desert locations.	Low Potential. The proposed project site is located outside the known range and current distribution of the species (USFWS 2006). However, potential habitat is present in the buffer area to the southeast, mainly along the Outlet Canal. No suitable habitat is present in the proposed project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of the proposed project site (see Figure 3a). Least Bell's vireo was historically recorded 5.3 miles

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					south of the project site (CDFW 2015a).
Invertebrates					
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	-	Found in short-lived seasonal cool-water vernal pools with low to moderate dissolved solids.	No Potential. No suitable habitat (vernal pools) was observed within the proposed project site. Vernal pool fairy shrimp has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Fishes					
Delta smelt	*Hypomesus transpacificus*	FT	CE	Restricted to the San Francisco Bay and Sacramento-San Joaquin Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties in California. These slender-bodied fish feed on small free-floating crustaceans and occasionally insect larvae. The species requires shallow open waters with freshwater flow and specific conditions (i.e., salinity and temperature) for spawning, rearing, etc.	No Potential. The proposed project site is located outside the known distribution and current range of the species. Furthermore, no suitable habitat is present in the proposed project site or buffer area. Delta smelt has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Mammals					
San Joaquin (Nelson's) antelope squirrel	*Ammospermophilus nelsoni*	-	CT	Found in the western San Joaquin Valley from 150 to 3,600 feet in elevation. Found on dry sparsely vegetated loam soils. This species digs burrows or uses other rodent (kangaroo rat or California ground squirrel) burrows. Requires widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes.	Low Potential. No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, south along the California Aqueduct, and the Elk Hills Oilfield, southeast along the Outlet Canal, and east at the Tule Elk State Natural

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					Reserve. No San Joaquin antelope squirrels were observed during biological surveys. The species has not been documented in the project site (see Figure 3a). The species has been recorded approximately 0.2 miles east on the Tule Elk State Natural Reserve and 0.3 miles to the south (CDFW 2015a).
Giant kangaroo rat	*Dipodomys ingens*	FE	CE	Prefer annual grassland on gentle slopes of generally less than 10°, with friable, sandy-loam soils. However, most remaining populations are found on poorer, marginal habitats which include shrub communities on a variety of soil types and on slopes up to about 22°. Giant kangaroo rats develop burrow systems with one to five or more separate openings. Utilize two types of burrow: 1) a vertical shaft with a circular opening and no dirt apron, and 2) a larger, more horizontally-opening shaft, usually wider than high with a well-worn path leading from the mouth.	Low Potential. No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No sign of giant kangaroo rat presence (i.e., mowing, hay stacking, seed caching, vertical burrow entrances, etc.) was identified during biological surveys. This species has not been documented within the boundaries the proposed project site (see Figure 3a). The nearest occurrence of giant kangaroo rat to the project site is recorded 0.8 miles to the southwest, on the south side of the California Aqueduct (CDFW 2015a).
Short-nosed kangaroo rat	*Dipodomys nitratoides brevinasus*	-	SSC	Permanent resident of alkali desert scrub habitat and herbaceous habitats with scattered shrubs. Currently found mainly in the southwestern San Joaquin Valley at	Low Potential. No suitable habitat for the species was observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
				elevations up to 1800 ft. Forages on open round and under shrubs, eating mainly seed for annual forbs and grasses. Requires sandy loam soils for excavation of burrows.	uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. This species has not been documented within the boundaries the proposed project site (see Figure 3a). Short-nosed kangaroo rats have been recorded 4.1 miles south and southeast of the proposed project site (CDFW 2015a).
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE	CE	Saltbush scrub and sink scrub communities in the Tulare Lake Basin of the Southern San Joaquin Valley. Requires soft, friable soils which escape seasonal flooding. This species digs burrows in elevated soil mounds often at the bases of shrubs.	Known to Occur (Historically in the Buffer Area). The species has been (historically) documented in the buffer area of the project site (see Figure 3a). Tipton kangaroo rats have been recorded 0.1 mile east of the project site, on the Tule Elk State Natural Reserve, and in locations 5 miles to the southeast and 7 miles to the northeast (CDFW 2015a). No suitable habitat or small mammal burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Coles Levee Ecosystem Preserve.

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
Tulare grasshopper mouse	*Onychomys torridus tularensis*	-	SSC	Found in the hot, arid portions of the southern San Joaquin Valley and adjacent interior valleys of the Coast Ranges (e.g., Cuyama Valley and Carrizo Plain). Occurs in a variety of habitats including blue oak woodland, upper Sonoran subshrub scrub, alkali sink and mesquite associations (on the valley floor), and grasslands (at the base of the foothills).	Low Potential. No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. As illustrated in Figure 3a, the species has not been recorded in the project site (CDFW 2015a).
San Joaquin pocket mouse	*Perognathus inornatus inornatus*	-	SSC	Found in grasslands and blue oak savannahs. Requires friable soils for digging.	Low Potential. No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. The species has not been recorded in the project site (see Figure 3a). San Joaquin pocket mouse has been documented 0.2 miles to the east, on the Tule Elk State Natural Reserve (CDFW 2015a).
Buena Vista Lake ornate shrew	*Sorex ornatus relictus*	FE	SSC	Marshlands and riparian areas in the Tulare Basin. Uses stumps, logs, and litter for cover. Prefers moist soil.	Low Potential. Riparian habitat that may serve as potential for this species is present to the southeast, outside the proposed project site, along the Outlet

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					Canal. No suitable habitat for Buena Vista Lake ornate shrew was observed in the proposed project site. The species has not been documented within the boundaries of the proposed project site (see Figure 3a). Buena Vista Lake shrew has been recorded approximately 2.7 miles southeast of the proposed project site (CDFW 2015a).
American badger	*Taxidea taxus*	-	SSC	The species is found in a variety of open herbaceous and shrub vegetation types/habitats with dry, friable soils. It is widely distributed in California, with the exception of the humid coastal belt, occurring from sea-level to alpine meadows and coniferous forests.	Low Potential. No suitable habitat for the species was observed in the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows that were of appropriate size for use by badger or sign (i.e., scat, tracks, digging, prey remains, etc.) of the species were observed during biological surveys. Badgers have been documented approximately 4.6 miles southeast and 5.8 miles east of the project site (CDFW 2015a).
San Joaquin kit fox	*Vulpes macrotis mutica*	FE	CT	Inhabit annual grasslands or grassy open stages with scattered shrubby vegetation. Require loose-textured sandy soils for burrowing, and a suitable prey base.	Known to Occur. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. While no

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					suitable habitat for the species was observed in the proposed project site, agricultural lands may serve as foraging habitat for the species. No individual San Joaquin kit fox were observed however tracks were identified during biological surveys in an existing roadway. No active dens or other sign (i.e., scat, digging, prey remains, etc.) of kit fox activity was detected. Numerous sightings of individual kit fox (including road kills), and active dens have been documented in the CNDDB in proximity to the project site (see Figure 3a). San Joaquin kit fox have been recorded 0.3 miles and 2.3 miles to the east, on the Tule Elk State Natural Reserve and the Kern Water Bank Authority (CDFW 2015a). The species has also been documented in various locations south of the California Aqueduct, approximately 0.5 miles and 0.8 miles south of the proposed project site (CDFW 2015a).
Reptiles					
Western pond turtle	*Emys marmorata*	-	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, typically with aquatic vegetation. Require basking sites and suitable upland habitat (sandy banks or grassy open fields) near water for egg-laying.	No Potential. The proposed project site does not support suitable habitat for the species, as existing canals and ditches in the project site are regularly maintained and lack aquatic vegetation year round. Where canals and ditches were observed to have water, the adjacent upland habitats were under active agricultural production (i.e., alfalfa, cotton). No individuals were observed or evidence of the species was identified during biological surveys.

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					Western pond turtles have not been recorded within the boundaries of the proposed project site (see Figure 3a). The species has been documented 0.4 miles to the south, along the California Aqueduct, and 0.8 east of the proposed project site, at the Tule Elk State Natural Reserve (CDFW 2015a).
Blunt-nosed leopard lizard	*Gambelia sila*	FE	CE, FP	Resident of sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seeks cover in mammal burrows, under shrubs or structures such as fence posts. May excavate their own burrows, but typically utilize small mammal or other lizard burrows.	Low Potential. No suitable habitat for blunt-nosed leopard lizard is present in the proposed project site since lands within the project boundaries are under agricultural use. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. No individual blunt-nosed leopard lizards were observed during biological surveys and the species has not been recorded in the project site. Blunt-nosed leopard lizard has been documented approximately 0.4 miles to the east, on the Tule Elk State Natural Reserve (see Figure 3a). Blunt-nosed leopard lizards have been recorded in locations east of Interstate 5, approximately 2.7 miles and 4.5 miles northeast of the project site (CDFW 2015a).

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	-	SSC	Open, dry habitats with little or no tree cover. Found in valley grassland and saltbush scrub in the San Joaquin Valley. The species needs mammal burrows for refuge and egg laying sites.	Low Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. No individual San Joaquin whipsnakes were observed during biological surveys. The species has been documented 9.9 miles east of the proposed project site (CDFW 2015a).
Giant garter snake	*Thamnophis gigas*	FT	CT	A highly aquatic species that prefers fresh water marsh and low gradient streams. Has adapted to drainage ditches and irrigation canals.	Known to Occur (Historically). The proposed project site is located outside the current known range and distribution of the species (CDFW 2015b). However, giant garter snake was historically documented within the boundaries of the project site (see Figure 3a). The species was identified in that location prior to, but not during, a 1986-87 study of the species' distribution (CDFW 2015a). The species was also historically captured in a location approximately 4.6 miles to the southeast (CDFW 2015a).
Plants					
Horn's milk-vetch	*Astragalus hornii var. hornii*	-	Rank 1B.1	Playas, meadows and seeps. Found along lake margins, and in alkaline soils. Elevation range: 60 to 850 meters. Blooming period: May	No Potential. No suitable habitat is present in the proposed project site or buffer area. No individuals or evidence of the species was observed during

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
				through October.	biological surveys. Horn's milk-vetch has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 4.6 miles to the southeast and 6.3 miles east of the project site (CDFW 2015a).
Heartscale	*Atriplex cordulata var. cordulata*	-	Rank 1B.2	Chenopod scrub, valley and foothill grassland, meadows, and seeps. Found on alkaline flats and scalds in the Central Valley, and on sandy soils. Elevation range 0 to 560 meters. Blooming period: April through October.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. Heartscale has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 4.5 miles to the south (CDFW 2015a).
Crownscale	*Atriplex coronata var. coronata*	-	Rank 4.2	Chenopod scrub, valley and foothill grassland, and vernal pools. Found in alkaline and clay soils. Elevation range 1 to 590 meters. Blooming period: March through October.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, crownscale has not been documented within the boundaries of the proposed project site (CDFW 2015a).
Lost Hills crownscale	*Atriplex coronata var. vallicola*	-	Rank 1B.2	Chenopod scrub, valley and foothill grassland, and vernal pools. Found in powdery, alkaline soils that are vernally moist with *Frankenia*, *Atriplex* spp., and *Distichlis*. Elevation range: 0 to 605 meters.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
				Blooming period: April through August.	biological surveys. Lost Hills crownscale has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 2.0 miles and 3.5 miles southeast of the proposed project site (CDFW 2015a).
Mexican mosquito fern	*Azolla microphylla*	-	Rank 4.2	Marshes, swamps, ponds or slow water. Elevation range: 30 to 100 meters. Blooming period: August.	No Potential. No suitable habitat for this species is present in the proposed project site or buffer area. As illustrated in Figure 3b, Mexican mosquito fern has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Slough thistle	*Cirsium crassicaule*	-	Rank 1B.1	Chenopod scrub, marshes and swamps (sloughs), and riparian scrub. Elevation range: 3 to 100 meters. Blooming period: May through August.	Known to Occur (Buffer Area). The species has been recorded in the buffer area of the proposed project (see Figure 3b). Slough thistle has also been documented along the east bank of the Kern River, approximately 4.6 miles southeast of the project site (CDFW 2015a). Potential habitat is present in the buffer area southeast of the proposed project site, mainly along the Outlet Canal. However, no suitable habitat for this species is present within the boundaries of the proposed project site. No individuals or evidence of the species were observed during biological surveys.
Recurved larkspur	*Delphinium recurvatum*	-	Rank 1B.2	Chenopod scrub, Cismontane woodland, Valley and foothill grassland. Found on alkaline soils. Elevation range: 3 to 790 meters. Blooming period: March through June.	No Potential. No suitable habitat for this species is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
					surveys. Recurved larkspur has not been documented within the boundaries of the proposed project site (see Figure 3b). However, the species has been recorded approximately 0.6 miles and 1.3 miles southwest of the proposed project site (CDFW 2015a).
Kern mallow	*Eremalche kernensis*	FE	Rank 1B.1	Chenopod scrub, valley and foothill grassland. Elevation range: 70 to 1,290 meters. Blooming period: March through May.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. Kern mallow has not been recorded within the boundaries of the proposed project site (see Figure 3b). The species has been documented in locations approximately 1.9 miles to the west and 4.8 miles southeast of the biological survey area (CDFW 2015a).
Hoover's eriastrum	*Eriastrum hooveri*	Delisted	Rank 4.2	Chenopod scrub, pinyon and juniper woodlands, and valley and foothill grasslands. Elevation range: 50 to 915 meters. Blooming period: March through July.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. The species has not been recorded within the boundaries of the proposed project site (see Figure 3b). The species has been documented in numerous locations south and southeast of the biological survey area (CDFW 2015a).
Cottony buckwheat	*Eriogonum gossypinum*	-	Rank 4.2	Chenopod scrub, valley and foothill grassland. Elevation range: 100 to 550 meters. Blooming period:	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
				March through September.	area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, this species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).
Tejon poppy	*Eschscholzia lemmonii ssp. kernensis*	-	Rank 1B.1	Chenopod scrub, valley and foothill grassland. Elevation range: 160 to 1,000 meters. Blooming period: March through May.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, Tejon poppy has not been documented within the boundaries of the proposed project site. The species has been recorded approximately 2.2 miles southwest and 2.9 miles southeast south of the proposed project site (CDFW 2015a).
Oil neststraw	*Stylocline citroleum*	-	Rank 1B.1	Chenopod scrub, valley and foothill grassland, and coastal scrub. Elevation range: 50 to 400 meters. Blooming period: March through April.	No Potential. No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, oil neststraw has not been documented within the boundaries of the proposed project site. The species has been recorded at several locations south of the proposed project site, within 1 to 2 miles (CDFW 2015a).
San Joaquin	*Trichostema ovatum*	-	Rank 4.2	Chenopod scrub, valley and foothill	No Potential. No suitable habitat is

Table 1
Special-Status Species Potentially Occurring in the Proposed Project Site

Common Name	Scientific Name	Federal Status	State Status	Habitat/Requirements	Potential to Occur in Project Site
bluecurls				grassland. Elevation range: 65 to 320 meters. Blooming period: July through October.	present in the proposed project site. Potential habitat is present in the buffer area, in undisturbed/uncultivated areas. However, no individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, San Joaquin bluecurls have not been documented within the boundaries of the proposed project site (CDFW 2015a).

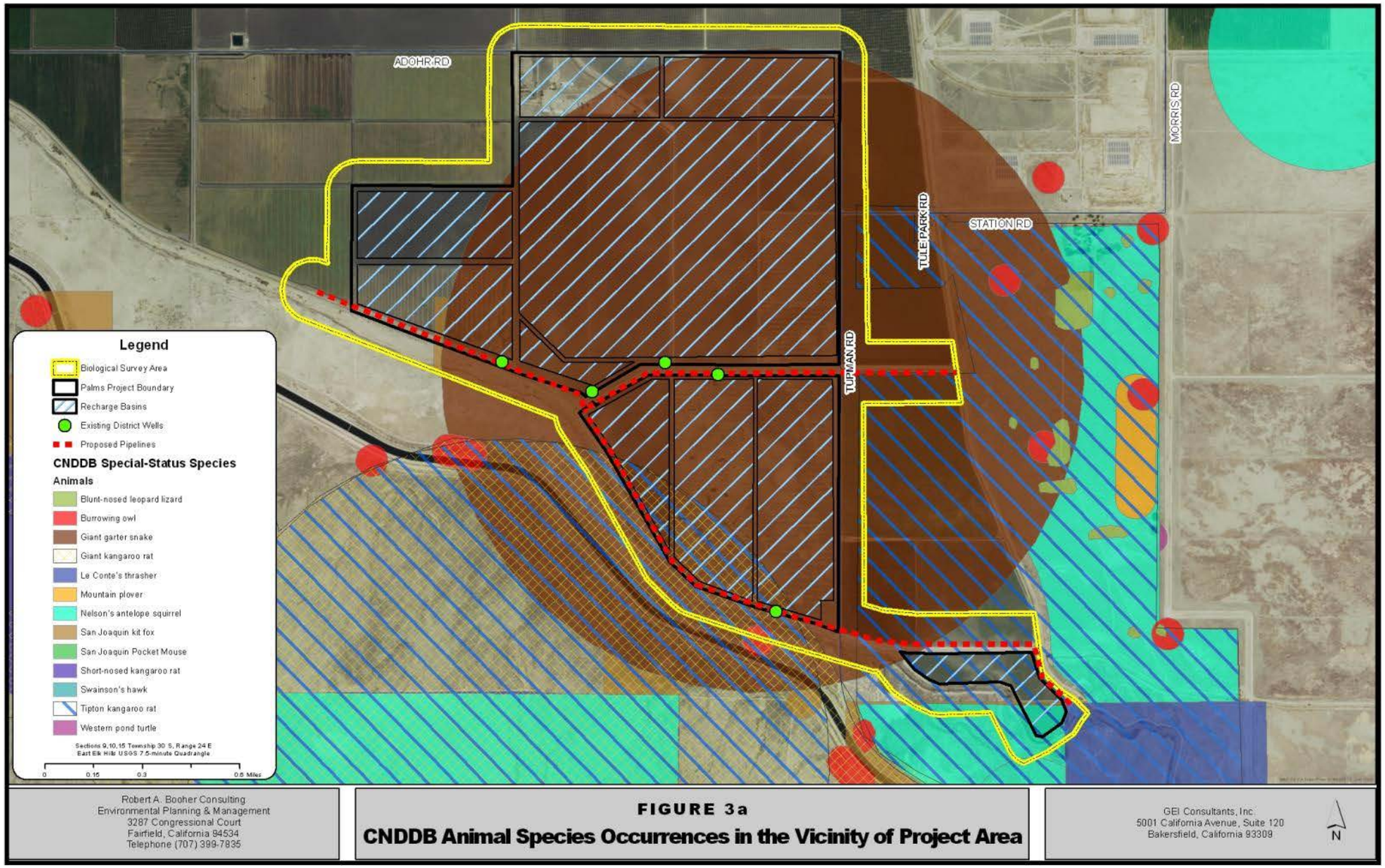
Status Codes:

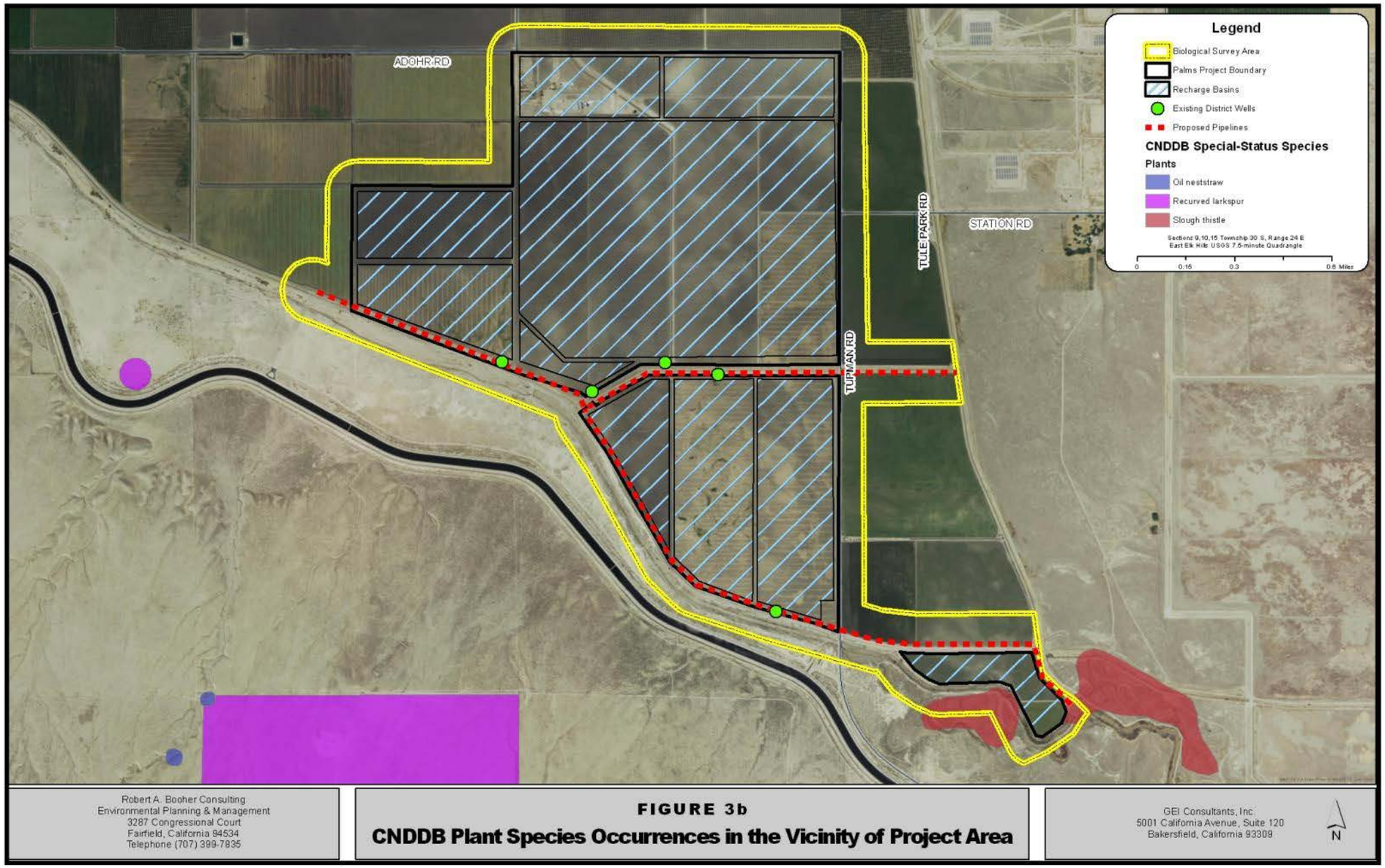
Federal
FE = Federally listed as Endangered
FT = Federally listed as Threatened
FC = Federal Candidate species
BCC = USFWS BCC-Birds of Conservation Concern

State
CE = California listed as Endangered
CT = California listed as Threatened
CR = California listed as Rare
FP = CDFW Fully Protected
SSC = CDFW Species of Special Concern
WL = CDFW Watch List

California Rare Plant Rank (CRPR)
California Rare Plant Rank 1A = Plants presumed extinct in California
California Rare Plant Rank 1B = Plants rare, threatened, or endangered in California and elsewhere
California Rare Plant Rank 2A = Plants presumed extirpated from California but more common elsewhere
California Rare Plant Rank 2B = Plants rare, threatened or endangered in California, but more common elsewhere
California Rare Plant Rank 3 = Plants about which we need more information; a review list
California Rare Plant Rank 4 = Plants of limited distribution; a watch list.
California Rare Plant Rank Rarity Status of .1 = Seriously endangered in California
California Rare Plant Rank Rarity Status of .2 = Fairly endangered in California

Status, distribution, and habitat information from the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) RareFind 5 (CDFW 2015a); California Native Plant Society (CNPS), California Rare Plant Electronic Inventory, 8th Edition (CNPS 2015); and United States Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) (USFWS 2015a).


ADOHR RD
MORRIS RD
TULE PARK RD
STATION RD
TUPMAN RD
Legend
Biological Survey Area
Palms Project Boundary
Recharge Basins
Existing District Wells
Proposed Pipelines
CNDDB Special-Status Species
Animals
Blunt-nosed leopard lizard
Burrowing owl
Giant garter snake
Giant kangaroo rat
Le Conte's thrasher
Mountain plover
Nelson's antelope squirrel
San Joaquin kit fox
San Joaquin Pocket Mouse
Short-nosed kangaroo rat
Swainson's hawk
Tipton kangaroo rat
Western pond turtle
Sections 9,10,15 Township 30 S, Range 24 E
East Elk Hills USGS 7.5-minute Quadrangle
0
0.15
0.3
0.6 Miles
Robert A. Booher Consulting
Environmental Planning & Management
3287 Congressional Court
Fairfield, California 94534
Telephone (707) 399-7835
FIGURE 3a
CNDDB Animal Species Occurrences in the Vicinity of Project Area
GEI Consultants, Inc.
5001 California Avenue, Suite 120
Bakersfield, California 93309
N


ADOHR RD
TULE PARK RD
STATION RD
TUPMAN RD
Legend
Biological Survey Area
Palms Project Boundary
Recharge Basins
Existing District Wells
Proposed Pipelines
CNDDB Special-Status Species
Plants
Oil neststraw
Recurved larkspur
Slough thistle
Sections 9,10,15 Township 30 S, Range 24 E
East Elk Hills USGS 7.5-minute Quadrangle
0
0.15
0.3
0.6 Miles
N
Robert A. Booher Consulting
Environmental Planning & Management
3287 Congressional Court
Fairfield, California 94534
Telephone (707) 399-7835
FIGURE 3b
CNDDB Plant Species Occurrences in the Vicinity of Project Area
GEI Consultants, Inc.
5001 California Avenue, Suite 120
Bakersfield, California 93309

RESULTS AND DISCUSSION

Results of our biological surveys for the proposed BVWSD Palms Project are presented below. The following discussion briefly describes current land use and habitat types that were present at the time of biological surveys and focuses on special-status wildlife and plant species that could potentially occur within the project site based on historic observations and known occurrences that have been documented in proximity to the project. Lists of wildlife and plant species observed during biological surveys for the proposed BVWSD Palms Project are included as Tables 2 and 3. Representative photographs of the proposed project site and buffer areas are included as Appendix A.

HABITAT TYPES

Agricultural Land

Agricultural lands may be defined broadly as lands used primarily for production of food and fiber. Based on aerial imagery, agricultural lands extend 30 miles north and east from the California Aqueduct (see Figure 2). The proposed Palms Project site has been historically used for agriculture (alfalfa, cotton, onions) and includes a portion of the former Hydrogen Energy California (HECA) Project site (URS 2013). The Palms Project is proposed in agricultural lands; lands observed in the project site were comprised of alfalfa, wheat, and fallow fields (previously planted to cotton). Agricultural lands immediately adjacent to the project site were planted to alfalfa, cotton, and pistachios. Surrounding land uses include water distribution (canal operation and maintenance).

Plant species found in this community were composed primarily of weedy, non-native species that are generally considered common, unwanted agricultural pests in the State of California and elsewhere. Wildlife use of this community is limited due to the lack of suitable habitat and active agricultural practices tend to result in frequent or continued disturbance. Wildlife species observed in agricultural areas during biological surveys included common raven (*Corvus corax*), common side-blotched lizard (*Uta stansburiana*), and coyote (*Canis latrans*).

Ruderal/Disturbed

Ruderal/disturbed habitats were observed in previously disturbed areas throughout the proposed project site, including a residential area. While canals and levee roads in the project site were generally free of vegetation, common plants found in disturbed areas were primarily weedy, non-native and native species. Wildlife use of this community is limited due to frequent disturbance and the monocultural and weedy nature of plant species present. Although the diversity of wildlife is limited, species that do occur in disturbed habitats are often abundant and well adapted to the presence of humans. Wildlife species observed in this community during biological surveys included common raven (*Corvus corax*), common side-blotched lizard (*Uta stansburiana*), and coyote (*Canis latrans*).

Table 2. Animal Species Observed during Biological Surveys

Scientific name	Common name
Animals	
Agelaius phoeniceus	Red-winged blackbird
Ardea alba	Great egret
Aspidoscelis tigris munda	Western (California)whiptail
Bubo virginianus	Great horned owl
Buteo jamaicensis	Red-tailed hawk
Buteo swainsoni	Swainson's hawk
Callipepla californica	California quail
Canis latrans	Coyote
Charadrius vociferus	Killdeer
Corvus corax	Common raven
Geococcyx californianus	Greater roadrunner
Lanius ludovicianus	Loggerhead shrike
Lepus californicus	Black-tailed jackrabbit
Sturnella neglecta	Western meadowlark
Sylvilagus audoboni	Desert cottontail
Tyrannus verticalis	Western kingbird
Uta stansburiana	Western side-blotched lizard
Zenaida macroura	Mourning dove

Table 3. Plant Species Observed during Biological Surveys

Scientific name	Common name
Plants	
Acroptilon repens	Russian knapweed
Atriplex lentiformis ssp. lentiformis	Big saltbush
Atriplex polycarpa	Allscale
Bromus madritensis ssp. *rubens*	Red brome
Bromus diandrus	Ripgut brome
Centaurea melitensis	Tocalote
Chenopodium album	Lambsquarters
Convolvulus arvensis	Field bindwind
Erodium cicutarium	Redstem filaree
Datura wrightii	Sacred thorn-apple
Distichlis spicata	Saltgrass
Helianthus annuus	Annual sunflower
Heliotropum curassavicum	Alkali heliotrope
Heterotheca grandiflora	Telegraphplant
Lactuca serriola	Prickly lettuce
Malvella leprosa	Alkali sida
Polypogon monspeliensis	Rabbitfoot polypogon
Portulaca oleracea	Common purslane
Rumex crispus	Curly dock
Salix sp.	Willow
Salsola tragus	Russian thistle
Senecio vulgaris	Common groundsel
Sisymbrium altissimum	Tall tumblemustard
Solanum elaeagnifolium	Silver-leaved nightshade
Sonchus olearceus	Annual sowthistle
Stephanomeria pauciflora	Wire lettuce
Suaeda nigra (=S. moquinii)	Bush seepweed
Tamarix	Salt cedar
Typha latifolia	Common cattail
Xanthium strumarium	Common cocklebur

Natural Lands

No USFWS designated critical habitat is present in the proposed project site (USFWS 2015a). No perennial or intermittent streams, designated wetlands, vernal pools, or other sensitive habitats were observed within the boundaries of the proposed project site. Natural lands are present in the buffer area south and east of the proposed project site. The following vegetation alliances were observed in natural lands in the buffer area surrounding the proposed Palms Project:

- Bromus rubens-Semi-Natural Stands — Bromus rubens Alliance
- Quailbush Scrub — Atriplex lentiformis Alliance
- Allscale Scrub — Atriplex polycarpa Alliance
- Bush Seepweed Scrub — Suaeda nigra Alliance
- Cattail Marsh — Typha Alliance
- Tamarisk Shrubland Stand — Tamarix spp.
- Willow Thicket — Salix Alliance

Three (3) rare communities were identified in the CNDDB in proximity to the proposed project site; these include Valley Sink Scrub, Valley Saltbush Scrub, and Great Valley Mesquite Scrub (CDFW 2015a). Valley Sink Scrub is documented in the CNDDB approximately 3.6 miles northeast of the project site, at the Junction of Interstate 5 and Stockdale Highway. Valley Saltbush Scrub and Great Valley Mesquite habitats are recorded in the CNDDB approximately 3.1miles northeast of the project site (CDFW 2015a). These rare community types (vegetation alliances) persist in areas of natural topography in the western San Joaquin Valley, mainly in areas that have not been developed or converted to agricultural use. As a result, many special-status wildlife and plant species have been documented in and presumably continue to occupy such areas.

Natural lands observed during biological surveys were present in the buffer area south of the project site, in uncultivated areas along the California Aqueduct, and to the east, on the adjacent Tule Elk State Natural Reserve. In addition, riparian vegetation comprised primarily of cottonwood and willow is present southeast of the project site, along the Outlet Canal. As proposed, the Palms Project would not result in surface disturbance to sensitive habitats or other natural lands.

SPECIAL-STATUS BIOLOGICAL RESOURCES

Through a literature review and an electronic search of the CNDDB (CDFW 2015) and CNPS Inventory (CNPS 2015), a total of 50 special-status species were identified that occur in or may be affected by projects in the East Elk Hills and Tupman quadrangles (an area measuring approximately 140 square miles). The USFWS IPaC report obtained for the project site identified an 15 migratory birds which were not included on the CNDDB species lists. Each of these species are discussed below.

AMPHIBIANS

California Red-Legged Frog is the largest native frog in the western United States, ranging from 1.75 to 5.25 inches from snout to vent (Stebbins 2003). The California red-legged frog can appear brown, gray, olive, red, or orange above with a pattern of dark spots or flecks. The hind legs are well developed, with large webbed feet. Adult frogs have white on the underside, with patches of bright red or orange on the hind legs and abdomen.

The California red-legged frog is listed as a federal Threatened species and is a CDFW Species of Special Concern (SSC). The species requires a variety of habitat elements, with aquatic breeding areas within a matrix of riparian and upland dispersal habitats (USFWS 2015b). Breeding occurs from November through March. Deep pools with dense stands of overhanging willows and an intermixed fringe of cattails are considered optimal habitat; however the species has been found in ephemeral creeks and drainages, and in ponds that do not support riparian vegetation. Accessibility to sheltering habitat is essential for red-legged frogs, and can be a limiting factor in its distribution.

Historically distributed along the coast from Marin County and inland from Shasta County, south to northwestern Baja California, the species is currently known to occur in only a few drainages

in the Sierra Nevada foothills, compared to more than 60 historical records (USFWS 2015b). In southern California, the species has essentially disappeared from the Los Angeles area south to the Mexican border; the only known population in Los Angeles County is on the Angeles National Forest, in San Francisquito Canyon. A recovery plan for the California red-legged frog was published on May 28, 2002. Designated critical habitat for this species was revised and a final rule was published on March 17, 2010.

The proposed project site is located outside the current known range and distribution of the species. Furthermore, the proposed project site is not located in an area that has been designated as critical habitat for the species (USFWS 2015b). No aquatic breeding habitat is present in the proposed project site or buffer area. No suitable upland aestivation habitat is present within the boundaries of the proposed project site. No individuals were observed during biological surveys. California red-legged frogs have not been documented in the proposed project site or within a 1-mile radius (CDFW 2015a). Since the proposed project is located outside the known range of the species, California red-legged frogs are not expected to be present or become established in the proposed project site.

BIRDS

Tricolored Blackbird is mostly a resident in California and is common throughout the Central Valley. The species breeds near freshwater, generally in emergent wetlands that support tall, dense cattails and/or tules. This highly colonial species requires open water, protected nesting substrate, and a foraging area with insect prey within a few miles of the colony. Tricolored blackbirds feed in grassland, cropland, and along the edges of ponds.

No suitable aquatic or nesting habitat was observed in the proposed project site or buffer area; however, potential foraging habitat for tricolored blackbird is present in the project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of the proposed project site (see Figure 3a). Tricolored blackbird has been recorded 2.3 miles southeast of the project site and 7.0 miles to the east (CDFW 2015a). The species may occasionally fly over and/or forage in the project site; however, the tricolored blackbird is not expected to become established or to nest in the proposed project site based on a lack of suitable nesting (wetland) habitat.

Bell's Sparrow is a small, gray-headed sparrow with a relatively long dark tail. These inconspicuous birds spend much of their time on the ground or concealed in shrubs. Bell's sparrow occurs in desert, shrubland, and chaparral habitats, and is often found in association with sagebrush (*Artemesia* sp.) or saltbush (*Atriplex* sp.). These birds feed on insects, spiders, and seeds.

No suitable habitat is present in the proposed project site. Potential foraging and nesting habitat was observed in the buffer area, south of the proposed project boundary. No individuals were observed during biological surveys. This species has not been documented in the CNDDB within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Bell's sparrow may be present in the buffer area south of the proposed project site, in an area of habitat adjacent to the California Aqueduct. The species may occasionally fly over the project site;

however, Bell's sparrow is not expected to forage, become established, or to nest in the proposed project site based on a lack of suitable foraging and nesting habitat.

Short-Eared Owl is a medium-sized owl with a large, round head. These ground-nesting owls require large expanses of open grassland for foraging and are the most widely distributed species of owl in the world. They fly low to the ground, preying on small mammals, and require an abundance of prey, as they are active both day and night.

Overwinter, potential habitat is present in the proposed project site; however, prey would be considered limited in the project site based on a lack of small mammal burrows that would support a suitable prey base. Potential habitat was observed in the buffer area, and in natural lands outside the proposed project boundaries (south along the California Aqueduct and Elk Hills Oil Field, and east at the Tule Elk State Natural Reserve. No individuals were observed during biological surveys. The species has not been documented in the CNDDB within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Short-eared owls may forage in the project site and buffer area; however, the species is not expected to become established or to nest in the proposed project site since the project is located outside the species' current nesting range.

Western Burrowing Owl is a ground dwelling owl that occurs in grassland habitats. Burrowing owls typically uses burrows of small mammals and large rodents, particularly California ground squirrels, for shelter and breeding. The species is listed by the USFWS as a Bird of Conservation Concern (BCC) and by the CDFW as a Species of Special Concern (SSC).

Potential habitat is present in undisturbed/uncultivated areas south and east of the project site. Furthermore, agricultural lands in the proposed project site may be used as foraging habitat. No individual burrowing owls, occupied burrows, or sign of their presence (i.e., whitewash, castings, feathers, etc.) were identified during biological surveys. The species has not been recorded within the boundaries of the proposed project site, but is known to occur in the general area (see Figure 3a). Numerous sightings of burrowing owls and several active burrows have been documented south of the project site, in Valley Saltbush Scrub habitat along the California Aqueduct. The species is also known to occur east of the project site, on the Tule Elk State Natural Reserve (CDFW 2015a). Burrowing owls may fly over and/or forage in the project site; however, based on a lack of potential burrows and suitable nesting habitat, the species is not expected to become established or nest in the project site.

Swainson's Hawk is a large, broad winged hawk with a four (4) foot wing span. Body plumage is characterized by three color phases: light, dark, and rufous. Sexes are similar in appearance and these birds display a dark "bib" from the lower throat to the upper breast. Their wing tips are pointed and they have light colored wing linings.

The Swainson's hawk migrates long distances to areas in South America including Argentina, Uruguay, and Southern Brazil. During fall and winter migration, groups of 100+ individual Swainson's hawks have been documented gathering at critical foraging sites in Yolo, Tulare, Kern, and San Joaquin Counties (CDFG 1994). Nesting grounds occur in northwestern Canada, western U.S., and Mexico. Nest trees used by Swainson's hawk generally range from 40 to 82

feet in height, however the species has been documented nesting at lower heights in mesquite and tamarisk shrubs Valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), sycamore (*Platanus* spp.), walnut (*Juglans hindsii*), and willow (*Salix* spp.) are the most commonly used types of nest-tree (CDFG 1988 and 1994).

The species nests throughout the Central Valley, although nesting habitat has been greatly reduced and remains fragmented. The species breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, and agricultural or ranch lands with tree lines or groves of trees (CDFW 2015a). Cropping patterns and agricultural practices greatly influence the species' distribution and abundance in the Valley. Swainson's hawks require suitable foraging adjacent to nest sites such as grasslands, alfalfa, grain fields, etc. that support rodent populations. Prey items include pocket gophers, deer mice, California ground squirrel, California voles, burrowing owls, mourning doves, meadowlarks, grasshoppers, crickets, beetles, and other insects

The species has been documented in telemetry studies foraging up to ten miles away from active nest sites (Estep 1989, Babcock 1993). Preferred foraging habitats for Swainson's hawk include alfalfa, fallow fields, beets, tomato, and other low-growing field crops, dry-land and irrigated pasture, rice land (during the non-flooded period), and cereal grain crops (including corn after harvest) (CDFG 1994). Crops that are incompatible for foraging Swainson's hawks include, cotton, orchards, and vineyards. These crop types are not suitable for foraging due to the density of vegetative cover, frequency and/or intensity of their cultivation, and lack of available prey. Any crop type that does not support an adequate prey population would be unsuitable foraging habitat for Swainson's hawk.

The Swainson's hawk is a California State threatened species. Historically, the species was considered one of the most common raptors in the state. Population declines are attributed to loss of native nesting (riparian) and foraging habitat. The species continues to be threatened by the loss of suitable nesting trees and conversion of agricultural crops to those that are unsuitable for foraging by Swainson's hawks.

No suitable nesting habitat is present within the boundaries of the proposed project site. No potential nest trees were observed in the proposed project site and no trees would be removed or otherwise impacted in the project site during project implementation. No nests (active or inactive) were observed in the proposed project site or within a 0.5 mile radius during biological surveys. Potential roosting and nesting habitat was observed outside the project boundaries, in areas that support riparian vegetation, along the Outlet Canal to the south and the Tule Elk State Natural Reserve to the east. Potential foraging habitat is present in the project site and buffer area, in areas of agriculture planted to suitable crops (alfalfa, etc.). Adjacent agricultural lands planted to cotton and pistachios are unsuitable for Swainson's hawk and do not represent potential foraging habitat. While no individuals were observed during biological surveys, Swainson's hawks have been documented 0.7 miles and 5.6 miles to the east, on the Tule Elk State Natural Reserve, and Kern Water Bank Authority lands, respectively (CDFW 2015a). Swainson's hawk may potentially roost and/or establish nest site(s) in riparian areas adjacent to or in proximity to the proposed project site. In addition, the species may forage in agricultural fields planted to crops that are suitable for foraging (alfalfa) near the proposed project site. The species is not expected to nest in the project site based on a lack of suitable nesting habitat.

Costa's Hummingbird is a small desert hummingbird with green upper parts. Male birds display a violet crown and throat, while female birds have a white throat and under parts, and sometimes violet feathers. The species occurs in desert, foothill, and chaparral communities and breeds in the Mojave and Sonoran Deserts of California and Arizona. Nests are typically placed in shrubs.

Potential habitat is present in the buffer area, south and east of the proposed project site; however, no suitable (nesting) habitat is present in the proposed project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Costa's hummingbirds may fly over and/or forage in the project site; however, the species is not expected to be become established or nest in the proposed project site based on a lack of suitable nesting habitat.

Cactus Wren occurs in deserts of the southwest. Limited to regions where thorny bushes or trees offer nesting sites. The species typically nests along gravelly watercourses and is known to occur sunny hillsides of mesas next to mountains.

The project site is outside the known range and current year-round distribution of the species. Furthermore, no suitable habitat for cactus wren is present in the proposed project site or buffer area. Cactus wrens are not expected to be present or become established in the proposed project site since the project is located outside the species' current range and lacks suitable habitat for the species.

Mountain Plover does not breed in California, but is found in the winter in the Central Valley south of Yuba County; along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego counties; and parts of Imperial, Riverside, Kern, and Los Angeles counties. Wintering mountain plovers are gregarious, forming loose foraging and roosting flocks reported as ranging in size from four (4) to more than 1,000 individuals (Hunting and Fitton 1999). During the winter, mountain plovers can be found foraging in open plains or rolling hills with short grasses or very sparse vegetation (including disked agriculture fields). This species is adapted to the natural grazing and fire regimes of the historic Great Plains and western valleys (Hunting 2000). At both their breeding and wintering sites, mountain plovers are generally associated with grasslands that include areas of bare ground. Grasslands on alkali soils or that have been recently burned, heavily grazed by domestic livestock, disked, or populated with fossorial mammals such as California ground squirrels (*Spermophilus beecheyi*) are known to be especially attractive to the species (Knopf and Rupert 1995, CPIF 2000). The mountain plover is less often associated with grasslands where the vegetation has not been grazed or mowed, or has become too tall (USFWS 1999).

This species has been recorded 0.6 miles east of the proposed project site (see Figure 3a). Mountain plover has also been documented 0.9 miles east of Tupman Road, on the Tule Elk State Natural Reserve (CDFW 2015a). Potential foraging habitat is present in the project site and buffer area. Potential habitat is also present in natural lands in vicinity to the project site, including the Elk Hills Oil Field to the south and the Tule Elk State Natural Reserve to the east.

No individuals were observed during biological surveys. The species may forage in the project site and buffer area overwinter, but is not expected to breed or nest in the project site, as it is located outside the known range for breeding and nesting.

Peregrine Falcon, the largest falcon in North America, is characterized by long pointed wings and powerful fast flight. These falcons are blue-gray above with barred underparts and thick sideburns. Peregrine falcons prey on medium-sized birds in flight, such as pigeons, and feed on shorebirds and ducks. They are more common along coasts, and can be found perching or nesting on cliffs, water towers, skyscrapers, and other tall structures.

Potential roosting and nesting habitat (palm trees, agricultural tanks, etc.) are present in the proposed project site; however, no suitable foraging habitat was observed. Forage in the project site would be considered limited based on a lack of suitable prey. No individuals or evidence of the species were observed during biological surveys. Peregrine falcon has not been documented in the CNDDB within the boundaries of or in proximity to the proposed project site (CDFW 2015a). There is potential for the species to be present in the project site, where tall features offer potential roost sites; however, the species is not expected to become established in the project site based on a lack of suitable forage for the species.

Bald Eagle is a large raptor with a dark brown body and white head. These birds occur near lakes, rivers, reservoirs, marshes, and coasts. Bald eagles prefer tall, mature coniferous or deciduous trees for perching and nest in forested areas near large bodies of water. In winter, these birds may be seen in dry, open uplands if there is access to open water for fishing. Bald eagles typically steal fish from osprey or mammals, rather than catching it for themselves. Although once endangered by hunting and pesticide use, bald eagles have flourished under protection.

No suitable nesting or foraging habitat is present in the proposed project site and buffer area. No potential roosts or individuals were observed during biological surveys. No individual bald eagles were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat for the species, bald eagles are not expected to be present or become established in the proposed project site.

Least Bittern is a year-round resident of freshwater marshes. These birds occur along the borders of ponds and reservoirs that provide ample cover. Nests are usually placed in tules, cattails, and bulrushes, generally over water.

No suitable habitat is present in the proposed project site or buffer area. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat for the species, least bitterns are not expected to occur in the proposed project site.

Loggerhead Shrike is a common resident in the lowlands and foothills throughout California. The species occurs in valley foothill hardwood, valley foothill riparian, pinyon-juniper woodland, and desert riparian habitats. Loggerhead shrikes prefer open habitats with scattered shrubs or trees for cover, and posts, fences, or other areas for perching. The species nests in

dense shrub or tree foliage; nests are generally constructed on branches 1 to 50 feet above the ground. These birds feed primarily on large insects, and will consume small birds, lizards, mammals, fish, carrion, and various invertebrates. Shrikes are known to skewer their prey items on sharp items including twigs or barbed wire fences.

Potential foraging habitat is present in the project site and buffer area. No suitable nesting habitat is present in the proposed project site; however potential nesting habitat was observed in the buffer area south of the proposed project site, along the California Aqueduct. The species has not been documented in the CNDDB within the boundaries of the proposed project site (CDFW 2015a), but an individual loggerhead shrike was observed perched overhead on a power line in the project site during biological surveys. While the species may forage in the project site, forage may be limited, as pesticide use in agricultural areas may reduce food availability. Loggerhead shrikes are not expected to become established or nest in the proposed project site based on a lack of suitable (nesting) habitat.

Marbled Godwit is a large shorebird that occurs in wetland, riparian, tidal flat, and sand dune habitats. These birds are often found in open shallow water along shorelines. The marbled godwit feeds on crustaceans, mollusks, worms, grasshoppers, and other insects, and on seeds and tubers.

No suitable habitat is present in the proposed project site or buffer area. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat for the species, marbled godwits are not expected to occur in the proposed project site.

Lewis's Woodpecker is a dark, medium-sized woodpecker with greenish black head, wings, and tail, and a dark red face. These woodpeckers occur in open woodland habitats and need trees for cavity nesting. This species of woodpecker feeds in flight or gleans insects from the tree surface, rather than excavating wood for boring insects.

No suitable habitat is present in the proposed project site or buffer area. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat for the species, Lewis's woodpeckers are not expected to occur in the proposed project site.

Long-Billed Curlew is a large brown shorebird characterized by its long, down-curved bill. These birds occur in sparse, short-grassland habitats and agricultural fields. In winter, long-billed curlews migrate to the coast and interior Mexico, in wetlands, tidal estuaries, mudflats, and flooded fields. During March and April, the species migrates north from wintering grounds. These large shorebirds feed mainly on insects (grasshoppers, beetles), earthworms, marine crustaceans (shrimp), and marine invertebrates.

The proposed project site is located outside the known breeding range of the species. Potential foraging habitat (agricultural fields) is present in the proposed project site and buffer area. No individuals were observed during biological surveys. The species has not been documented

within the boundaries of or in proximity to the proposed project site (CDFW 2015a). While the species may forage in the project site during periods of winter migration, long-billed curlews are not expected to breed or nest in the proposed project site since it is not within the known range of the species.

Fox Sparrow is a dark, splotchy colored sparrow that occurs in dense thickets. These birds occur in remote areas of coniferous forest, and mountain scrub. These sparrows may be seen over winter in tall chaparral, scrub, and forest habitats, generally foraging on the ground and in leaf litter for insect prey.

No suitable habitat is present in the proposed project site; however the species may forage in the buffer area. No individuals were observed during biological surveys. The species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). While the species may potentially forage in the buffer area, the fox sparrow is not expected to be present or become established in the proposed project site based on a lack of suitable habitat and current land use.

Nuttall's Woodpecker is a small black and white woodpecker. These birds are confined to the oak woodlands of and riparian areas in California, and are rarely found in conifers. Trees are required for cavity nesting. This species of woodpecker consumes insects and arthropods, and occasionally fruit, but does not feed on acorns.

No suitable habitat is present in the proposed project site and buffer area. No individuals were observed during biological surveys. The species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat, Nuttall's woodpecker is not expected to be present or become established in the proposed project site.

Brewer's Sparrow is a small grayish brown sparrow with few distinct markings. These sparrows occur in arid scrub and desert grasslands, and are often found in association with big sagebrush (*Artemesia tridentata*) and other large sagebrush species (>5 feet tall), including saltbush (*Atriplex* sp.), and creosote. The species forages in shrubs and on the ground, and feeds on insects, including grasshoppers, ants, beetles, and spiders.

No suitable habitat is present in the proposed project site. However, potential foraging habitat is present in the buffer area south and east of the proposed project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). While the species may potentially forage in the buffer area, Brewer's sparrow is not expected to be present or become established in the proposed project site based on a lack of suitable habitat, the

California Spotted Owl is a large owl with mottled brown chest coloring, a round head, and no ear tufts. This is one of three subspecies of spotted owl, found only in California. The California spotted-owl occurs in old-growth coniferous and other mature forests, and rocky canyons. Spotted-owls typically require trees for nesting, as they are cavity nesters. These birds hunt at

night, feeding on small mammals; woodrats, flying squirrels, and bats are important components of their diet.

The proposed project site is located outside the known range of the species. Furthermore, no suitable habitat is present in the proposed project site and buffer area. The species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Based on a lack of suitable habitat, California spotted owls are not expected to be present or become established in the proposed project site.

Le Conte's Thrasher is an uncommon to rare resident in southern California deserts and in western and southern San Joaquin Valley. Although formerly found north to Fresno County, the species has been rarely recorded north of Kern County since the 1950s. The species occurs in open desert wash, desert scrub and succulent shrub, and alkali desert scrub habitats. Le Conte's thrasher use scattered (saltbush) shrubs for cover and dense, spiny shrubs for nesting. These birds feed mainly on small lizards and insects by probing the ground and digging in the soil.

Le Conte's thrasher has been recorded in the buffer area, southeast of the proposed project (see Figure 3a). The species was documented approximately 0.3 miles to the southeast (CDFW 2015a). No suitable habitat was observed in the project site. However, potential (nesting) habitat for this species is present in the buffer area south and east of the proposed project site, in areas that support a shrub component. No individuals were identified in the project site or buffer area during biological surveys. Where natural lands persist, with adequate shrub cover for nesting, the species would be expected to occur. While the species may fly over and/or forage in the project site, Le Conte's thrashers are not expected to become established or to nest in the project site based on a lack of suitable (nesting) habitat.

Least Bell's Vireo inhabits low dense riparian vegetation along water or dry parts of intermittent streams. The species is typically associated with willow, cottonwood, baccharis, wild blackberry, or mesquite in desert locations.

The proposed project site is located outside the known range and current distribution of the species (USFWS 2006). While potential habitat is present in the buffer area to the southeast, mainly along the Outlet Canal, no suitable habitat is present in the proposed project site. No individuals were observed during biological surveys. This species has not been documented within the boundaries of the proposed project site (see Figure 3a). Least Bell's vireo was historically recorded 5.3 miles south of the project site (CDFW 2015a).

INVERTEBRATES

Vernal Pool Fairy Shrimp are short-lived crustaceans that occur in small vernal pools of California. Their habitats form when winter rains fill shallow depression; pools persist for months and then evaporate in the spring. This species is known to inhabit clear-water sandstone depression and grassland swale pools. They are generally 0.5-1.5 inches long and are fairly translucent. Their life span is from December to early May, and is often temperature dependent. They feed on algae, bacteria and detritus and are consumed by birds, reptiles, and amphibians.

Eggs are laid by adult shrimp each winter season; however, eggs may lie dormant in the soil for up to ten (10) years before hatching.

Vernal pool fairy shrimp are endemic to grasslands of the Central Valley, and the Central and South Coast mountains. The species has been found throughout the Central Valley, from Shasta County to Tulare County, along the Coast Range from Solano to San Luis Obispo and Santa Barbara Counties, and in southern California in Riverside and San Diego Counties. Vernal pool fairy shrimp is listed as a federal threatened species.

No suitable habitat (vernal pools) was observed in the proposed project site. Since the proposed project site is under agricultural production, vernal pool fairy shrimp are not expected to occur or become established in the project site.

FISH

Delta Smelt is a slender-bodied fish feed on small free-floating crustaceans and occasionally insect larvae. The species requires shallow open waters with freshwater flow and specific conditions (i.e., salinity and temperature) for spawning, rearing, etc. Delta smelt are restricted to the San Francisco Bay and Sacramento-San Joaquin Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties in California.

The proposed project site is located outside the known distribution and current range of the species (USFWS 2015a). Furthermore, no suitable aquatic habitat is present in the proposed project site or buffer area. Delta smelt has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a). Since the Palms Project is proposed in active agriculture and lacks suitable habitat for the species, Delta smelt are not expected to occur in the project site.

MAMMALS

San Joaquin (Nelson's) Antelope Squirrel is listed as a State threatened species. The species historically occurred in the western and southern portions of the Tulare Basin, San Joaquin Valley, and contiguous areas to the west in the upper Cuyama Valley, and on the Carrizo and Elkhorn Plains (USFWS 1998). However, the current distribution is extremely fragmented due to agricultural conversions that have occurred during the last century. Thus, substantial populations now occur only around Lokern and Elk Hills in western Kern County, and on the Carrizo and Elkhorn plains in southeastern San Luis Obispo County. Within its occupied range the species inhabits arid annual grassland and shrubland communities and is most numerous in areas with a sparse to moderate cover of shrubs. Occupied habitat also typically occurs on open, gentle slopes with friable soils. Areas with high water tables, steep slopes, or broken, rocky upland terrain appear to be avoided by the species (USFWS 1998). Habitats that are considered fair to good in quality typically support between 3 and 10 antelope squirrels per acre (USFWS 1998). The species is primarily diurnal and may be active throughout the day.

No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area,

south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, south along the California Aqueduct, and the Elk Hills Oilfield, southeast along the Outlet Canal, and east at the Tule Elk State Natural Reserve. No San Joaquin antelope squirrels were observed during biological surveys. The species has not been documented in the project site (see Figure 3a). The species has been recorded approximately 0.2 miles east on the Tule Elk State Natural Reserve and 0.3 miles to the south (CDFW 2015a). San Joaquin antelope squirrel is expected to be persist in areas of natural land; however, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the species is not expected to become established in the project site.

Giant Kangaroo Rat is listed as a federal and State endangered species. Giant kangaroo rats prefer annual grassland on gentle slopes of generally less than 10 percent with friable, sandy-loam soils. However, most remaining populations are on poorer, marginal habitats which include shrub communities on a variety of soil types and slopes up to 22 percent. The historical distribution of the species encompasses a narrow band of gently sloping ground along the western edge of the San Joaquin Valley, with occasional colonies on steeper slopes and ridge tops, from the base of the Tehachapi Mountains in Kern County along the western edge of the valley to near Los Banos in Merced County. The species' occupied range is currently fragmented into six major geographic units that include the Panoche Region in western Fresno and eastern San Benito counties; Kettleman Hills in Kings County; San Juan Creek Valley in San Luis Obispo County; western Kern County in the area of the Lokern, Elk Hills, and other uplands around McKittrick, Taft, and Maricopa; Carrizo Plain National Monument in eastern San Luis Obispo County; and Cuyama Valley in Santa Barbara and San Luis Obispo Counties.

Giant kangaroo rats are primarily seedeaters, but also eat green plants and insects. They cut the ripening heads of grasses and forbs and cure them in small surface pits located on the area over their burrow system (Shaw 1934, Williams *et al*. 1993). They also gather individual seeds scattered over the surface of the ground and mixed in the upper layer of soil. Surface pits are uniform in diameter and depth (about 1 inch), placed vertically in firm soil, and filled with seedpods. After placing seeds and seed heads in pits, the animal covers them with a layer of loose, dry dirt. Pits are filled with the contents of the cheek pouches after a single trip to harvest seeds. Before being moved underground, the seeds are sun-dried which prevents molding (Shaw 1934). Individuals in many populations also make large stacks of seed heads (i.e., haystacks) on the surface of their burrow systems (Hawbecker 1944, Williams *et al*. 1993). The material is cured and then stored underground. Amounts cached in haystacks may not correspond with annual herbaceous productivity. Estimated home range size ranges from about 646 to 3,768 square feet. There is no significant difference in size of home range between sexes. The core area of the territory, located over the burrow system (i.e., precinct) is the most intensely used location in the home range (Braun 1985). Grinnell (1932) and Shaw (1934) suggested that territories were occupied by a single animal. More recent studies indicate that multiple individuals may live in a precinct. These individuals appear to be family groups of females and offspring of different ages (Randall 1997). Estimates of density, employing both trapping and counts of precincts, ranged from 1 to 44 individuals per acre (Grinnell 1932, Braun 1985, Williams 1992).

Giant kangaroo rat burrow systems (precincts) are distinctive because of the size and orientation of the individual entrances and the presence of cleared vegetation in the vicinity of the system. Precincts may include one to several burrow openings and a colony may consist of two to thousands of precincts. Burrows of two types may be observed within the precincts. Horizontal burrow openings are typical in appearance compared to other kangaroo rats. However, these openings are usually quite large in comparison to the burrow openings of other species. Giant kangaroo rats also may construct vertical burrow openings. Other characteristics of giant kangaroo rat precincts include tracks from their distinctively large feet and tail drags, haystacks near the burrows, and large scat near the burrow entrances. Individual precincts are usually connected to other precincts by well-worn paths and are relatively easy to detect, even from a distance (Williams 1980).

No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No sign of giant kangaroo rat presence (i.e., mowing, hay stacking, seed caching, vertical burrow entrances, etc.) was identified during biological surveys. This species has not been documented within the boundaries the proposed project site (see Figure 3a). The nearest occurrence of giant kangaroo rat to the project site is recorded 0.8 miles to the southwest, on the south side of the California Aqueduct (CDFW 2015a). Giant kangaroo rat is expected to be present in areas of natural land; however, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the species is not expected to become established in the project site.

Short-nosed Kangaroo Rat is a California species of concern. This species is one of three subspecies of the San Joaquin kangaroo rat. The short-nosed kangaroo rat uses grassland habitats, as well as desert scrub associations, especially *Atriplex* (CDFW 2014). This species has also been found along levees and could occur in agricultural areas.

No suitable habitat for the species was observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. This species has not been documented within the boundaries the proposed project site (see Figure 3a). Short-nosed kangaroo rats have been recorded 4.1 miles south and southeast of the proposed project site (CDFW 2015a). Short-nosed kangaroo rat is expected to be present in areas of natural land; however, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the species is not expected to be present or become established in the project site.

Tipton Kangaroo Rat is one of three subspecies of the San Joaquin kangaroo rat. This species can be distinguished from the other species within their range by the presence of four toes on the hind feet, as opposed to five toes. The species occurs in saltbush scrub and sink scrub habitats in the Tulare Lake Basin of the southern San Joaquin Valley. This species needs soft, friable soils

that escape seasonal flooding (CDFW 2015). Tipton kangaroo rats often dig burrows at the bases of shrubs.

Historically, Tipton kangaroo rats were distributed on the Valley floor; the western extent of their range was marshes and the Buena Vista and Kern lakes (USFWS 2010 and USFWS 1998). Tipton kangaroo rat is known to occur in limited scattered areas, located east of the California Aqueduct. Due to agricultural development, water diversion, and storage, much of the area in proximity to the project sites is unsuitable for the species.

The species has been (historically) documented in the buffer area of the project site (see Figure 3a). Tipton kangaroo rats have been recorded 0.1 mile east of the project site, on the Tule Elk State Natural Reserve, and in locations 5 miles to the southeast and 7 miles to the northeast (CDFW 2015a). No suitable habitat or small mammal burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Coles Levee Ecosystem Preserve. Tipton kangaroo rat is expected to be present in areas of natural land, particularly in areas that avoid seasonal flooding. However, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the species is not expected to be present or become established in the project site.

Tulare grasshopper mouse historically ranged from western Merced County and eastern San Benito County east to Madera County and south to the Tehachapi Mountains. Current distribution of the species includes the western margin of the Tulare Basin (including western Kern County), Carrizo Plain National Monument, the Cuyama Valley side of the Caliente Mountains, eastern San Luis Obispo County, and Ciervo-Panoche Region in Fresno and San Benito Counties. The taxon typically inhabits hot, arid grassland and shrub land vegetation communities (e.g., alkali sink, saltbush scrub, and mesquite scrub). It has also been recorded in blue oak woodland, where it is considered very rare. Little more is known about the habitat requirements of the taxon. However, its distribution generally follows that of other special-status species associated with arid habitats in the San Joaquin Valley, Cuyama Valley, and Carrizo Plain (i.e., San Joaquin kit fox and giant kangaroo rat).

No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. As illustrated in Figure 3a, the species has not been recorded in the project site (CDFW 2015a). This species is expected to be present in areas of natural land; however, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the Tulare grasshopper mouse is not expected to be present or become established in the project site.

San Joaquin Pocket Mouse is listed as a CDFW Species of Special Concern (SSC). The species occurs in dry, open grassland and scrub habitats in the Central and Salinas Valleys of

California, and feeds primarily on seeds from grasses and shrubs. San Joaquin pocket mice hibernate in their burrows most of the year and are active only at night during the spring and summer.

No suitable habitat or small mammal burrows suitable for use by this species were observed within the boundaries of the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. The species has not been recorded in the project site (see Figure 3a). San Joaquin pocket mouse has been documented 0.2 miles to the east, on the Tule Elk State Natural Reserve (CDFW 2015a). This species is expected to be present in areas of natural land; however, based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the San Joaquin pocket mouse is not expected to be present or become established in the project site.

Buena Vista Lake Ornate Shrew lives in dense vegetation around the perimeter of marshes, lakes or sloughs. Prefers moist soil and uses stumps, logs, and litter for cover. The Buena Vista Lake shrew formerly occupied wetlands and marshlands that occurred around Buena Vista Lake and in the Tulare Basin (USFWS 1998). However, its range has become very restricted due to the loss of lakes sloughs, and riparian areas. This species was federally listed as endangered in 2002 and its recovery was initially addressed in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The USFWS designated Critical habitat for this species in a final rule that was published on July 2, 2013 (USFWS 2013a).

The proposed project does not occur in an area that has been designated by the USFWS as critical habitat for the Buena Vista Lake ornate shrew (USFWS 2015a, 2015b). No suitable habitat for Buena Vista Lake ornate shrew was observed in the proposed project site; the project site lacks habitat features that are required by the shrew. Riparian habitat that may serve as potential for this species is present to the southeast, outside the proposed project site, along the Outlet Canal. The species has not been documented within the boundaries of the proposed project site (see Figure 3a). Buena Vista Lake shrew has been recorded approximately 2.7 miles southeast of the proposed project site (CDFW 2015a). Based on a lack of suitable habitat in the project site and conditions observed during biological surveys, the Buena Vista Lake ornate shrew is not expected to be present or become established in the project site.

American Badger (*Taxidea taxus*) is widespread across the drier portions of the western United States where suitable habitat is characterized by most open vegetation communities with dry, friable soils. These include grassland and shrub communities, and open stages of some woodland communities. Badgers mate in summer and early fall, and most young are born in March and April (Long 1973). The most common signs of habitat occupation by badgers include dens and fresh diggings. Badger dens exhibit characteristics that are diagnostic of the species (e.g., dome-shaped entrance with claw marks in the upper portion of the entrance).

No suitable habitat for the species was observed in the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California

Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows that were of appropriate size for use by badger or sign (i.e., scat, tracks, digging, prey remains, etc.) of the species were observed during biological surveys. Badgers have been documented approximately 4.6 miles southeast and 5.8 miles east of the project site (CDFW 2015a). Although no burrows suitable for potential denning were observed within the proposed project sites at the time of our field surveys, it is possible that badgers may travel through and/or forage in the proposed project site. Forage, however, would be limited in the project site based on a lack of small mammal burrows that would support a suitable prey base for the species.

San Joaquin Kit Fox historically occurred throughout the southern portion of the San Joaquin Valley, along the eastern edge of the San Joaquin Valley, and in the dry interior valleys of the Coast Ranges. The species occurs in a variety of open grassland, oak savannah, and shrub vegetation communities. However, in the southern portion of its range it is generally found in sparse annual grassland and scrub communities (e.g., valley sink scrub, saltbush scrub). Den characteristics of the subspecies vary across its range. In the southern portion of its range the taxon often creates dens with two entrances; natal/pupping dens typically have multiple entrances. Entrances range from 8 to 10 inches in diameter and are normally higher than wide, but kit foxes can utilize dens with entrances as small as four inches in diameter. Kit foxes often change dens on a regular basis. Home ranges for the taxon have been reported by several authors to range from 1 to 12 square miles (USFWS 1998).

Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. While no suitable habitat for the species was observed in the proposed project site, agricultural lands may serve as foraging habitat for the species. No individual San Joaquin kit fox were observed however tracks were identified during biological surveys in an existing roadway. No known or potential dens, or other sign (i.e., scat, digging, prey remains, etc.) of kit fox activity was detected. Numerous sightings of individual kit fox (including road kills), and active dens have been documented in the CNDDB in proximity to the project site (see Figure 3a). San Joaquin kit fox have been recorded 0.3 miles and 2.3 miles to the east, on the Tule Elk State Natural Reserve and the Kern Water Bank Authority (CDFW 2015a). The species has also been documented in various locations south of the California Aqueduct, approximately 0.5 miles and 0.8 miles south of the proposed project site (CDFW 2015a). The proposed project site may accommodate foraging San Joaquin kit fox. However, forage would be limited based on a lack of small mammal burrows in the project site that would support a suitable prey base.

REPTILES

Western Pond Turtle is a thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. The species seeks cover underwater from basking sites such as open banks, logs, or rocks. Western pond turtles require suitable upland habitat (sandy banks or grassy open fields) for egg-laying.

The proposed project site does not support suitable habitat for the species, as existing canals and ditches in the project site are regularly maintained and lack aquatic vegetation year round. Where

canals and ditches were observed to have water, the adjacent upland habitats were under active agricultural production (i.e., alfalfa, cotton). No individuals were observed or evidence of the species was identified during biological surveys. Western pond turtles have not been recorded within the boundaries of the proposed project site (see Figure 3a). The species has been documented 0.4 miles to the south, along the California Aqueduct, and 0.8 east of the proposed project site, at the Tule Elk State Natural Reserve (CDFW 2015a). Based on a lack of suitable habitat in the project site, the species is not expected to be present or become established in the project site.

Blunt-Nosed Leopard Lizard is listed as a federal and State endangered species. The species is also considered Fully Protected by the CDFW. Blunt-nosed leopard lizards inhabit open, sparsely vegetated areas of low relief (particularly annual and perennial grasslands, alkali scrub, and saltbush scrub), and are absent from areas of steep slope, dense vegetation, or seasonal flooding. The current range of the species includes undeveloped parcels in the southern-most portion of the San Joaquin Valley (Tulare and Kings Counties south), San Joaquin Valley floor in the vicinity of western Madera County, and along the western edge of the San Joaquin Valley from Merced County south. Its range also extends into the Carrizo Plain and Cuyama Valley southwest of the San Joaquin Valley.

Estimated densities in occupied habitat have varied from 0.1 to 8.5 lizards per acre (Uptain *et al*. 1985, Williams and Germano 1991, Williams *et al*. 1993, Germano *et al*. 1994). Individuals use small rodent burrows for shelter from predators and temperature extremes. Their burrows are usually abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels (Montanucci 1965). Seasonal above-ground activity is correlated with weather conditions (primarily temperature). Optimal activity occurs when air temperatures are between 23.5 °C and 40 °C and ground temperatures are between 22 °C and 36 °C (USFWS 1985). Adults are active above ground in the spring months from March or April through June or July with the level of activity decreasing until approximately late June when most adults go underground and become inactive. At this latter time only sub-adult and hatchling individuals generally continue to be active. By August or September generally all adults have retreated to burrows to begin over-wintering. Hatchlings may be active until mid-October or November.

No suitable habitat for blunt-nosed leopard lizard is present in the proposed project site since lands within the project boundaries are under agricultural use. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. No individual blunt-nosed leopard lizards were observed during biological surveys and the species has not been recorded in the project site. Since the proposed project would not modify or alter potential blunt-nosed leopard lizard habitat, protocol level surveys to detect species presence were not completed.

Blunt-nosed leopard lizard has been documented approximately 0.4 miles to the east, on the Tule Elk State Natural Reserve (see Figure 3a). Blunt-nosed leopard lizards have been recorded in locations east of Interstate 5, approximately 2.7 miles and 4.5 miles northeast of the project site

(CDFW 2015a). Observation records in the CNDDB were made in areas that support Valley Saltbush Scrub or Alkali Sink habitats. Where natural lands persist, the species may potentially occur; however, based on current agricultural land use and site conditions observed during biological surveys, blunt-nosed leopard lizards are not expected to be present or become established in the project site.

San Joaquin Whipsnake is a California Species of Special Concern. The species occurs along the Coast Ranges from Alameda and San Joaquin Counties in the north, south to Kern County. They are found in open, dry habitats with little or no tree cover. They require mammal burrows or rocky outcrops for refuge and may use them as oviposition sites (Jennings and Hayes 1994).

No suitable habitat is present in the proposed project site. Potential habitat is present in the buffer area, south and east of the project site, in uncultivated areas that support natural vegetation. These areas occur outside the project boundaries, along the California Aqueduct, the Outlet Canal, the Tule Elk State Natural Reserve, and the Elk Hills Oil Field. No burrows suitable for potential use by this species were observed within the boundaries of the proposed project site. No individual San Joaquin whipsnakes were observed during biological surveys. The species has been documented 9.9 miles east of the proposed project site (CDFW 2015a).

Giant Garter Snake is the largest of all garter snakes and perhaps the most aquatic garter snake of California. They are brown below and brown, olive or tan above with checkered spots and three (3) pale or yellow stripes that run down their back and sides. Giant garter snakes generally measure three to five (3-5.5) feet in length. Giant garter snakes are active spring to mid-fall (May 1 through October 1). Breeding occurs from March to May. Females give birth to live young from late July to early September; brood sizes range from 10 to 46 young. During fall, they seek refuge in burrows or other soil crevice above floodwater levels and remain dormant throughout the winter. The diet of a giant garter snake consists mainly of fish, amphibians, and their larvae. They will also consume ground nesting birds and their young.

The species occurs in marsh, swamp, riparian scrub, and wetland habitats. Giant garter snakes prefer freshwater marsh and low gradient streams with mud bottoms, but have adapted to drainage canals and irrigation ditches (CDFW 2015a). The snake requires enough water during its active season to maintain high densities of prey; emergent wetland vegetation (i.e., cattails and bulrushes) for cover and foraging; and adjacent uplands for basking. Higher uplands are used for cover and refuge from floodwaters during its inactive season.

The giant garter snake is listed as a federal and State threatened species. Giant garter snakes are endemic to the Central Valley of California and historically occurred throughout the San Joaquin and Sacramento Valleys (Hansen and Brode 1980). The species has been documented north from Colusa County and south to Buena Vista Lake in Kern County. Its current range is limited to the Sacramento Valley and isolated portions of the San Joaquin Valley (USFWS 1999). Due to loss of natural habitat, the giant garter snake relies heavily upon rice fields in the Sacramento Valley. Only a few sightings have been reported in the San Joaquin Valley, on Federal National Wildlife Refuge Lands and State Wildlife Areas (USFWS 2015c).

The proposed project site is located outside the current known range and distribution of the species (CDFW 2015b). Giant garter snake has been historically documented within the boundaries of the project site (see Figure 3a). The species was identified in that location prior to, but not during, a 1986-87 study of the species' distribution (CDFW 2015a). Giant garter snake was also historically captured in a location approximately 4.6 miles to the southeast (CDFW 2015a). No suitable habitat for giant garter snake was observed within the proposed project site. While canal systems in the area may provide a means of dispersal for giant garter snake, the species has not been documented in proximity to the project site in more recent years. Since canals in the project site that contain water lack vegetation and appear to be regularly maintained, giant garter snake is not expected to occur in the project site based on a lack of suitable habitat.

Incidental Wildlife

A few bird species protected under the Federal Migratory Bird Treaty Act were observed in flight or foraging during field surveys (see Table 2). No active nests or inactive nesting sites were observed during biological surveys. Potential nesting habitat for migratory and other sensitive birds (great-horned owl) was observed in tree stands (palm) within the project site. Potential nesting and foraging habitat is also present in areas that support natural vegetation, and in areas that contain riparian vegetation, along the Outlet Canal to the southeast. Additionally, red-tailed hawks and common raven may construct nests on power poles that occur parallel to existing access roads.

SPECIAL-STATUS PLANTS

From our literature reviews, a list was generated of 13 special-status plants that may potentially occur in or be affected by projects in the East Elk Hills and Tupman quadrangles (an area representing 140 square miles). As illustrated in Figure 3b, three (3) special-status plants have been documented in proximity to the proposed project site (CDFW 2015a). These species include slough thistle, recurved larkspur, and oil neststraw. The life history and habitat requirements of each of these species are briefly described below.

Horn's Milk-Vetch is an annual herb that occurs in playas, meadows and seeps. The species is typically found along lake margins, and in alkaline soils. The species blooms from May through October. Horn's milk-vetch was subject to eradication efforts in the early 1900's because it was poisonous to sheep and the species is known from only 14 occurrences (CNPS 2015).

No suitable habitat is present in the proposed project site or buffer area. No individuals or evidence of the species was observed during biological surveys. Horn's milk-vetch has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 4.6 miles to the southeast and 6.3 miles east of the project site (CDFW 2015a).

Heartscale is an annual herb that has been historically documented in the northern Temblor Range, usually on bare soils around vernal pools (Twisselmann 1967). This species occurs on saline or alkaline soils in meadows, seeps, and chenopod scrub habitats, and in sandy areas in

valley and foothill grassland. Plants are similar to crownscale, both in appearance and habitat requirements; the species has been recorded in association with the spiny saltbush (*Atriplex spinifera*) community.

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. Heartscale has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 4.5 miles to the south (CDFW 2015a).

Crownscale is an annual herb that is known from south of the Tulare Lake, west through the Temblor Range to Soda Lake in San Luis Obispo County (Twisselmann 1967). Preferred habitats include vernal pools and alkaline or clay soils in chenopod scrub, valley and foothill grassland. This species is similar to heartscale, both in appearance and habitat requirements.

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, crownscale has not been documented within the boundaries of the proposed project site (CDFW 2015a).

Lost Hills Crownscale is an annual herb that has been documented in Kern, Kings, Fresno, Merced, and San Luis Obispo Counties. Plants from San Luis Obispo may be an unnamed new taxon (CNPS 2015). This species occurs in powdery, alkaline soils that are seasonally moist in chenopod scrub, vernal pools, and valley and foothill grassland habitats. Threats to the species include grazing, agricultural conversion, and energy development.

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. Lost Hills crownscale has not been documented within the boundaries of the proposed project site (see Figure 3b). The species has been recorded approximately 2.0 miles and 3.5 miles southeast of the proposed project site (CDFW 2015a).

Mexican Mosquito Fern occurs in marshes, swamps, ponds or slow water. No suitable habitat for this species is present in the proposed project site or buffer area. No individuals or evidence of this species were observed during biological surveys. As illustrated in Figure 3b, Mexican mosquito fern has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).

Slough Thistle is an annual or perennial herb that occurs in chenopod scrub, riparian scrub, marshes and swamps. The species may be present in other areas where conditions are favorable. Slough thistle is known from fewer than 20 locations in Kern, Kings, and San Joaquin Counties (CNPS 2015). Threats to this species include agriculture and competition from non-native plants.

The species has been recorded in the buffer area of the proposed project (see Figure 3b). Slough thistle has also been documented along the east bank of the Kern River, approximately 4.6 miles southeast of the project site (CDFW 2015a). Potential habitat is present in the buffer area southeast of the proposed project site, mainly along the Outlet Canal and on the Tule Elk State Natural Reserve. However, no suitable habitat for this species is present within the boundaries of the proposed project site. No individuals or evidence of the species were observed during biological surveys.

Recurved Larkspur is a perennial herb that is endemic to California. Historically, recurved larkspur was widely distributed in the Sacramento and San Joaquin valleys, ranging from Glenn and Butte counties south to Kern County. Most of the known occurrences are in Kern, Tulare, and San Luis Obispo Counties. The species now appears to be very rare outside the southern San Joaquin Valley (CDFW 2015a). Much of this species habitat has been converted to agriculture, and the species continues to be threatened by grazing and trampling (CNPS 2015).

Recurved larkspur occurs on sandy or clay alkaline soils, generally in annual grasslands or in association with saltbush scrub or valley sink scrub habitats. The species occurs at elevation ranging from 100 to 2,000 feet above sea level (CDFW 2015a) and blooms from March through June (CNPS 2015). Very little ecological information is available for the species and most of the literature on the species pertains to its taxonomy.

Potential habitat for recurved larkspur is present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas that border the California Aqueduct. However, no suitable habitat for this species is present in the proposed project site. No individuals or evidence of the species were observed during biological surveys. Recurved larkspur has not been documented within the boundaries of the proposed project site (see Figure 3b). However, the species has been recorded approximately 0.6 miles and 1.3 miles southwest of the proposed project site (CDFW 2015a).

Kern Mallow is an annual herb that occurs on alkali flats and eroded hills, mainly in the southern San Joaquin Valley (USFWS 2013). This species occurs in chenopod scrub, valley and foothill grassland habitats and is often found growing under spiny and common saltbush (USFWS 1998). Flower color is white to more or less purple (USFWS 2013). Plants have either perfect flowers (i.e., having both pistils and stamens) or pistillate flowers (i.e., without stamens). While other *Eremalche* species have perfect flowers, *E. kernensis* is the only member of this genus that exhibits this condition, known as gynodioecy. Reproduction of the species varies greatly depending on precipitation.

There has been much uncertainty about the taxonomic status and identification of Kern mallow, focused on flower color, gender and range (USFWS 1998). Studies have focused on three related taxa: Kern mallow (*Eremalche kernensis*), Parry's mallow (*E. parryi*), and desert mallow (*E. exilis*). Historically, *E. kernensis* was thought to have a very restricted range, limited to an area between McKittrick and Buttonwillow. At the time of listing, the white flowered *E. kernensis* was known from only six (6) locations in this area, locally known as Lokern (USFWS 2013). The *Recovery Plan* for the species recognized pink-flowered plants in Buena Vista Valley, Elk Hills, Lost Hills, McKittrick Hills, Stockdale, the Temblor Range, Corcoran,

Cuyama Valley, and Pixley (USFWS 1998). In 2002, it was determined that many records of *E. kernensis* were likely misidentified and were *E. exilis* (Andreasen et al. 2002). Confusion over the taxonomic status of Kern mallow has not been resolved by genetic studies completed to date. Populations of Kern mallow have been documented in Kern, San Luis Obispo, Santa Barbara, Tulare, and Ventura Counties (CNPS 2015). The species is known from 212 records, 209 of which are presumed extant However, many of the locations where Kern mallow has been historically recorded have not been revisited to determine if the species is present (USFWS 2013).

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. Kern mallow has not been recorded within the boundaries of the proposed project site (see Figure 3b). The species has been documented in locations approximately 1.9 miles to the west and 4.8 miles southeast of the biological survey area (CDFW 2015a).

Hoover's Eriastrum is an annual herb that occurs in chenopod scrub, valley and foothill grassland, and pinyon juniper woodland habitats. The species was previously listed as threatened by the USFWS; however, Hoover's eriastrum was delisted in 2003.

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. The species has not been recorded within the boundaries of the proposed project site (see Figure 3b). The species has been documented in numerous locations south and southeast of the biological survey area (CDFW 2015a).

Cottony Buckwheat is an annual herb that occurs on clay soils in chenopod scrub and valley and foothill grassland habitats. The blooming period of the species is March through September. Cottony buckwheat has been documented in Kern, Kings, Fresno, and San Luis Obispo Counties (CNPS 2015).

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, this species has not been documented within the boundaries of or in proximity to the proposed project site (CDFW 2015a).

Tejon Poppy is an annual herb that occurs in chenopod scrub and valley and foothill grassland habitats. The species is historically known from only six (6) occurrences; however, within the last two decades the species has been recorded in over 50 additional locations. All documented occurrences of Tejon poppy have been in Kern County, in the southern portion of the San Joaquin Valley (CNPS 2015).

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas.

No individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, Tejon poppy has not been documented within the boundaries of the proposed project site. The species has been recorded approximately 2.2 miles southwest and 2.9 miles southeast south of the proposed project site (CDFW 2015a).

Oil Neststraw is an annual herb that occurs in chenopod scrub, coastal scrub, and valley and foothill grassland habitats. The blooming period of the species is during March and April. The species has been recorded only in Kern and San Diego Counties (CNPS 2015).

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, oil neststraw has not been documented within the boundaries of the proposed project site. The species has been recorded at several locations to the south, within 1 to 2 miles of the proposed project site (CDFW 2015a).

San Joaquin Bluecurls is an annual herb that occurs in chenopod scrub, and valley and foothill grassland habitats. The blooming period of the species is between July and October.

No suitable habitat is present in the proposed project site. However, potential habitat may be present in the buffer area south of the proposed project site, in undisturbed/uncultivated areas. No individuals or evidence of the species were observed during biological surveys. As illustrated in Figure 3b, San Joaquin bluecurls have not been documented within the boundaries of the proposed project site (CDFW 2015a).

As illustrated in Figures 3a and 3b, 13 special-status wildlife species and three (3) special-status plants have been documented in the CNDDB in vicinity to the proposed project site (CDFW 2015a). Special-status wildlife species that have been recorded in proximity to the proposed project site include San Joaquin kit fox, Western burrowing owl, San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, San Joaquin pocket mouse, blunt-nosed leopard lizard, giant garter snake, Swainson's hawk, mountain plover, Le Conte's thrasher, and Western pond turtle. Special-status plants that have been documented in vicinity to the project site include slough thistle, recurved larkspur, and oil neststraw.

A total of seven (7) special-status species are known to occur, indicating they were either identified while conducting biological surveys for the proposed project, or they have been (historically) documented in the project site or buffer area in the CNDDB. Species in this category include giant garter snake, San Joaquin kit fox, Tipton kangaroo rat, Le Conte's thrasher, loggerhead shrike, and slough thistle. Loggerhead shrike is the only special-status species indicated in the records search that was directly observed during biological surveys; the remaining species were recorded in the CNDDB (CDFW 2015a).

ANALYSIS OF POTENTIAL IMPACTS

The habitat assessment conducted for the proposed BVWSD Palms Project found that no natural lands are present within the boundaries of the proposed project site. However, natural lands and

native habitats are present in the buffer area, in undisturbed/uncultivated areas south and east of the proposed project boundary. Areas of habitat adjacent to the project site occur along the California Aqueduct to the south and on the Tule Elk Reserve to the east. Other natural lands in proximity include the Elk Hills Oil Field, the Coles Levee Ecosystem Preserve, and the Kern Water Bank. Riparian habitat is present southeast of the project site, along the Outlet Canal. The proposed project would avoid directly impacting adjacent areas of saltbush scrub and annual grassland habitat, as they occur outside the boundaries of the proposed project site. Since the proposed project would be conducted in lands disturbed by agricultural use, project implementation would not result in impacts to natural lands.

The project would not interfere with movements of wildlife species or with established native resident or migratory wildlife corridors. Native resident and/or migratory fish and known native wildlife nursery sites are not present within the proposed project site or buffer area.

No riparian, wetland, vernal pool, streams, or other sensitive community types were observed within the boundaries of the proposed project site during biological surveys. The proposed project would avoid riparian areas, designated wetlands, and potential wetland areas, as they occur outside the boundaries of the proposed project site. Based on a lack of suitable aquatic habitat in the project site, species including California red-legged frog, vernal pool fairy shrimp, Western pond turtle, delta smelt, least bittern, and marbled godwit are not expected to be present or exposed to the proposed project. Therefore, no specific measures are recommended for these species.

The proposed project is located outside the known range and current distribution of special-status species including California red-legged frog, giant garter snake, Delta smelt, California spotted owl, Lewis's woodpecker, Nuttall's woodpecker, and least bittern. Furthermore, based on a lack of suitable habitat with required elements, these species and others including vernal pool fairy shrimp, cactus wren, and bald eagle are not expected to be present or become established in the proposed project site or buffer area. Therefore, no specific measures are recommended for these species.

No suitable habitat for special-status plants is present within the boundaries of the proposed project site. No special-status plants were observed in the proposed project site during biological surveys. Based on the habitat requirements of targeted plant species and current land use, special-status plant species are not expected to be present or become established in the project site. This determination is based on historic land conversion from habitat to agricultural use, the level of current disturbance, and site conditions observed at the time of our biological surveys.

Slough thistle, recurved larkspur, and oil neststraw have been (historically) recorded in vicinity to the proposed project site; however, special-status plants are not expected to occur in the proposed project site based on historic land conversion and current land use that was observed during biological resource surveys. By confining project activities to previously disturbed areas that do not represent habitat, there is no potential for impact to special-status plants. General avoidance measures to protect wildlife allow for protection of plants as well. Therefore, no specific measures for special-status plant species are included.

Direct mortality or injury to common wildlife populations could occur during ground disturbance activities associated with implementation of the project. Small vertebrate and invertebrate species are particularly prone to impact during project implementation because they are much less mobile, and cannot easily move out of the path of project activities. Other more mobile wildlife species, such as most birds and larger mammals, can avoid project-related activities by moving to other adjacent areas temporarily. Increased human activity and vehicle traffic in the vicinity may disturb some wildlife species. However, common wildlife species have likely become acclimated to on-going agricultural activities and oil and gas exploration, development, and production activities. Because common wildlife species observed during biological surveys are locally and regionally common, potential impacts to these resources are considered less than significant. Therefore, no avoidance or minimization measures are proposed at this time.

Although the project site is located in agriculture, RAB Consulting determined that several special-status wildlife species may potentially be present during project activities, or have low potential to occur in the proposed project site. Certain migratory bird species, such as long-billed curlew and mountain plover, may forage in agricultural areas that contain low-growing vegetation and a potential insect prey base. As a result of mobility, there is potential for certain species to occasionally pass through and/or to forage in the project site. Since natural land that represents potential habitat for several San Joaquin Valley upland species are present in areas adjacent to the project site, avoidance measures to protect special-status wildlife species including, but not limited to, San Joaquin kit fox, American badger, Western burrowing owl, special-status small mammal species, and blunt-nosed leopard lizard during construction and pipeline installation are described below.

Implementation of the proposed project could potentially impact individual special-status small mammal species, including giant kangaroo rat, Tipton kangaroo rat, San Joaquin antelope squirrel, San Joaquin pocket mouse, and Tulare grasshopper mouse, should they be present in the proposed project site during project implementation. Should small mammal burrows become established in the project site prior to construction, the project could impact burrows that may be potentially used by these species. Impacts to special-status small mammal species or their burrows could occur through crushing by construction equipment or entombment below ground in burrows during project activities. These species' normal behavior could also be affected due to noise and vibration from project activities. Impacts to these species would be considered significant. In the event that special-status small mammal species are present or potential small mammal burrows become established in the proposed project site, measures to protect this species from potential impacts are included and described further in the ***Proposed Avoidance and Mitigation Measures*** section.

Implementation of the proposed project could potentially impact individual blunt-nosed leopard lizards, should they be present in the proposed project site during project implementation. Should California ground squirrel burrows, or other small mammal burrows become established in the project site prior to construction, the project could impact burrows that may be potentially used by blunt-nosed leopard lizards. Impacts to blunt-nosed leopard lizards or their burrows could occur through crushing by construction equipment or entombment below ground in burrows during project activities. This species' normal behavior could also be affected due to noise and vibration from project activities. Impacts to this species would be considered

significant. In the event that blunt-nosed leopard lizards are present in the proposed project site, measures to protect this species from potential impacts and avoid take are included and described further in the ***Proposed Avoidance and Mitigation Measures*** section.

Implementation of the proposed project could potentially impact individual San Joaquin kit fox, American badgers, or their dens, should they become established within the proposed project site prior to project implementation. Impacts to badgers or kit fox could occur through crushing by construction equipment during project activities. These species could also be affected due to noise and vibration from project activities if dens are located closer than 200 feet to the proposed project site; project related noise and vibration could cause the abandonment of occupied dens. Impacts to these species would be considered significant. Avoidance and minimization measures to protect this species from potential impacts are included and described further in the ***Proposed Avoidance and Minimization Measures*** section.

Implementation of the proposed project could potentially impact individual and nesting burrowing owls should they become established within the proposed project site prior to or during project implementation. Impacts to this species could occur through crushing by construction and drilling equipment during implementation of project activities. Actively nesting burrowing owls could also be affected due to noise and vibration from project activities if nests are located near the proposed project; project related noise and vibration could cause the abandonment of active nest sites. Impacts to this species would be considered significant. Pre-construction surveys are recommended to detect species presence and/or use in the project sites. In the event that burrowing owls become established in the proposed project site, measures to protect this species from potential impacts are described further in the ***Proposed Avoidance and Minimization Measures*** section.

Implementation of the proposed project could potentially impact individual and nesting migratory bird species, should they become established within the proposed project site prior to project implementation. Impacts to migratory bird species could occur through crushing by construction equipment during project activities. Actively nesting birds could also be affected due to noise and vibration from project activities, if nests are located closer than 250 feet to the proposed project site. Project related noise and vibration could cause the abandonment of active nest sites. Impacts to these species would be considered significant. In the event that nesting birds become established in the proposed project site, avoidance and minimization measures to protect these species from potential impacts are described further in the ***Proposed Avoidance and Minimization Measures*** section.

Implementation of the proposed project could potentially impact individual and nesting Swainson's hawks, should they become established near the proposed project site prior to project implementation. Impacts to the species could occur through crushing by construction equipment and vehicles during project activities. Actively nesting birds could also be affected due to noise and vibration from project activities, if nests are located within 0.5 miles of the proposed project site. Project related noise and vibration could cause the abandonment of active nest sites or forced (early) fledging. Impacts to this species would be considered significant. In the event that Swainson's hawks become established in or near the proposed project site, avoidance and minimization measures to protect the species from potential impacts are described further in the

Proposed Avoidance and Minimization Measures section.

Direct mortality or injury to sensitive animal populations could occur from earth-moving activities, if sensitive animal populations become established prior to or during project implementation. Sensitive animals could also become trapped or buried in an open trench. Avoidance and minimization measures to protect sensitive animal species from potential impacts are described further in the ***Proposed Avoidance and Minimization Measures*** section. For example, biological pre-construction surveys are recommended prior to earth disturbing activities associated with berm construction and pipeline installation (i.e., digging, trenching, and backfilling).

PROPOSED AVOIDANCE AND MINIMIZATION MEASURES

The following avoidance and minimization measures are recommended to avoid or reduce potential impacts to special-status species during the proposed BVWSD Palms Project:

1. An Environmental Awareness Program will be presented to all personnel working in the field on the proposed project site. The program will consist of a brief presentation in which biologists knowledgeable of endangered species biology and legislative protection explain endangered species concerns. The program will include a discussion of special-status plants and sensitive wildlife species. Species biology, habitat needs, status under the Endangered Species Act(s), and measures being incorporated for the protection of these species and their habitats will also be addressed.

2. As close to the beginning of project activities as possible, but not more than 14 days prior, a qualified biologist will conduct a final pre-construction biological survey of proposed construction areas to verify that no special-status species have become established in the project site.

3. Project site boundaries will be clearly delineated by stakes and/or flagging. Project activities are restricted to the project site to minimize inadvertent degradation or loss of adjacent habitat or agricultural lands during project operations.

4. All areas of habitat and small mammal burrows that may serve as potential for special-status species will be avoided during project activities.

5. To prevent entry of special-status small mammals and other wildlife into construction areas, an exclusion barrier (i.e., silt fencing) should be installed along the southern edge of the project boundary.

6. A biological monitor is recommended when project activities are being conducted in areas adjacent to potential habitat for special-status species (on the south end of the project site). The biologist will be available to direct exclusion barrier installation, and on an on-call basis thereafter for the duration of the project, to direct project activities and ensure that take of listed and other special-status species is avoided.

7. Off-road traffic outside of the designated project site should be prohibited.

8. Project-related traffic will observe a 20 mph speed limit in the project site, except on County roads and State and federal highways, to avoid impacts to special-status and common wildlife species.

9. When possible, project activities will be scheduled to avoid evening hours to minimize potential impacts to special-status wildlife species that are active during the night.

10. Hazardous materials, fuels, lubricants, and solvents that spill accidentally during project-related activities will be cleaned up and removed from the project sites as soon as possible according to applicable federal, State and local regulations.

11. To prevent entrapment of animals during construction, all excavated steep-walled holes or trenches in excess of two (2) feet in depth should be covered at the close of each working day by plywood or similar material. For trenches that cannot be closed daily, one or more escape ramps constructed of earth fill or wooden planks should be installed. Ramps should be located at no greater than 1,000-foot intervals (for pipelines) and at no less than 45-degree angles.

12. Before such holes or trenches are filled they should be thoroughly inspected for trapped animals. Any animals discovered will be allowed to escape voluntarily, or will be removed from the trench or hole by a qualified biologist and allowed to escape unimpeded.

13. All pipes, culverts, or similar structures stored at the proposed project sites overnight having a diameter of four (4) inches or greater will be inspected thoroughly for wildlife species before being buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight will be capped. If during project implementation a wildlife species is discovered inside a pipe, that section of pipe will not be moved or, if necessary, moved only once to remove it from the path of project activity, until the wildlife species has escaped.

14. All food-related trash items such as wrappers, cans, bottles or food scraps generated during project activities will be disposed of only in closed containers and regularly removed from the proposed project sites. Food items may attract wildlife species onto the proposed project sites, consequently exposing such animals to increased risk of injury or mortality. No deliberate feeding of wildlife will be allowed.

15. To prevent harassment or mortality of wildlife species via predation, or destruction of their dens or nests, no domestic pets will be permitted on the project sites.

16. The following measures (a-e) will be implemented by BVWSD to ensure protection and no take of blunt-nosed leopard lizards during project implementation:

    a. A final clearance survey will be conducted to ensure that no blunt-nosed leopard lizards are present in the project site.

b. If no individual blunt-nosed leopard lizards are observed and no burrows are identified within the project sites and a 50-foot avoidance buffer during the final clearance survey, then project activities may proceed.

c. Alternatively, if suitable burrows that may serve as potential refugia for blunt-nosed leopard lizard are identified that cannot be avoided, and a minimum 50-foot avoidance buffer cannot be maintained, then additional surveys to detect the species will be completed in accordance with CDFW's *Approved Survey Methodology For The Blunt-Nosed Leopard Lizard* (CDFG 2004).

d. If a blunt-nosed leopard lizard is observed during project pre-construction or clearance surveys, the USFWS and CDFW will be notified for further guidance.

e. All vehicle operators will check under vehicles and equipment prior to operation, or if left idle.

17. BVWSD will implement the following measures (17-19) to protect San Joaquin kit fox. These measures have been adapted from the USFWS *Standardized Recommendations For Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011):

    a) Pre-construction surveys should be conducted by a qualified biologist no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities.

    b) Construction and other project related activities should avoid den(s) that could be used by San Joaquin kit fox.

    c) If a natal/pupping den is discovered within the project site or within 200 feet of the project boundaries, the USFWS and CDFW should be notified. Natal/pupping dens may not be destroyed while occupied, and a take authorization/permit is required to destroy these dens even after they are vacated.

    d) If dens are identified during pre-construction surveys that may be used by San Joaquin kit fox, protective exclusion zones will be established prior to project activities.

    e) To ensure protection of known dens, exclusion zones should be established 100 feet from the den entrance(s) with fencing that does not prevent access to the den by kit foxes. Acceptable fencing includes untreated wood particle-board, silt fencing, or orange construction fencing, as long as it has opening for kit fox ingress/egress and keeps humans and equipment out.

    f) For potential and/or atypical dens, placement of 4-5 flagged stakes 50 feet from the den entrance(s) will suffice to identify the den location; fencing will not be required, but the exclusion zone must be observed.

g) Exclusion zones around kit fox dens will be maintained until all construction related disturbances have been completed. At that time all fencing will be removed to avoid attracting subsequent attention to the dens.

h) Only essential vehicle operation on existing roads and foot traffic should be permitted in exclusion zones. Otherwise, all construction, vehicle operation, material storage, or any type of surface-disturbing activity should be prohibited or greatly restricted within the exclusion zones.

18. If den avoidance is not feasible or if buffer zones cannot be maintained, known dens and potential dens should be monitored prior to construction activities.

    a. Known dens and potential dens occurring within the footprint of the project must be monitored for three (3) consecutive days with tracking medium or an infra-red camera beam to determine the current use. If no kit fox activity is observed during this period, the den(s) should be destroyed immediately to preclude subsequent use.

    b. If kit fox activity is observed at the den(s) during this period, the den(s) should be monitored for at least five (5) consecutive nights from the time of the observation to allow any resident animal to move to another den during its normal activity. Only when the den(s) are determined unoccupied may the den(s) be excavated.

    c. Destruction of the den(s) should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den(s) should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot reenter to use the den during the construction period. If at any point during excavation, a kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring the den as described above should resume. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped without further disturbance, from the partially destroyed den.

    d. If any kit fox den is considered to be a potential den, but is later determined during monitoring or destruction to be currently, or previously used by kit fox (e.g., if kit fox sign is found inside), then all construction activities will cease and the USFWS and CDFW will be notified immediately.

19. Destruction of any known or natal/pupping kit fox den requires take authorization/permit from the USFWS and CDFW.

20. BVWSD should designate a project representative as the contact for any employee or contractor who finds a dead, injured, or entrapped special-status wildlife species.

21. If ground disturbing activities are planned to occur during the breeding season of migratory bird or raptor species (February through mid-September), surveys for active nests will be conducted by a qualified biologist no more than 14 days prior to the start of

project activities. Pre-construction surveys will be conducted for nesting migratory birds and raptor species in the project sites and areas that support potential nesting habitat.

a. If no active nest(s) are found, then project activities may proceed and no further mitigation measures will be required.

b. If active nest(s) are found, then exclusion zones will be established a minimum of 250-feet around a nest. Project activities will avoid disturbance within the exclusion zone during the nesting season.

22. To meet the minimum level of protection for Swainson's hawk, surveys to identify birds and active nest sites should be completed by a qualified biologist for a ½ mile radius around all project activities. Surveys should be completed in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000).

a. If project activities are scheduled to occur outside the breeding or nesting season (August through December), then no additional surveys for Swainson's hawk are required.

b. If ground disturbing activities are planned to occur during the breeding or nesting season of Swainson's hawk (late March through late July) additional surveys to detect adults birds and nest(s) are recommended. The survey periods, times, and number of survey days are as follows:

Survey Dates	Search Image	Survey Time	Number of Surveys
January – March 20	Potential Nest Locations	All day	1 (optional)
March 21 – April 5	Arrival	Sunrise to 1000 1600 to Sunset	3
April 6-April 20	Breeding	Sunrise to 1200 1630 to Sunset	3
April 21-June 10	Nesting (egg-laying & incubation	Monitor known nest sites only	Initiating surveys is not recommended
June 11 – July 30	Nest sites (post-fledging)	Sunrise to 1200 1600 to Sunset	3

c. If surveys locate a nest site within 0.5 mile, a Swainson's hawk Monitoring and Mitigation Plan will be prepared by a qualified biologist in consultation with the CDFW.

d. During the breeding and nesting season (late March through late July), ensure no disturbance or other project related activities that may cause nest abandonment or forced fledging to occur within 0.5 miles of an active Swainson's hawk nest. Buffer zones may be adjusted in consultation with the CDFW.

23. The following measures included in the CDFW's *Staff Report on Burrowing Owl Mitigation* (CDFG 2012) will be implemented by BVWSD for the proposed project:

    a. Pre-construction (take avoidance) surveys will be completed by a qualified biologist no less than 14 days prior to ground disturbing activities to detect the presence of burrowing owls in the project site.

    b. If no burrowing owls are detected during pre-construction (take avoidance) surveys, then project activities may proceed.

    c. If burrowing owl presence is detected during pre-construction surveys the owls will be monitored to determine use in the project site.

    d. Avoid impacting burrows occupied during the non-breeding season (by migratory or non-migratory resident burrowing owls).

    e. Avoid disturbing occupied burrows during the burrowing owl nesting season (February 1 through August 31).

    f. Recommended setback distances and restricted activity dates for burrowing owl nesting sites based on the level of disturbance are as follows:

Time of Year	Level of Disturbance		
	Low	Medium	High
April 1 – Aug 15	200 meters	500 meters	500 meters
Aug 16 – Oct 15	200 meters	200 meters	500 meters
Oct 16 – Mar 31	50 meters	100 meters	500 meters

CONCLUSION

Sixteen special-status species (13 special-status wildlife species and three (3) special-status plants) have been documented in the CNDDB in vicinity to the proposed project site (CDFW 2015a). Special-status wildlife species that have been recorded in proximity to the proposed project site include San Joaquin kit fox, Western burrowing owl, San Joaquin antelope squirrel, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, San Joaquin pocket mouse, blunt-nosed leopard lizard, giant garter snake, Swainson's hawk, mountain plover, Le Conte's thrasher, and Western pond turtle. Special-status plants that have been documented in vicinity to the project site include slough thistle, recurved larkspur, and oil neststraw.

A total of seven (7) of those special-status species are known to occur, indicating they were either identified while conducting biological surveys for the proposed project, or they have been (historically) documented in the project site or buffer area in the CNDDB. Species in this category include giant garter snake, San Joaquin kit fox, Tipton kangaroo rat, Le Conte's thrasher, loggerhead shrike, and slough thistle. Loggerhead shrike is the only special-status

species indicated in the records search that was directly observed during biological surveys; the remaining species were recorded in the CNDDB (CDFW 2015a).

The habitat assessment conducted for the proposed BVWSD Palms Project found that no natural lands are present within the boundaries of the proposed project site. However, natural lands and native habitats are present in the buffer area, in undisturbed/uncultivated areas south and east of the proposed project boundary. Areas of habitat adjacent to the project site occur along the California Aqueduct to the south and on the Tule Elk Reserve to the east. Other natural lands in proximity include the Elk Hills Oil Field, the Coles Levee Ecosystem Preserve, and the Kern Water Bank. Riparian habitat is present southeast of the project site, along the Outlet Canal. The proposed project would avoid directly impacting adjacent areas of saltbush scrub and annual grassland habitat, as they occur outside the boundaries of the proposed project site. As proposed, the BVWSD Palms Project has been sited to avoid impacts to natural lands, including sensitive plant communities, riparian areas, designated wetlands, and potential wetlands.

Since the proposed project would be conducted entirely on lands disturbed by agricultural use, project implementation would not result in impacts to natural lands. Based on historic conversion to agricultural use, current land use, and conditions observed during biological surveys, RAB Consulting has determined the proposed project site does not support habitat that is suitable for use by many special-status species with potential to occur.

No suitable habitat for special-status plants is present within the boundaries of the proposed project site. No special-status plants were observed in the proposed project site during biological surveys. Based on the habitat requirements of targeted plant species and current land use, special-status plant species are not expected to be present or become established in the project site. This determination is based on historic land conversion from habitat to agricultural use, the level of current disturbance, and site conditions observed at the time of our biological surveys.

Although the project site is located in agricultural lands, RAB Consulting determined that several special-status wildlife species may potentially be present during project activities, or have low potential to occur in the proposed project site. Certain migratory bird species, such as long-billed curlew and mountain plover, may forage in agricultural areas that contain low-growing vegetation and a potential insect prey base. As a result of mobility, there is potential for certain species to occasionally pass through and/or to forage in the project site. Since natural land that represents potential habitat for several San Joaquin Valley upland species is present in areas adjacent to the project site, avoidance measures are recommended to protect special-status wildlife species including, but not limited to, San Joaquin kit fox, American badger, Western burrowing owl, giant kangaroo rat, Tipton kangaroo rat, short-nosed kangaroo rat, San Joaquin pocket mouse, Tulare grasshopper mouse, and blunt-nosed leopard lizard during project activities.

If the avoidance and minimization measures recommended in this report are implemented by the BVWSD for the proposed Palms project, impacts to listed and other special-status wildlife and special-status plant species would be avoided.

LITERATURE CITED AND REFERENCES CONSULTED

Abrams, L. 1923. Illustrated flora of the Pacific states. Volume I. Stanford University Press, Stanford, California. 538 pp.

Abrams, L. 1944. Illustrated flora of the Pacific states. Volume II. Stanford University Press, Stanford, California. 635 pp.

Abrams, L. 1951. Illustrated flora of the Pacific states. Volume III. Stanford University Press, Stanford, California. 866 pp.

Abrams, L. and R. S. Ferris. 1960. Illustrated flora of the Pacific states. Volume IV. Stanford University Press, Stanford, California. 732 pp.

Braun, S. E. 1985. Home range and activity patterns of the giant kangaroo rat, *Dipodomys ingens*. Journal of Mammalogy. 66(1):1-12.

Burt, W. B. and R. P. Grossenheider. 1976. A field guide to the mammals. Houghton Mifflin Company. Boston, Massachusetts. 289 pp.

Bushnel, R. G. 1978. Effect of noise on wildlife. Introduction. Pages 7-22. *In*: Fletcher, J. L. and R. G. Busnel (eds.). Effects of noise on wildlife. Academic Press, New York. 305 pp.

CDFG (California Department of Fish and Game). 1984. Guidelines for assessing effects of proposed developments on rare and endangered plants and plant communities. The Resource Survey, California Department of Fish and Game.

CDFG (California Department of Fish and Game). 1989. Designated Endangered or Rare Plants. State of California, Resources Agency.

CDFG (California Department of Fish and Game). 1990. Region 4 Survey methodologies for San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, Tipton kangaroo rat, giant kangaroo rat. Compiled by R. Rempel and G. Presley.

CDFG (California Department of Fish and Game). 1995. Staff report on burrowing owl mitigation. Unpublished protocol, California Department of Fish and Game, Sacramento, California. 8 pp.

CDFG (California Department of Fish and Game). 2000. Guidelines for assessing effects of proposed developments on rare and endangered plants and natural communities. The Resource Survey, California Department of Fish and Game.

CDFG (California Department of Fish and Game). 2004. Approved survey methodology for the blunt-nosed leopard lizard. Unpublished protocol, California Department of Fish and Game, Sacramento, California. 4 pp.

CDFG (California Department of Fish and Game). 2004. Natural Diversity Database Special Animals. Unpublished list.

CDFG (California Department of Fish and Game). 2009. Protocols for Surveying and evaluating impacts to special-status native plant populations and natural communities. California Department of Fish and Game, November 2009.

CDFG (California Department of Fish and Game). 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency, Department of Fish and Game. March 7, 2012. 34 pp.

CDFW (California Department of Fish and Wildlife). 2015. California Natural Diversity Database. Rare Find 5, for Commercial Subscribers. Habitat Planning and Conservation Branch. Electronic Database.

CDFW (California Department of Fish and Wildlife). 2015b. California Wildlife Habitat Relationships Systems. California Department of Fish and Wildlife. California Interagency Wildlife Task Group. https://nrm.dfg.ca.gov/. Website accessed on July 3, 2015.

CDFW (California Department of Fish and Wildlife). 2015c. Survey and Monitoring Protocols and Guidelines. https://www.dfg.ca.gov/widlife/nongame/survey_monitor.html.

CNPS (California Native Plant Society). 1991. Mitigation guidelines regarding impacts to rare, threatened, and endangered plants. Unpublished manuscript by California Native Plant Society – Rare plant scientific advisory committee. 17 pp.

CNPS (California Native Plant Society). 2001. Botanical survey guidelines of the California Native Plant Society. Fremontia. 29:3-4.

CNPS. California Native Plant Society). 2012. Vegetation Alliances of the Great Valley Ecoregion, California.

CNPS (California Native Plant Society) Rare Plant Program. 2015. Inventory of Rare, and Endangered Plants of California, (online edition, v8-02). California Native Plant Society. Sacramento, California. Website http://www.rareplants.cnps.org [accessed September 10, 2015).

Cheatham, N. H. and J. R. Haller. 1975. An annotated list of California habitat types. Unpublished manuscript prepared for University of California Natural Land and Water Reserves System. 80 pp.

Cypher, B.L., G.D. Warrick, M.R.M. Otten, T.P. O'Farrell, W.H. Berry, C.E. Harris, T.T.Kato, P.M. McCue, J.H. Scrivner and B.W. Zoellick. 2000. Population dynamics of San

Joaquin kit foxes at the Naval Petroleum Reserves in California. Wildlife Society Monograph Number 145. 43 pp.

Cypher, E. A. 1994. Demography of *Caulanthus californicus*, *Lembertia congdonii*, and *Eriastrum hooveri*, and vegetation characteristics of endangered species populations in the southern San Joaquin Valley and the Carrizo Plain Natural Area in 1993. California Dept. Fish and Game, Sacramento, Unpubl. Rep., 50 pp. + photographs.

Germano, D.J. and D.F. Williams. 1994. *Gambelia sila* (blunt-nosed leopard lizard). Cannibalism. Herpetological Review. 25:26-27.

Germano, D.J., R.B. Rathbun and L.R. Saslaw. 2001. Managing exotic grasses and conserving declining species. Wildlife Society Bulletin. 29:551-559.

Germano, D.J., P.T. Smith and S.P. Tabor. 2007. Food habitats of the blunt-nosed leopard lizard (*Gambelia sila*). Southwestern Naturalist. 52(2): 319-324.

Grinnell, J. 1932. Habitat relations of the giant kangaroo rat. Journal of Mammology. 13(4):305-320.

Grinnell, J. and A. H. Miller. 1944. The Distribution of the Birds of California. Cooper Ornithological Club, Berkeley, California. 615 pp.

Hawbecker, A. C. 1944. The giant kangaroo rat and sheep forage. Journal of Wildlife Management. 8:161-165.

Hawbecker, A. C. 1947. Food and moisture requirements of the Nelson antelope ground squirrel. Journal of Mammalogy. 28:115-125.

Hawbecker, A. C. 1953. Environment of the Nelson antelope ground squirrel. Journal of Mammalogy. 34 (3): 324-334.

Hickman, J. 1996. The Jepson Manual: Higher plants of California. University of California Press. Berkeley, California.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished manuscript, California Department of Fish and Game, Nongame - Heritage Program, Sacramento. 156 pp.

Ingles, L. G. 1965. Mammals of the Pacific states, California, Oregon, Washington. Stanford University Press, Stanford, California. 506 pp.

Jameson, E. W. Jr. and H. J. Peeters. 1988. California Mammals. University of California Press. Berkeley, CA. 403 pp.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. Contract Number 8023. 260 pp.

Laughrin, L. 1970. San Joaquin fit fox, its distribution and abundance. Wildlife Management Branch Administrative Report Number 70-2. State of California Resources Agency, Department of Fish and Game. Sacramento, California. 19 pp.

Lee, J. M. and D. B. Griffith. 1977. Transmission audible noise and wildlife. *In*: Proceedings Symposium Ninth International. Congress on Acoustics. July 4-9, 1977. Madrid, Spain.

Long, C. A. 1973. *Taxidea taxus*. Mammal Species, 26:1-4.

Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior. The Condor. 75:446-456.

Moe, L.M. 1994. A synonymozied list of vascular plant species in Kern County, California. Crossosoma. 20(1):17-44.

Moe, L.M. 1995. A key to vascular plant species of Kern County California. California Native Plant Society. 225 pp.

Montanucci. R.R. 1965. Observations on the San Joaquin leopard lizard, *Crotaphytus wislizenii silus* Stejneger. Herpetologica. 21:270-283.

Montanucci. R.R. 1967. Further studies on leopard lizards, *Crotaphytus wislizenii*. Herpetologica. 23:119-125.

Morrell, S. 1972. Life History of the San Joaquin Kit Fox. California Department of Fish and Game. 58(3): 162-174.

Munz, P. A. and D. D. Keck. 1968. A California flora and supplement. University of California Press, Berkeley.

Murie, O. J. 1974. A Field Guide to Animal Tracks. Houghton Mifflin Company. Boston, MA.

Nelson, J. R. 1987. Rare plant surveys: Techniques for impact assessment. pp. 159-166. *In*: T. Elias (ed.), Conservation and Management of Rare and Endangered Plants. California Native Plant Society, Sacramento, California.

O'Farrell, T. P. 1983. San Joaquin kit fox recovery plan. U. S. Fish and Wildlife Service, Sacramento, California. 84 pp.

Orloff, S.G. 1992. Survey techniques for the San Joaquin kit fox (*Vulpes macrotis mutica)*. pp 185-197. *In*: Williams, D.F., S. Byrne and T. A. Rado (eds.), Proceedings of a conference on endangered and sensitive species of the San Joaquin Valley, California, Bakersfield,

California, December 10-11, 1987. California Energy Commission, Sacramento, California. 388 pp.

Orloff, S. F. Hall, and L. Spiegel. 1986. Distribution and habitat requirements of the San Joaquin kit fox in the northern extreme of its range. California-Nevada Wildlife Society Proceedings.

Palmero, L. 1983. Foraging and social behavior of Cuyama Valley leopard lizards. Unpublished masters of science thesis, University of California, Davis, California.

Preston, W. L. 1981. Vanishing Landscapes: Land and line in the Tulare Basin. University of California Press, Berkeley, California.

Randall, J. A. 1997. Social organization and communication in *Dipodomys ingens*. Report for Research during 1995-96, Permit PR-799486, on the endangered giant kangaroo rat, *Dipodomys ingens*, to U.S. Fish and Wildlife Service.

Remsen, J. V. Jr. 1978. Bird species of special concern in California, an annotated list of declining or vulnerable bird species. California Department of Fish and Game, Nongame Wildlife Investigations, Wildlife Management Branch Administrative Report Number 78-1. 52 pp.

Sankary, M.N. and M.G. Barbour. 1972. Autecology of *Atriplex polycarpa* from California. Ecology. 53:155-1162.

Sawyer, J. and T. Keeler-Wolf. 1995. A manual of California Vegetation. California Native Plant Society. Sacramento, California

Shaw, W. T. 1934. The ability of the giant kangaroo rat as a harvester and storer of seeds. Journal of Mammalogy. 15(4):275-286.

Skinner, M.W., and B.M.Pavlik. 1994. Inventory of rare and endangered vascular plants of California. California Native Plant Society Special Publication Number 1 (5th edition). California Native Plant Society, Sacramento, California. 336 pp.

Smith, J. P. and K. Berg. 1988. Inventory of rare and endangered plants of California. California Native Plant Society Special Publication Number 4, Sacramento, California.

Stebbins, R. C. 2003. A field guide to western reptiles and amphibians. Third Edition. Houghton Mifflin Company. Boston, Massachusetts. 514 pp.

Swainson's Hawk Technical Advisory Committee. 2000. Recommended Timing and Methodology For Swainson's Hawk Nesting Surveys In California's Central Valley. May 31, 2000. 5 pp.

Taylor, D. W. 1987. Status of San Joaquin Woolly-threads (*Lembertia congdonii*). U. S. Fish and Wildlife Service, Sacramento.

Taylor, D. W. and W. B. Davilla. 1986. Status survey of three plants endemic to the San Joaquin Valley, California. U.S. Fish and Wildlife Service, Sacramento, California.

Tollestrup, K. 1976. A standardized method of obtaining an index of densities of blunt-nosed leopard lizards, *Crotaphytus silus*. U.S. Fish and Wildlife Service. Unpublished Masters Thesis.

Twisselmann, E. C. 1956. A flora of the Temblor Range, Kern County, California. Wasmann Journal of Biology. 14:161-300.

Twisselmann, E. C. 1967. A flora of Kern County, California. Wasmann Journal of Biology. 25:1-395.

Uptain, C., W.A. Clark, and S.M. Juarez. 1985. Mark-recapture population estimates and visitation indices for the blunt-nosed leopard lizard, *Gambelia silus*, at the Pixley National Wildlife Refuge. U.S. Fish and Wildlife Service, Delano, CA, Contract Nos. 10181-9810-3(js) and 10181-4672-4, 34 pp. + Appendices.

URS Corporation (URS). 2013. (DRAFT) Biological Assessment. Hydrogen Energy California, Kern County, California. February 2013. 95 pp.

USFWS (U.S. Fish and Wildlife Service). 1980. Blunt-nosed leopard lizard recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon. 61 pp.

USFWS (U.S. Fish and Wildlife Service). 1989. Standardized recommendations for the protection of the San Joaquin kit fox. April 1989.

USFWS (U.S. Fish and Wildlife Service). 1990. Endangered and threatened wildlife and plants. Federal Register. 50(35): 6184-6229.

USFWS (U.S. Fish and Wildlife Service). 1995. Blunt-nosed leopard lizard revised recovery plan. U.S. Fish and Wildlife Service, Portland, OR. 85 pp.

USFWS (U.S. Fish and Wildlife Service). 1996. Endangered and threatened wildlife and plants; Review of plant and animal taxa that are candidates for listing as endangered or threatened species. Federal Register. 61(40): 7596-7613.

USFWS (U.S. Fish and Wildlife Service). 1998. Recovery Plan for upland species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

USFWS (U.S. Fish and Wildlife Service). 1999. Standardized recommendations for the protection of the San Joaquin kit fox prior to or during ground disturbance. Unpublished protocol prepared by U.S. Fish and Wildlife Service, Sacramento, California. 7 pp.

USFWS (U.S. Fish and Wildlife Service). 2000. Guidelines for conducting and reporting botanical inventories for federally listed, proposed and candidate plants. United States Fish and Wildlife Service. January 2000.

USFWS (U.S. Fish and Wildlife Service). 2006. Least Bell's Vireo (*Vireo bellii pusillus*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office, Carlsbad, California. September 2006. 27 pp.

USFWS (U.S. Fish and Wildlife Service). 2010. Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. February 2010. 102 pp.

USFWS (U.S. Fish and Wildlife Service). 2010b. *Monolopia (=Lembertia) congdonii* (San Joaquin woolly-threads) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. June 2010. 32 pp.

USFWS (U.S. Fish and Wildlife Service). 2011. U.S. Fish and Wildlife Service Standardized Recommendations For Protection Of The Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance. Prepared by the Sacramento Fish And Wildlife Office, January 2011. 9 pp.

USFWS (U.S. Fish and Wildlife Service). 2013. *Eremalche kernensis* (Kern Mallow) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 73 pp.

USFWS (U.S. Fish and Wildlife Service). 2015a. Information, Planning, and Conservation System (IPaC). Unofficial IPaC Trust Resource Report obtained online at: http://ecos.fws.gov.ipac.

USFWS (U.S. Fish and Wildlife Service). 2015b. Environmental Conservation Online System (ECOS). Critical Habitat Portal for Threatened and Endangered Species. Available online at: http://ecos.fws.gov/crithab/.

USFWS (U.S. Fish and Wildlife Service). 2015c. Environmental Conservation Online System (ECOS). Species profiles available online at: http://ecos.fws.gov.

Wilbur, S.R. 1978. The California condor, 1966-76: A look at its past and future. U.S. Fish and Wildlife Service North America Fauna 72:1-136.

Williams, D. F. 1980. Distribution and population status of the San Joaquin antelope squirrel and the giant kangaroo rat. California Department of Fish and Game, Nongame Wildlife Investigation Report E-W-4, IV-10.1. 45 pp.

Williams, D. F. 1986. Mammalian species of special concern in California. California Department of Fish and Game, Wildlife Management Division, Administrative Report. 86-1. 112 pp.

Williams, D.F. 1992. Geographic distribution and population status of the giant kangaroo rat, Dipodomys ingens (Rodentia, Heteromyidae). Pp. 301-325, in Endangered and sensitive species of the San Joaquin Valley, California (D.F. Williams, S. Byrne, and T.A. Rado, eds.). California Energy Commission, Sacramento, 388 pp.

Williams, D.F., and D.J. Germano. 1991. Effects of livestock grazing on endangered species at Pixley National Wildlife Refuge, Tulare County, California. U.S. Fish and Wildlife Service, Kern National Wildl. Refuge, Delano, CA, Order No. 10181-11764(BW), 33 pp.

Williams, D.F., H.H. Genoways, and J.K. Braun. 1993. Population studies of endangered kangaroo rats and blunt-nosed leopard lizards in the Carrizo Plain Natural Area, California. California Department of Fish and Game, Nongame Bird and Mammal Sec., Rep 93-01:1-114.

Williams, D.F. and K.S. Killburn. 1991. *Dipodomys ingens*. Mammal Species. 377:1-7.

Zarn, M. 1974. Habitat management for unique or endangered species. Burrowing owl, *Speotyto cunicularia hypugaea*, Report Number 11. Technical Note, U. S. Department of Interior, Bureau of Land Management. Denver, Colorado. 25 pp.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer and M. White. 1990. California's wildlife. Volume I - amphibians and reptiles. Volume II - birds, and Volume III - mammals. California Department of Fish and Game. Sacramento, California.

APPENDIX A
REPRESENTATIVE PHOTOGRAPHS

Photograph 1
View north of the proposed project site, from the west side of Tupman Road.

Photograph 2
View south of the proposed project site, taken from the west side of Tupman Road.

Photograph 3
View east from a proposed recharge basin in the project site.

Photograph 4
View west from a proposed recharge basin within the Palms project site.

Photograph 5
View north of plowed fields and an existing agricultural facility within the Palms project site.

Photograph 6
View west from the northern boundary of the Palms project site.

Photograph 7
A maintained canal within the project site, view east toward the Tule Elk State Natural Reserve.

Photograph 8
View south of a maintained irrigation ditch observed within the project site.

Photograph 9
View of existing BVWSD facilities within the proposed project site.

Photograph 10
A recently plowed field in the project site, east of Tupman Road.

Photograph 11
View of pistachios planted in the buffer area, north of Adohr Road.

Photograph 12
Cotton planted in the buffer area, east of and adjacent to the proposed project.

Photograph 13
View east along the southernmost pipeline alignment.

Photograph 14
View of buffer area south of project site, east of Tupman Road.

Photograph 15
View west of natural lands present south of the project boundary.

Photograph 16
View north of trespass dumping observed in the buffer area south of the project site.

PHASE I SURVEY, BVWSD PALMS PROJECT, KERN COUNTY, CALIFORNIA

Prepared for:

Ms. Stephanie Breeden
GEI Consultants, Inc.
700 NE Multnomah Street, Suite 230
Portland, OR 97232

Prepared by:

Peter A. Carey, M.A., RPA
Associate Archaeologist

and

David S. Whitley, Ph.D., RPA
Principal Investigator

ASM Affiliates
20424 West Valley Blvd., Suite A
Tehachapi, California 93561

December 2015

PN 22470.03

TABLE OF CONTENTS

Chapter **Page**

Management Summary ..... **iii**

1. INTRODUCTION AND REGULATORY CONTEXT **1**

2. ENVIRONMENTAL AND CULTUAL BACKGROUND **5**

2.1 ENVIRONMENTAL BACKGROUND 5
2.2 GEOARCHAEOLOGICAL BACKGROUND 5
2.3 ETHNOGRAPHIC BACKGROUND 7
2.4 Archaeological Background 8
2.5 HISTORICal background 11

3. ARCHIVAL RECORDS SEARCH **17**

3.1 Previous Canal surveys 20

4. METHODS AND RESULTS **19**

4.1 INVENTORY RESULTS 19

5. SUMMARY AND RECOMMENDATIONS **21**

5.1 RECOMMENDATIONS 21

REFERENCES **23**

Confidential Appendices **27**

Confidential Appendix A: **29**

Site Record **29**

Confidential Appendix B: **30**

Isolate Records **30**

LIST OF FIGURES

Page

Figure 1. Location of the BVWSD Palms Project survey area, Kern County, California. 4
Figure 2a. Unnamed canal lateral, looking north. 6
Figure 2b. Southernmost survey parcel, looking east. 6

LIST OF TABLES

Page

Table 1. Survey Reports Within the Project Area 15
Table 2. Survey Reports Within .5-mi of the Project Area 16
Table 3. Resources Within .5-mi of the Project Area 17
Table 4. Isolated Artifacts – The Palms Project 20

MANAGEMENT SUMMARY

An intensive Phase I cultural resources survey was conducted for the Buena Vista Water Storage District (BVWSD) Palms Project (Project), near Buttonwillow, Kern County, California. This study was conducted by ASM Affiliates, Inc., with David S. Whitley, Ph.D., RPA, serving as principal investigator. Background studies and fieldwork for the survey were completed in August and September 2015. The study was undertaken to assist with California Environmental Quality Act (CEQA) compliance.

A records search of site files and maps was conducted on August 4, 2015, at the Southern San Joaquin Valley Archaeological Information Center (AIC), California State University, Bakersfield. A search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed on September 17, 2015. These investigations determined that the study area had not been previously surveyed in its entirety but portions of ten historical linear sites, all canals or ditches, were within it. Previous evaluations of these historical resources determined that they were not significant or unique. No sacred sites or traditional cultural places had been identified within or adjacent to the study area.

The Phase I survey fieldwork was conducted in August and September 2015, with parallel transects spaced at 15-meter (m) intervals walked along the approximately 1,160-acre (ac) survey area, and buffers of 50-ft on each side of the pipeline route.

No significant historical resources or properties were discovered within the study area. Based on these findings, construction of the recharge cells and pipelines do not have the potential to result in adverse impacts to significant historical resources or properties, and no additional cultural resource studies are recommended.

1. INTRODUCTION AND REGULATORY CONTEXT

ASM Affiliates was retained by GEI Consultants, Inc., to conduct an intensive Phase I cultural resources survey for the Buena Vista Water Storage District (BVWSD) Palms Project study area, near Buttonwillow, Kern County, California. The Project Area of Potential Effect (APE) was defined as the area of direct ground surface disturbance. The cultural resources survey covered the entirety of the APE, with 50-ft buffers.

The purpose of this archaeological investigation was to assist with California Environmental Quality Act (CEQA) compliance for development of the above locations. The investigation was undertaken, specifically, to ensure that significant impacts to historical resources do not occur as a result of project construction.

This current included:

- A background records search and literature review to determine if any known archaeological sites were present in the project zone and/or whether the area had been previously and systematically studied by archaeologists;
- A search of the NAHC *Sacred Lands File* to determine if any traditional cultural places or cultural landscapes have been identified within the area;
- An on-foot, intensive inventory of the study area to identify and record previously undiscovered cultural resources and to examine known sites; and
- A preliminary assessment of any such resources found within the subject property.

This study was conducted by ASM Affiliates, Inc., of Tehachapi, California, during August and September 2015. David S. Whitley, Ph.D., RPA, served as principal investigator and Rob Azpitarte, B.A., ASM Associate Archaeologist, conducted the fieldwork with the assistance of Stacey Escamilla, B.A., Amber Tedrow, B.A., Mercedes Bandimere, B.A., Jeff Stephens, B.A., and Mike Huerta, A.A.

This document constitutes a report on the Phase I survey. Subsequent chapters provide background to the investigation, including historic context studies; the findings of the archival records search; a summary of the field surveying techniques employed; and the results of the fieldwork. We conclude with management recommendations for the Project area.

1.1 PROJECT LOCATION

The Project area is located approximately 5.7-miles (mi) southeast of Buttonwillow and 16-mi west of Bakersfield, Kern County, California. This places it towards the southern end and on the open flats of the San Joaquin Valley, a large interior and relatively low-lying valley that drains northwards to the San Francisco Bay. While the study area is a significant distance from the Pacific Ocean, elevation is only approximately 290-feet (ft) above mean seal level (amsl). The Project area is situated south of Adohr Road and a majority of the Project area is situated west of Tupman Road, with a small portion to the east of Tupman Road. The entire Project area is located north of the California Aqueduct.

The proposed Palms Project will total approximately 1,100-acres in Sections 9, 10, 11, 14, 15, and 23, Township 30 South, Range 24 East (T30S/R24E), Mount Diablo Base and Meridian (MDBM; Figure 1).

1.2 PROJECT DESCRIPTION

The proposed Palms Project is a groundwater replenishment and water banking project that will entail the removal of irrigated lands and conversion of these lands to recharge facilities. The Project involves multiple stages: 1) construction of recharge facilities, 2) installation of pumps in existing wells and approximately 4 miles of pipeline, 3) construction and equipping additional recovery wells with associated piping, and 4) water treatment facilities if needed. Stages 3 and 4 primarily involve the recovery aspect and would be constructed at a later date. Construction of stages 1 and 2 would include activities consistent with digging, trenching, and excavation of soil to create water holding ponds and channels, and the installation new pipeline. Linear trenches would be excavated around the perimeter of the water holding facilities to install approximately 16,500 feet of 24-inch-diameter pipe and another 5,000 feet of 36 inch pipe to convey water recovered from the Palms project area. Approximately 4-mi of pipelines will be installed, primarily on the west and south sides of the Project area running along, but separate from, the West Side Canal. Additionally, pipeline will be installed along an unnamed lateral of the East Side Canal to connect that canal to the recharge system.

1.3 REGULATORY CONTEXT

1.3.1 CEQA

CEQA is applicable to discretionary actions by state or local lead agencies. Under CEQA, lead agencies must analyze impacts to cultural resources. Significant impacts under CEQA occur when "historically significant" or "unique" cultural resources are adversely affected, which occurs when such resources could be altered or destroyed through project implementation. Historically significant cultural resources are defined by eligibility for or by listing in the California Register of Historical Resources (CRHR). The criteria for listing historically significant cultural resources in the CRHR are as follows (see PRC § 5024.1, Title 14 CCR, Section 4852 and § 15064.5(a)(3)).

Significant cultural resources are those archaeological resources and historical properties that:

(A) Are associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Are associated with the lives of persons important in our past;

(C) Embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of an important creative individual, or possess high artistic values; or

(D) Have yielded, or may be likely to yield, information important in prehistory or history.

Unique resources under CEQA are those that represent:

an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC § 21083.2(g)).

Preservation in place is the preferred approach under CEQA to mitigating adverse impacts to significant or unique cultural resources.

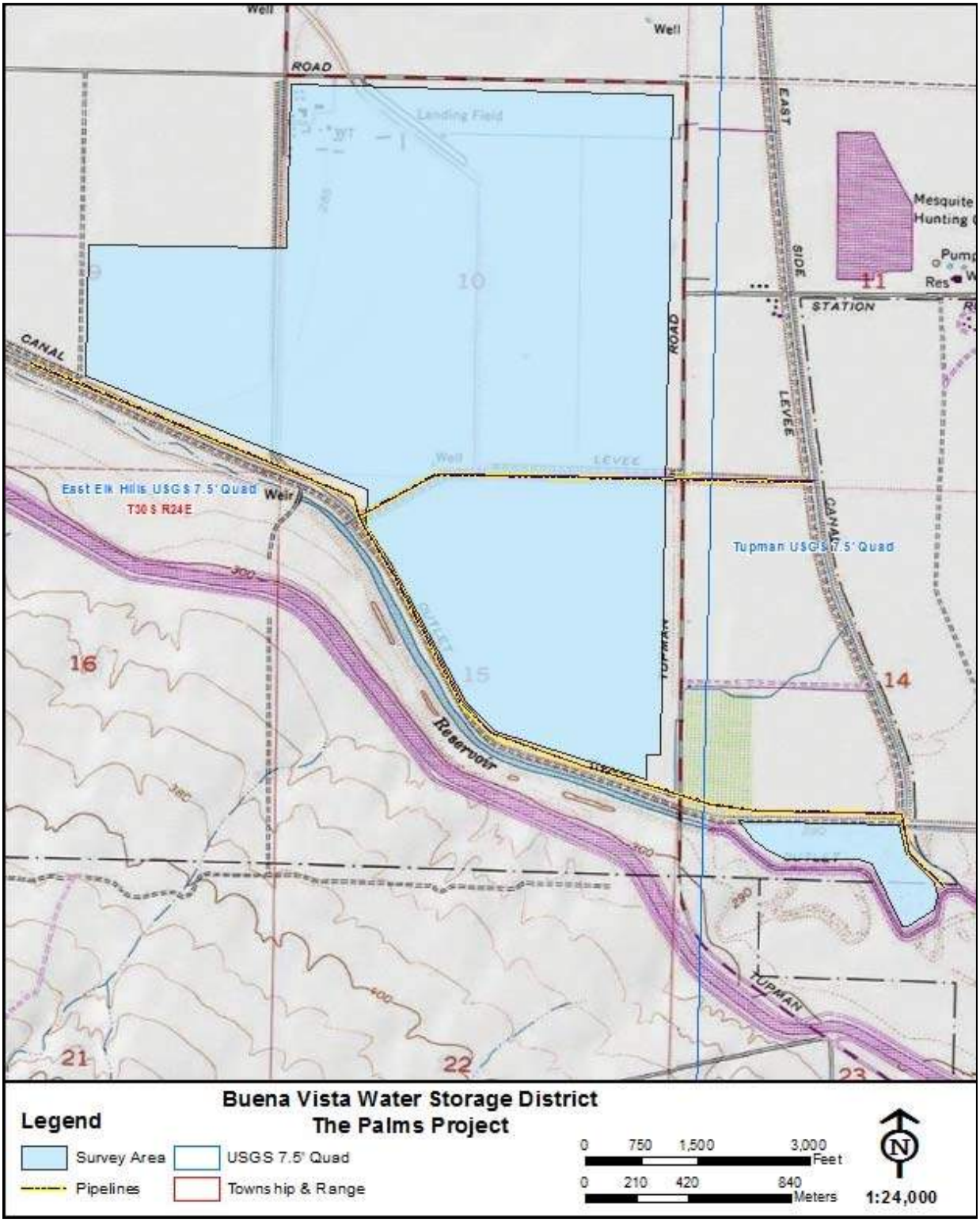


Figure 1. Location of the BVWSD Palms Project survey area, Kern County, California.

2. ENVIRONMENTAL AND CULTUAL BACKGROUND

2.1 ENVIRONMENTAL BACKGROUND

At the time of the Phase I study, the Project study area consisted of and was surrounded by fallow farm fields (Figure 2a and 2b). Although this location currently may be characterized as a dry open valley bottom, the study area is located within the historical Kern River Delta area. Prior to reclamation and channelization, the region would have been a low lying, water rich area characterized by sloughs, marshes and swamps. While occasionally inundated by floodwaters, in most years the region would have been marshy during the winter rainy season.

Historical and recent land-use has thus changed the vegetation that was once present within and near the Project area. However, it is likely that Riparian Woodlands were once found along drainages in the general vicinity. Although the Project area may have included the Valley Grassland community, depending upon drainage and seasonal storm systems, freshwater marshes may have also been present (see Schoenherr 1992).

2.2 GEOARCHAEOLOGICAL BACKGROUND

Examination of the East Elk Hills (1932, 1:31,680) topographical quadrangle demonstrates that the Project area historically consisted of the Buena Vista Slough, a northern channel of the southern San Joaquin Valley basin consisting of low lying sloughs and swamps which experienced periodic flooding, drying, and, potentially, stripping. Although this does not preclude human use, especially seasonally, preserved habitations would be restricted to higher topography. Sporadic or seasonal use of the intervening areas (e.g., for hunting or plant gathering) would result in surficial archaeological deposits that were periodically re-worked by changing hydrological conditions, and thus are out of original context and lack integrity. This conclusion is confirmed by Meyer, Young, and Rosenthal (2010:137) who map the immediate soils in the project area as historic/modern, dating to the last 150 years, which are “found along active channels and lakeshores.” This indicates that the Project area has low subsurface archaeological sensitivity, and a low potential for subsurface archaeological disturbance.

Figure 2a. Unnamed canal lateral, looking north.

Figure 2b. Southernmost survey parcel, looking east.

2.3 ETHNOGRAPHIC BACKGROUND

Penutian-speaking Yokuts tribal groups occupied the southern San Joaquin Valley region and much of the nearby Sierra Nevada. Ethnographic information about the Yokuts was collected primarily by Powers (1971, 1976 [originally 1877]), Kroeber (1925), Gayton (1930, 1948), Driver (1937), Latta (1977) and Harrington (n.d.). For a variety of historical reasons, existing research information emphasizes the central Yokuts tribes who occupied both the valley and particularly the foothills of the Sierra. The northernmost tribes suffered from the influx of Euro-Americans during the Gold Rush and their populations were in substantial decline by the time ethnographic studies began in the early twentieth century. In contrast, the southernmost tribes were partially removed by the Spanish to missions and eventually absorbed into multi-tribal communities on the Sebastian Indian Reservation (on Tejon Ranch), and later the Tule River Reservation and Santa Rosa Rancheria to the north. The result is an unfortunate scarcity of ethnographic detail on southern Valley tribes, especially in relation to the rich information collected from the central foothills tribes where native speakers of the Yokuts dialects are still found. Regardless, the general details of indigenous life-ways were similar across the broad expanse of Yokuts territory, particularly in terms of environmentally influenced subsistence and adaptation and with regard to religion and belief, which were similar everywhere.

This scarcity of specific detail is particularly apparent in terms of southern valley tribal group distribution. According to Kroeber (1925:478), the Tulamni occupied the edges of Buena Vista Lake and the southwestern end of the valley; the Hometwoli lived in and around Kern Lake to the east; the Tuhohi (or Chuxoxi) resided near the mouth of Kern River as it drained north into Tulare Lake; and Yauelmani territory comprised the southeastern side of the valley extending north into Bakersfield proper. The study area lies near the boundaries of these tribes, but its specific territorial affiliation is unclear.

Regardless of tribal affiliation, historical village distribution was similar across the region. Villages were typically located along lakeshores and major stream courses (as these existed circa AD 1800). The study area lies within a region that, historically, contained a series of sloughs that connected Buena Vista Lake, to the south, with Goose Lake and Tulare Lake, to the north. Major historical winter-aggregation village locations on the west side of the San Joaquin Valley were typically located on higher ground above the sloughs, swamps and lakeshores, smaller, summer-dispersal camps may have been located on slight rises on the valley floor.

Most Yokuts groups, regardless of specific tribal affiliation, were organized as a recognized and distinct tribelet; a circumstance that almost certainly pertained to the tribal groups noted above. Tribelets were land-owning groups organized around a central village and linked by shared territory and descent from a common ancestor. The population of most tribelets ranged from about 150 to 500 peoples (Kroeber 1925).

Each tribelet was headed by a chief who was assisted by a variety of assistants, the most important of whom was the *winatum*, a herald or messenger and assistant chief. A shaman also served as religious officer. While shamans did not have any direct political authority, as Gayton (1930) has illustrated, they maintained substantial influence within their tribelet.

Shamanism is a religious system common to most Native American tribes. It involves a direct and personal relationship between the individual and the supernatural world enacted by entering a trance or hallucinatory state (usually based on the ingestion of psychotropic plants, such as jimsonweed or more typically native tobacco). Shamans were considered individuals with an unusual degree of supernatural power, serving as healers or curers, diviners, and controllers of natural phenomena (such as rain or thunder). Shamans also produced the rock art of this region, depicting the visions they experienced in vision quests believed to represent their spirit helpers and events in the supernatural realm (Whitley 1992, 2000).

The centrality of shamanism to the religious and spiritual life of the Yokuts was demonstrated by the role of shamans in the yearly ceremonial round. The ritual round, performed the same each year, started in the spring with the jimsonweed ceremony, followed by rattlesnake dance and (where appropriate) first salmon ceremony. After returning from seed camps, fall rituals began in the late summer with the mourning ceremony, followed by first seed and acorn rites and then bear dance (Gayton 1930:379). In each case, shamans served as ceremonial officials responsible for specific dances involving a display of their supernatural powers (Kroeber 1925).

Subsistence practices varied from tribelet to tribelet based on the environment of residence. Throughout Native California, and Yokuts territory in general, the acorn was a primary dietary component, along with a variety of gathered seeds. Valley tribes augmented this resource with lacustrine and riverine foods, especially fish and wildfowl. As with many Native California tribes, the settlement and subsistence rounds included the winter aggregation into a few large villages, where stored resources (like acorns) served as staples, followed by dispersal into smaller camps, often occupied by extended families, where seasonally available resources would be gathered and consumed.

Although population estimates vary and population size was greatly affected by theintroduction of Euro-American diseases and social disruption, the Yokuts were one of the largest, most successful groups in Native California. Cook (1978) estimates that the Yokuts region contained 27 percent of the aboriginal population in the state at the time of contact; other estimates are even higher.

2.4 ARCHAEOLOGICAL BACKGROUND

The southern San Joaquin Valley region has received minimal archaeological attention compared to other areas of the state. In part, this is because the majority of California archaeological work has concentrated in the Sacramento Delta, Santa Barbara Channel and central Mojave Desert areas (see Moratto 1984). Although knowledge of the region's prehistory is limited, enough is known to determine that the archaeological record is broadly similar to south-central California as a whole (see Gifford and Schenk 1926; Hewes 1941; Wedel 1941; Fenenga 1952; Elsasser 1962; Fredrickson and Grossman 1977; Schiffman and Garfinkel 1981). Based on these sources, the general prehistory of the region can be outlined as follows.

Initial occupation of the region occurred at least as early as the *Paleoindian Period*, or prior to about 10,000 YBP (years before present). Evidence of early use of the region is indicated by characteristic fluted and stemmed points found around the margin of Tulare Lake, in the foothills

of the Sierra, and in the Mojave Desert proper. (In each case, these are locations many miles distant from the study area.)

Both fluted and stemmed points are particularly common around lake margins, suggesting a terminal Pleistocene/early Holocene lakeshore adaptation similar to that found throughout the far west at the same time; little else is known about these earliest peoples. Additional finds consist of a Clovis-like projectile point discovered in a flash-flood cut-bank near White Oak Lodge in 1953 on Tejon Ranch (Glennan 1987a, 1987b). More recently, a similar fluted point was found near Bakersfield (Zimmerman et al. 1989), and a number are known from the Edwards Air Force Base and Boron area of the western Mojave Desert. Although human occupation of the state is well-established during the Late Pleistocene, relatively little can be inferred about the nature and distribution of this occupation with a few exceptions. First, little evidence exists to support the idea that these Paleo-Indians peoples were big-game hunters, similar to those found on the Great Plains. Second, the western Mojave Desert evidence suggests small, very mobile populations that left a minimal archaeological signature.

Substantial evidence for human occupation of California first occurs during the middle Holocene, roughly 7500 to 4000 YBP. This period is known as the *Early Horizon*, or alternatively as the Early Millingstone along the Santa Barbara Channel. In the south, populations concentrated along the coast with minimal visible use of inland areas. Adaptation emphasized hard seeds and nuts with tool-kits dominated by mullers and grindstones (manos and metates). Additionally, little evidence for Early Horizon occupation exists in most inland portions of the state, partly due to a severe cold and dry paleoclimatic period occurring at this time. Regardless of specifics, Early Horizon population density was low with a subsistence adaptation more likely tied to plant food gathering than hunting.

Environmental conditions improved dramatically after about 4000 YBP during the *Middle Horizon* (or Intermediate Period). This period known climatically as the Holocene Maximum (circa 3800 YBP) and was characterized by significantly warmer and wetter conditions than previously experienced. Archaeologically, it was marked by large population increase and radiation into new environments along coastal and interior south-central California and the Mojave Desert (Whitley 2000). In the Delta region to the north, this same period of favorable environmental conditions was characterized by the appearance of the Windmiller culture which exhibited a high degree of ritual elaboration (especially in burial practices) and perhaps even rudimentary mound-building tradition (Meighan, personal communication, 1985). Along with ritual elaboration, Middle Horizon times experienced increasing subsistence specialization, perhaps correlating with the appearance of acorn processing technology. Penutian speaking peoples (including the Yokuts) are also posited to have entered the state roughly at the beginning of this period and, perhaps to have brought this technology with them (cf. Moratto 1984). Likewise it appears the so-called "Shoshonean Wedge" in southern California or the Takic speaking groups that include the Gabrielino/Fernandeño, Tataviam and Kitanemuk, may have moved into the region at this time, rather than at about 1500 BP as first suggested by Kroeber (1925).

Evidence for Middle Horizon occupation of interior south-central California is substantial. For example, in northern Los Angeles County along the upper Santa Clara River, to the south of the San Joaquin Valley, the Agua Dulce village complex indicates occupation extending back to the

Intermediate Period, when the population of the village may have been 50 or more people (King et al n.d.). Similarly, inhabitation of the Hathaway Ranch region near Lake Piru, and the Newhall Ranch near Valencia, appears to date to the Intermediate Period (W & S Consultants 1994). To the west, little or no evidence exists for pre-Middle Horizon occupation in the upper Sisquoc and Cuyama River drainages; populations first appear there at roughly 3500 YBP (Horne 1981). The Carrizo Plain, the valley immediately west of the San Joaquin, experienced a major population expansion during the Middle Horizon (W & S Consultants 2004; Whitley et al. 2007), and recently collected data indicates the Tehachapi Mountains region was first significantly occupied during the Middle Horizon (W & S Consultants 2006). A parallel can be drawn to the inland Ventura County region where a similar pattern has been identified (Whitley and Beaudry 1991), as well as the western Mojave Desert (Sutton 1988a, 1988b), the southern Sierra Nevada (W & S Consultants 1999), and the Coso Range region (Whitley et al. 1988). In all of these areas a major expansion in settlement, the establishment of large site complexes and an increase in the range of environments exploited appear to have occurred sometime roughly around 4,000 years ago. Although most efforts to explain this expansion have focused on local circumstances and events, it is increasingly apparent this was a major southern California-wide occurrence and any explanation must be sought at a larger level of analysis (Whitley 2000). Additionally, evidence from the Carrizo Plain suggests the origins of the tribelet level of political organization developed during this period (W & S Consultants 2004; Whitley et al. 2007). Whether this same demographic process holds for the southern San Joaquin Valley, including the study area, is yet to be determined.

The beginning of the *Late Horizon* is set variously at 1500 and 800 YBP, with a consensus for the shorter chronology. Increasing evidence suggests the importance of the Middle-Late Horizons transition (AD 800 to 1200) in the understanding of south-central California. This corresponds to the so-called Medieval Climatic Anomaly, a period of climatic instability that included major droughts and resulted in demographic disturbances across much of the west (Jones et al. 1999). It is also believed to have resulted in major population decline and abandonments across south-central California, involving as much as 90 percent of the interior populations in some regions including the Carrizo Plain (Whitley et al. 2007). It is not clear whether site abandonment was accompanied by a true reduction in population or an agglomeration of the same numbers of peoples into fewer but larger villages. What is clear is that Middle Period villages and settlements were widely dispersed across the landscape; many at locations that lack contemporary evidence of fresh water sources. Late Horizon sites, in contrast, are typically located where fresh water was available during the historical period, if not currently.

The subsequent Late Horizon can be best understood as a period of recovery from a major demographic collapse. One result is the development of regional archaeological cultures as the precursors to ethnographic Native California; suggesting that ethnographic life-ways recorded by anthropologists extend roughly 800 years into the past.

The position of southern San Joaquin Valley prehistory relative to patterns seen in surrounding areas is still somewhat unknown. The presence of large lake systems in the valley bottoms can be expected to have mediated some of the desiccation seen elsewhere. But, as the reconstruction of Soda Lake in the nearby Carrizo Plain demonstrates (see Whitley et al. 2007) environmental perturbations had serious impacts on lake systems too. Identifying certain of the prehistoric

demographic trends for the southern San Joaquin Valley and determining how these trends (if present) correlate with those seen elsewhere, is a current important research objective.

2.5 HISTORICAL BACKGROUND

Spanish explorers first visited the southern end of the San Joaquin Valley in 1772, but its lengthy distance from the missions and presidios along the Pacific Coast delayed permanent settlement for many years, including during the Mexican period of control over the Californian region. In the 1840s, Mexican rancho owners along the Pacific Coast allowed their cattle to wander and graze in the San Joaquin Valley (JRP Historical Consulting 2009). The Mexican government granted the first ranchos in the southern part of the San Joaquin Valley in the early 1840s, but these did not result in permanent settlement. It was not until the annexation of California in 1848 that the exploitation of the southern San Joaquin Valley began (Pacific Legacy 2006).

The discovery of gold in northern California in 1848 resulted in a dramatic increase of population, consisting in good part of fortune seekers and gold miners, who began to scour other parts of the state. After 1851, when gold was discovered in the Sierra Nevada Mountains in eastern Kern County, the population of the area grew rapidly. Some new immigrants began ranching in the San Joaquin Valley to supply the miners and mining towns. Ranchers grazed cattle and sheep, and farmers dry-farmed or used limited irrigation to grow grain crops, leading to the creation of small agricultural communities throughout the valley (JRP Historical Consulting 2009).

After the American annexation of California, the southern San Joaquin Valley became significant as a center of food production for this new influx of people in California. The expansive unfenced and principally public foothill spaces were well suited for grazing both sheep and cattle (Boyd 1997). As the Sierra Nevada gold rush presented extensive financial opportunities, ranchers introduced new breeds of livestock, consisting of cattle, sheep and pig (Boyd 1997).

With the increase of ranching in the southern San Joaquin came the dramatic change in the landscape, as non-native grasses more beneficial for grazing and pasture replaced native flora (Preston 1981). After the passing of the Arkansas Act in 1850, efforts were made to reclaim small tracts of land in order to create more usable spaces for ranching. Eventually, as farming supplanted ranching as a more profitable enterprise, large tracts of land began to be reclaimed for agricultural use, aided in part by the extension of the railroad in the 1870s (Pacific Legacy 2006).

Following the passage of state wide ‘No-Fence’ laws in 1874, ranching practices began to decline, while farming expanded in the San Joaquin Valley in both large land holdings and smaller, subdivided properties. As the farming population grew, so did the demand for irrigation. Settlers began reclamation of swampland in 1866, and built small dams across the Kern River to divert water into the fields. By 1880, 86 different groups were taking water from the Kern River. Ten years later, 15 major canals provided water to thousands of acres in Kern County.

During the period of reclaiming unproductive land in the southern San Joaquin Valley, grants were given to individuals who had both the resources and the finances to undertake the operation alone. One small agricultural settlement, founded by Colonel Thomas Baker in 1861 after procuring one such grant, took advantage of reclaimed swampland along the Kern River. This settlement became

the City of Bakersfield in 1869, and quickly became the center of activity in the southern San Joaquin Valley, and in the newly formed Kern County. Located on the main stage road through the San Joaquin Valley, the town became a primary market and transportation hub for stock and crops, as well as a popular stopping point for travelers on the Los Angeles and Stockton Road. The Southern Pacific Railroad reached the Bakersfield area in 1873, connecting it with important market towns elsewhere in the state, dramatically impacting both agriculture and oil production (Pacific Legacy 2006).

Three competing partnerships developed during this period which had a great impact on control of water, land reclamation and ultimately agricultural development in the San Joaquin Valley: Livermore and Chester, Haggin and Carr, and Miller and Lux, perhaps the most famous of the enterprises. Livermore and Chester were responsible, among other things, for developing the large Hollister plow (three feet wide by two feet deep), pulled by a 40 mule team, which was used for ditch digging. Haggin and Carr were largely responsible for reclaiming the beds of the Buena Vista and Kern lakes, and for creating the Calloway Canal, which drained through the Rosedale area in Bakersfield to Goose Lake (Morgan 1914). Miller and Lux ultimately became one of the biggest private property holders in the country, controlling the rights to over 22,000 square miles. Miller and Lux's impact extended beyond Kern County, however. They recognized early-on that control of water would have important economic implications, and they played a major role in the water development of the state. They controlled, for example, over 100 miles of the San Joaquin River with the San Joaquin and Kings River Canal and Irrigation System (http://en.wikipedia.org/wiki/Henry_Miller(rancher). They were also embroiled for many years in litigation against Haggin and Carr over control of the water rights to the Kern River. Descendants of Henry Miller continue to play a major role in California water rights, with his great grandson, George Nickel, Jr., the first to develop the concept of water banking, thus creating a system to buy and sell water (http://exiledonline.com/california-class-war-history-meet-the-oligarch-family-thats-been-scamming-taxpayers-for-150-years-and-counting/).

The San Joaquin Valley was dominated by agricultural pursuits until the oil boom of the early 1900s, which saw a shift in the region, as some reclaimed lands previously used for farming were leased to oil companies. Nonetheless, the shift of the San Joaquin Valley towards oil production did not halt the continued growth of agriculture (Pacific Legacy 2006). The Great Depression of the 1930s brought with it the arrival of great number of migrants from the drought-affected Dust Bowl region, looking for agricultural labor. These migrants established temporary camps in the valley, staying on long past the end of the drought and the Great Depression, eventually settling in towns such as Bakersfield where their descendants live today (Boyd 1997).

The community of Buttonwillow is the closest population center to the study area, with roughly 1,500 inhabitants. It was established in 1895, with the creation of its first post office, and was then known as Buena Vista. It was more commonly known as Buttonwillow due to the presence of a lone buttonbush (*Cephalanthus occidentalis*) at this location, supposedly used as a meeting place by the Yokuts, and eventually became known by this name. Miller and Lux created the first store in the community, which served the local ranching and agricultural community (https://en.wikipedia.org/wiki/Buttonwillow,_California). Although it is close to the Elk Hills oil field, most of its residents are employed in agriculture, signaling the fact that farming and oil

production continue to be the primary economic activities in this portion of western Kern County, into the twenty-first century.

2.5.1 Reclamation of the Buena Vista Slough and the Kern River

Miller & Lux

Charles Lux was born in 1823 in Hatten, Germany, to a wheelwright in a German Catholic family. Henry Miller was born in 1827 in Wurttemberg, Germany, as Heinrich Alfred Kreiser, whose father was a master butcher and cattle trafficker. By their teenage years, both Lux and Kreiser left Germany for America, like so many German emigrants in the 1830s and 1840s, for better opportunity and a chance to own land of their own (Igler 2001). Lux arrived in New York in 1839 and apprenticed with a butcher until he saved enough money to move to San Francisco ten years later. Kreiser arrived in New York in 1847 and worked at a hog shop until he was offered a ticket to San Francisco by an acquaintance named Henry Miller. The ticket was in Miller's name and was non-refundable and non-transferrable. Kreiser took the opportunity to head west under the name of Henry Miller, by which he was known as until his death in 1916.

After their respective arrivals in San Francisco, both Lux and Miller found work employed as butchers and soon saved enough money to each become independent proprietors. Lux went into partnership with an Englishman named Alfred Edmondson and purchased 1,700 acres of Rancho Buri Buri. A few years later, Lux bought out his partner and met Miller, with whom he purchased 1,600 head of cattle. In 1858, Miller and Lux formed a permanent partnership until Charles Lux's death in 1887. Their main offices were in San Francisco, and over the tenure of their partnership, they acquired hundreds of thousands of cattle ranching land in California, Oregon, and Nevada (Igler 2001).

In 1868, Miller and Lux purchased land in Kern County with local rancher James C. Crocker, who convinced them that they could produce prime cattle for their northern ranches. As the largest landowners of the area, Miller and Lux planned to reclaim the land around the Buena Vista Slough. This land, which would in the next century come under the management of the BVWSD, included a large flood plain that, if not reclaimed in a timely manner, could flood and ruin reclamation efforts. Water from the delta of the Kern River would flood and then fill the beds of Kern and Buena Vista Lake, from which the water would continue through the Buena Vista Slough to form a swamp that would eventually drain into Tulare Lake. Lux formed the Kern Valley Water Company to begin reclamation efforts. Other land owners participated in the reclamation of the Buena Vista Slough including Frederick Cox, C.W. Clarke (predecessor of Carmel Cattle Company), John H. Reddington, George N. Cornwell, L.H. Bonestell, Horatio B. Livermore, and Horatio Stabbins. Miller and Lux owned approximately 37,000 acres of the land in the area, and as such owned a large percentage of stock in the company (Woolley 1963; 1927). In early 1877, Miller and Lux fortuitously hired the massive workforce of men recently unemployed by the Southern Pacific Railroad after having just finished laying the final tracks from northern California to Kern County (Igler 2001). Between 200 to 300 manual laborers, foremen, blacksmiths, and carpenters were given food and housing in these months working on reclaiming the Buena Vista Slough, a swamp that was approximately 50 miles long and several miles wide (Igler 2001). That same year, the Kern Valley Water Company Canal (now called the Kern River Flood Canal) and

the East Side Canal were completed. However, lack of water resulted in the slaughtering of cattle while the reclamation efforts were well underway. In addition to the drought, James Haggin, a business tycoon from Kentucky, quickly bought up thousands of acres of land upstream from Miller and Lux's landholdings along the Kern River and soon owned nearly every irrigation ditch along the river. This resulted in no water reaching Miller and Lux's land, as well as angering hundreds of other landowners in the area who were beholden to Haggin for irrigation water for their farmlands (Igler 2001). In 1879, Miller and Lux filed a lawsuit against Haggin, which they ultimately won but which resulted in the division of the Kern River to Haggin's interests and Miller and Lux to the south. Reclamation efforts continued.

In 1888, Miller and Lux purchased the land holdings of Reddington, Bonestell, and Livermore. The following year, Clarke conveyed another 4,520 acres to Miller and Lux (Woolley 1963). At the turn of the twentieth century, Miller and Lux held over 84% of the total land holdings. By 1913, a demand for the extension north toward Wasco Road of the original Kern Valley Water Company Canal resulted in the formation of the Kern Valley Reclamation Company, of which Miller and Lux owned approximately 94% interest with Carmel Cattle Company owned approximately 6% (Woolley 1963; 1927). The Kern Valley Reclamation Company also constructed the Kern Valley Reclamation Company Canal the following year. By 1916, both Miller and Lux were deceased, but their land irrigation company continued to function. The Main Drain irrigation canal began construction the same year of Miller's death in 1916, and was not completed until 1918.

Formation of the BVWSD

As early as July 1922, the first proposal was made for the formation of the BVWSD, consisting of 125,890 acres of land. When it was formally organized in 1924, the district acquired the Kern Valley Water Canal from the Kern Valley Water Company for $42,000. From the Kern Valley Reclamation Company, it acquired the Kern Valley Reclamation Company's Canal and Goose Lake Canal for $128,000. In 1927, the proprietors of Miller and Lux's land holdings contractually agreed that all water regulation would be maintained by the BVWSD. By the 1920s, the "L" canal, the 17 extension, the Belridge Ditch, and the Cox Canal had been constructed. Vlasnik Road Ditch and Canal 17 were not completed until circa 1940, according to historic maps. The associated ditches of the Cox Canal were not completed until circa 1950. Today, the BVWSD manages approximately 130,000 acre-feet of water per year from the Kern River, in addition to 21,000 acre-feet of water from the State Water Project (BVWSD 2015).

3. ARCHIVAL RECORDS SEARCH

An archival records search was conducted at the California State University, Bakersfield, Southern San Joaquin Valley Archaeological Information Center (AIC), by AIC staff members to determine: (i) if prehistoric or historical archaeological sites had previously been recorded within the Palms Project study area; (ii) if the project area had been systematically surveyed by archaeologists prior to the initiation of this field study; and/or (iii) whether the region of the field project was known to contain archaeological sites and to thereby be archaeologically sensitive. Additionally, a search of the NAHC *Sacred Lands File* was conducted in order to ascertain whether traditional cultural places or cultural landscapes had been identified within the APE. The results of this archival records search are summarized here.

The records search at the AIC indicated that one previous archaeological survey (KE-04072) had been completed within the project area (Table 1) and another 17 had been completed within .5-mi of the project area (Table 2). Thirty-two archaeological resources were identified within .5-mi of the project area (Table 3). Of the 32 identified resources, 21 are prehistoric, 10 are historic, and 1 is a multi-component historic and prehistoric site. The NAHC *Sacred Lands File* did not indicate the presence of any cultural places within the project area.

In addition to the record search and NAHC *Sacred lands File* request, other resources were addressed to assist in local agriculture and irrigation history. Surveys conducted by ArchaeoPaleo Resource Management, Inc. (2013) and ASM Affiliates, Inc. (2015) for CEQA compliance covered portions of the East Side Canal and West Side Canal, which border the project area on the east and south-southwest sides, respectively. Though both resources lay outside the current project area, laterals located within the project area connect to the canals; therefore, information on those canals is provided below.

A farm complex constructed in the early-1950s (BVWSD personal communication 2015) is present at the northwest corner of the project area and will not be impacted by the Project. It was therefore not included in the Project APE and not recorded during the current survey.

Table 1. Survey Reports Within the Project Area.

Report No (KE-)	Year	Author(s)/Affiliation	Title
04072	2010	Madeleine Bray, Candace Ehringer, and Damien Tietjen	Phase I Cultural Resources Assessment for the West Kern Water District Project, Kern County, California.

Table 2. Survey Reports Within .5-mi of the Project Area.

Report No (KE-)	Year	Author(s)/Affiliation	Title
00142	1997	Catherine Lewis Pruett, Peggy Murphy, and Dorothy Fleagle/ Three Girls and a Shovel	Addendum I: Emergency Flood Area. A Cultural Resources Assessment and Plan for the Kern Water Bank Authority Project Near Bakersfield, Kern County, CA
00924	1991	Peak and Associates, Inc.	Cultural Resource Assessment of Sample Areas of Naval Petroleum Reserve No. 1, Kern County, California
01810	1983	Jim Woodward	Proposed Capture Pen & Buried Telephone Line
01811	1992	Leslie Hartzell/ UC Davis	Hunter-Gatherer Adaptive Strategies and Lacustrine Environments in the Buena Vista Lake Basin, Kern County, CA
02015	1991	Gary Reinoehl/ Department of Parks and Recreation	Tule Elk State Reserve Cultural Resources Survey
02268	1998	Thomas Jackson, Lisa Shapiro, and Jerome King/ Pacific Legacy, Inc.	Prehistoric Archaeological Resources Inventory and Evaluation of Naval Petroleum Reserve No. 1 (Elk Hills), Kern County, CA
02269	1997	Thomas Jackson, Lisa Shapiro, and Gwyn Alcock/ Pacific Legacy, Inc.	Prehistoric Archaeological Extended Inventory Research at Naval Petroleum Reserve No. 1 (Elk Hills), Kern County, CA
02278	1999	Mike Avina/ Jones & Stokes Associates, Inc.	Cultural Resources Inventory Report for Williams Communications, Inc. Fiber Optic Cable System Installation Project, San Luis Obispo to Bakersfield, Volume I
02375	1999	Thomas L. Jackson, Lisa A. Shapiro, and Jerome H. King/ Pacific Legacy, Inc.	Prehistoric Archaeological Resources Inventory and Evaluation at Naval Petroleum Reserve No. 1 (Elk Hills), Kern County, CA
02885	2004	Marla Mealey/California State Parks Southern Service Center	Archaeological Testing Report for the Restroom Replacement Project at Tule Elk State Reserve
03054	2005	Scott Billat/ Earth Touch	New Tower (“NT”) Submission Packet: Semitropic CA-3224A
03508	1997	Thomas Jackson and Lisa Shapiro/ Pacific Legacy, Inc.	Cultural Resources Management Plan Naval Petroleum Reserve No. 1, Elk Hills, Kern County, CA
03509	1997	PAR Environmental Services, Inc.	Historic Resources Evaluation and Assessment Report of Western Naval Petroleum Reserve No. 1, Elk Hills, Kern County, CA
03767	2010	Catherine Lewis Pruett/ Three Girls and a Shovel	A Cultural Resources Assessment for Three Possible Locations for a Water Turnout and Underground Pipeline from the California Aqueduct to the West Side Canal, Kern County, CA
03868	2005	Carrie D. Wills/ Michael Brandman Associates, Irvine, CA	Phase I Cultural Resource Survey Palm Ranch Dairy Project Unincorporated Kern County, CA
03869	2005	Carrie D. Wills/ Michael Brandman Associates, Irvine, CA	Addendum to Phase I Cultural Resource Survey: Phase II Testing Results Palm Ranch Dairy Project Unincorporated Kern County, CA
04428	2013	Hubert Switalski and Robert Larkin/ Stantec	Cultural and Paleontological Resources Survey Report for Modified Alignment of CO2 Supply Line and Facility Construction (Section 26S), Elk Hills, Kern County, California

Table 3. Resources Within .5-mi of the Project Area

Primary No (P-15-)	Trinomial (CA-KER-)	Type	Age	Description
000124	124	Site	Prehistoric	Lithic scatter
000125	125	Site	Prehistoric	Lithic scatter
000126	126	Site	Prehistoric	Lithic scatter, habitation debris
000358	358	Site	Prehistoric	Lithic scatter, chipped shell and bone
000359	359	Site	Prehistoric	Lithic scatter
001612	1612	Site	Prehistoric	Lithic scatter, elk pellets
002414	2414	Site	Prehistoric	Lithic scatter, habitation debris
002415	2415	Site	Prehistoric	Lithic scatter
002416	2416	Site	Prehistoric	Lithic scatter
002417	2417	Site	Prehistoric	Lithic scatter, habitation debris
002419	2419	Site	Prehistoric	Lithic scatter
002420	2420	Site	Prehistoric	Lithic scatter
003253	3253H	Site	Historic	Trash scatter
005984	5018	Site	Prehistoric	Lithic scatter
006776	5401	Site	Prehistoric	Lithic scatter, shell scatter
011157	6504	Site	Prehistoric	Lithic scatter, habitation debris
013725	7701H	Structure	Historic	Canal/aqueduct (East Side Canal)
015676	8655H	Site	Historic	Trash scatter
015677	8656H	Site	Historic	Trash scatter
015678	N/A	Isolate	Historic	Glass insulator
015688	8662/H	Site	Prehistoric/ Historic	Lithic scatter, habitation debris/ Foundations, trash scatter
015690	N/A	Building	Historic	Pump house
015819	8697H	Structure	Historic	Canal/aqueduct (West Side Canal)
015820	8698H	Structure	Historic	Canal/aqueduct (California Aqueduct)
015821	N/A	Isolate	Prehistoric	Chert flake
015822	8699	Site	Prehistoric	Lithic scatter
015823	N/A	Isolate	Prehistoric	“Obsidian needle”
015824	N/A	Isolate	Historic	Listerine bottle
015825	N/A	Isolate	Prehistoric	Chert flake
015826	N/A	Isolate	Historic	Listerine bottle
015827	8700	Site	Prehistoric	Lithic scatter
016496	9076	Site	Prehistoric	Lithic scatter, shell scatter

3.1 PREVIOUS CANAL SURVEYS

Surveys conducted by ArchaeoPaleo Resource Management Inc. (2013) and ASM Affiliates, Inc. (2015) for CEQA compliance covered portions of the East Side Canal and West Side Canal. A resurvey was not undertaken during the current study as the canals lay outside of the current project area; however, information on the canals is important given their proximity to the study area and the presence of laterals from these canals within the project area.

3.1.1 P-15-016998 (CA-KER-9372H)/P-15-013725 (CA-KER-7701H) – East Side Canal

The East Side Canal is an irrigation canal constructed in 1876 by the Kern Valley Water Company, owned by Miller and Lux. It is a major canal of the larger Kern River Flood Canal District and has undergone alterations and improvements through the 1950s to present. 30-foot wide built-up levees flank either side of the canal. The depth of the canal is approximately 10-15 feet deep below the levees. The canal has undergone major alterations in alignment, shape, and depth; it does not retain integrity. It has been determined not significant.

3.1.2 P-15-017005 (CA-KER-9375H)/P-15-015819 (CA-KER-8697H) – West Side Canal

The West Side Canal is an irrigation canal reportedly constructed prior to 1890, though only a small portion was present at that time. The segment of the West Side Canal that borders the project area on the west and south sides has existed since at least 1912 (ArchaeoPaleo Resource Management, Inc. 2013). The canal is an approximately 30-ft wide dredged canal with variable depth averaging approximately 10 to 15-ft. Over the years, the canal has undergone alterations in alignment, shape, and depth; it does not retain integrity. It has been determined not significant.

4. METHODS AND RESULTS

The project area totals approximately 1,100 acres, including recharge cells and pipelines with 50-ft buffer on either side (see Figure 1). The study area was examined with the field crew walking parallel transects through the project area and along the pipeline route spaced at 15-m intervals, in order to identify surface artifacts, archaeological indicators (e.g., shellfish or animal bone), and/or archaeological deposits (e.g., organically enriched midden soil); tabulation and recording of surface diagnostic artifacts; site sketch mapping; preliminary evaluation of site integrity; and site recording, following the California Office of Historic Preservation Instructions for Recording Historic Resources, using DPR 523 forms.

Special attention was paid to rodent burrow back dirt piles, in the hope of identifying sub-surface soil conditions that might be indicative of archaeological features or remains. No cultural resources were collected during the survey.

The study area was surveyed by ASM Associate Archaeologists Rob Azpitarte, B.A. and Assistant Archaeologists Stacey Escamilla, B.A., Amber Tedrow, B.A., Mercedes Bandimere, B.A., Jeff Stephens, B.A., and Mike Huerta, A.A. Fieldwork was conducted in August and September 2015. Soils throughout the study area are sandy-silty alluvium with very few lithic clasts, reflecting a soils origin in deltaic processes. The study area consists of disked fields and existing, previously disturbed canals, roads, and structures.

4.1 INVENTORY RESULTS

One prehistoric site and 16 prehistoric isolates were identified during the survey.

4.1.1 Newly Recorded Site

RABV-1

RABV-1 is a small, sparse prehistoric lithic scatter. The site was identified and recorded on August 25th, 2015 in a disked agriculture field entirely within the plow-zone. The site is located approximately 65-m east of an unnamed dirt road in Section 10 of Township 30 South, Range 24 East at an elevation of 288-ft amsl. Site dimensions are 39-m north-south by 15-m east-west. The field in which the site is located had recently been disked and therefore contained no vegetation. Soil on site is a loamy sand with dispersed granite and quartz clasts.

RABV-1 consists of seven cryptocrystalline silicate (CCS) flakes and one quartzite flake (A1-A8). A GIS sketch map was created for this site using a Trimble GEOEXPLORER 6000 Series. Eight artifacts were recorded, all of which are lithic debitage: A1 is a tan CCS secondary flake, A2 is a red CCS secondary flake, A3 is a white CCS secondary flake, A4 is a tan CCS secondary flake, A5 is a brown/gray piece of quartzite shatter, A6 is a tan/white CCS secondary flake, A7 is a tan piece of CCS shatter, and A8 is a tan CCS secondary flake. No diagnostic artifacts were identified at the site. Site condition is poor due to agricultural disturbance.

Due to the lack of temporal diagnostics or datable materials, the age of the site is unknown. It appears to consist of a very small lithic workshop.

4.1.2 Newly Recorded Isolates

In addition to the archaeological site, 16 isolated prehistoric artifacts were recorded within the APE. These are all examples of lithic debitage, none of which are temporally diagnostic. The presence of these artifacts, however, suggests that the general area was sporadically used for generalized hunting and/or gathering activities.

Table 4. Isolated Artifacts – The Palms Project

Resource	Description	Section/Township/Range
RA-ISO-1	Tan CCS core tool, 4.6 x 3.6 x 1.5 cm	Sec 10/T30S/R24E
RA-ISO-2	Tan CCS flake, 4.0 x 2.0 x 1.3 cm	Sec 10/T30S/R24E
RA-ISO-3	Tan CCS shatter, 4.5 x 3.0 x 1.5 cm	Sec 10/T30S/R24E
RA-ISO-4	Tan quartzite core, 5.0 x 4.5 x 3.5 cm	Sec 10/T30S/R24E
RA-ISO-5	Tan CCS flake tool, 4.0 x 3.5 x 1.5 cm	Sec 10/T30S/R24E
RA-ISO-6	Tan CCS shatter, 1.6 x 1.4 x 0.4 cm	Sec 10/T30S/R24E
RA-ISO-7	Tan CCS shatter, 1.9 x 1.4 x 0.6 cm	Sec 10/T30S/R24E
RA-ISO-8	Tan/white CCS primary flake, 3.0 x 2.5 x 1.0 cm	Sec 10/T30S/R24E
RA-ISO-9	Tan/white CCS primary flake , 1.9 x 1.8 x 0.4cm	Sec 10/T30S/R24E
RA-ISO-10	Gray/white CCS shatter, 4.7 x 2.4 x 1.3 cm	Sec 10/T30S/R24E
RA-ISO-11	Tan/white CCS shatter, 3.9 x 2.1 x 1.6 cm	Sec 10/T30S/R24E
RA-ISO-12	Tan CCS shatter, 3.0 x 2.3 x 1.6 cm	Sec 10/T30S/R24E
RA-ISO-13	Butterscotch CCS shatter, 4.3 x 3 x 1.8 cm	Sec 10/T30S/R24E
RA-ISO-14	Tan CCS shatter, 1.5 x 1.1 x 3.0 cm	Sec 9/T30S/R24E
RA-ISO-15	Brown/red CCS shatter, 3.3 x 2.5 x 0.6 cm	Sec 10/T30S/R24E
RA-ISO-16	Tan CCS re-fit flakes, 2.6 x 2.5 x 0.4 cm	Sec 11/T30S/R24E

5. SUMMARY AND RECOMMENDATIONS

An intensive Phase I archaeological survey was conducted for the BVWSD Palms Project study area, located near Buttonwillow, Kern County, California. A records search of site files and maps was conducted at the Southern San Joaquin Valley AIC and a search of the NAHC *Sacred Lands File* was completed. These investigations determined that the study area had not been previously surveyed in its entirety, and that no sites or sacred places had been recorded within it. Survey resulted in the recording of one prehistoric archaeological site, a low density surface lithic scatter given the temporary designation RABV-1, and 16 prehistoric isolated artifacts, within the Project area.

5.1 RECOMMENDATIONS

An archival records search, background studies, and an intensive, on-foot surface reconnaissance of the BVWSD Palms Project study area, Kern County, California, were conducted as part of a Phase I cultural resources survey. One prehistoric archaeological site, RABV-1, was recorded. This site consists of a low density lithic scatter. Although a formal determination of significance and test excavation has not been completed at this site, it has the potential to contain information useful for the understanding of local prehistory. Following CEQA, it is recommended that the significance of the site be established prior to project implementation, or that potential adverse impacts to it be mitigated by preservation in place.

The 16 isolated artifacts are categorically not significant under CEQA, with their recording having exhausted any research potential they might contain. No further work on or consideration of these isolated resources is therefore recommended. It is further recommended that an archaeologist be contacted in the unlikely event that archaeological resources are discovered during the construction or use of the Project area.

REFERENCES

ArchaeoPaleo Resource Management

2013 Paleontological Resources and Cultural Resources Phase I Assessment for the Buena Vista Water Storage District Northern Area Project, Kern County, California. Report on file, BVWSD.

ASM Affiliates

2015 Phase I Survey/Class III Inventory, BVWSD Northern Pipeline Project, Kern County, California. Report on file, BVWSD.

Buena Vista Water Storage District (BVWSD)

2015 Buena Vista Water Storage District homepage. http://bvh2o.com/ (Accessed March 10, 2015).

Cook, S. F.

1978 Historical Demography. In *California*, edited by R. F. Heizer, pp. 91-98. Handbook of North American Indians, Vol. 8, W. C. Sturtevant, general editor. Smithsonian Institute, Washington, D.C.

Driver, H. E.

1937 Cultural Element Distributions: VI, Southern Sierra Nevada. *University of California Anthropological Records* 1(2):53-154. Berkeley.

Elsasser, A.

1962 *Indians of Sequoia and Kings Canyon National Parks*. Three Rivers: Sequoia Natural History Association.

Fenenga, F.

1952 The Archaeology of the Slick Rock Village, Tulare County, California. *American Antiquity* 17:339-347.

Fredrickson, D.A. and J. Grossman

1977 A San Dieguito component at Buena Vista Lake, California. *Journal of California and Great Basin Anthropology* 4:173-190.

Gayton, A. H.

1930 Yokuts-Mono Chiefs and Shamans. *University of California Publications in American Archaeology and Ethnology* 24:361-420. Berkeley

1948 Yokuts and Western Mono Ethnography. *University of California Anthropological Records* 10:1–290. Berkeley.

Gifford, E. W., and W. E. Schenck
1926 Archaeology of the Southern San Joaquin Valley. *University of California Publications in American Archaeology and Ethnology* 23(1):1-122.

Glennan, W.S.
1987a Concave-Based Lanceolate Fluted Projectile Points from California. *Prehistory of the Antelope Valley, California: An Overview*, R.W. Robinson, ed., *Antelope Valley Archaeological Society, Occasional Papers No.1*: 21-24.
1987b Evidence for Paleoeastern Culture Type in the Southwestern Great Basin. *Prehistory of the Antelope Valley, California: An Overview*, R.W. Robinson, ed., *Antelope Valley Archaeological Society, Occasional Papers No.1*:11-20.

Harrington, John Peabody
n.d. Yokuts ethnographic notes. National Anthropological Archives, Washington, D.C..

Hewes, G.
1941 Archaeological reconnaissance of the central San Joaquin Valley. *American Antiquity* 7:123-133.

Horne, S.P.
1981 *The Inland Chumash: Ethnography, Ethnohistory and Archaeology*. Ph.D. dissertation, UCSB. University Microfilms, Ann Arbor.

Igler, David
2001 *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850-1920*. University of California Press: Berkeley.

Jones, T. L., G. M. Brown, L. M. Raab, J. L. McVickar, W. G. Spaulding. D. J. Kennett, A. York, and P. L. Walker
1999 Demographic Crisis in Western North America during the Medieval Climatic Anomaly. *Current Anthropology* 40:137-170.

King, C., C. Smith and T. King
n.d. Archaeological Report Related to the Interpretation of Archaeological Resources Present at the Vasquez Rocks County Park. Report on file, UCLA AIC.

Kroeber, A.L.
1925 Handbook of the Indians of California. *Bureau of American Ethnology, Bulletin 78*. Washington, D.C.

Latta, F. F.
1977 *Handbook of the Yokuts Indians*. Bear State Books, Santa Cruz.

Meyer, J., D.C. Young and J.S. Rosenthal

2010 A Geoarchaeological Overview and Assessment of Caltrans Districts 6 and 9, Cultural Resources Inventory of Caltrans Districts 6/9 Rural Conventional Highways. On file, SSJV Information Center, CSUB.

Moratto, M
1984 *California Archaeology*. New York: Academic Press.

Morgan, W.A.
1914 *History of Kern County, California with Biographical Sketches.* Los Angeles: Historic Record Company.

Pacific Legacy, Inc.
2006 *Southern San Joaquin Valley Oil Fields Comprehensive Study*. Manuscript on file, BLM Bakersfield office.

Powers, Stephen
1971 The Yokuts Dance for the Dead. In *The California Indians: A Source Book* (second edition), edited by R. F. Heizer and M. A. Whipple, pp. 513-519. University of California Press, Berkeley (original 1877).
1976 *Tribes of California*. Berkeley, University of California Press (original 1877).

Schiffman, R. A., and A. P. Garfinkel
1981 *Prehistory of Kern County: An Overview*. Bakersfield College Publications in Archaeology No. 1.

Schoenherr, A.A.
1992 *A Natural History of California*. Berkeley: University of California Press.

Sutton, M.Q.
1988a An Introduction to the Archaeology of the Western Mojave Desert, California. *Archives of California Prehistory, No. 14*. Salinas: Coyote Press.
1988b On the Late Prehistory of the Western Mojave Desert. *Pacific Coast Archaeological Society Quarterly* 24(1):22-29.

W & S Consultants
1994 Phase II Test Excavations and Determinations of Significance at CA- LAN-2133, -2233, -2234, -2235, -2236, -2240, -2241 and -2242, Los Angeles County, California. Manuscript on file, CSUF AIC.
1999 Class III Inventory/Limited Archaeological Testing Program for the Ducor Telephone Project, Kennedy Meadows, Tulare County, California. Manuscript on file, CSUB AIC.
2004 *Class II Inventory of the Carrizo Plain National Monument, San Luis Obispo County, California*. Report on file, BLM Bakersfield office.
2006 *Phase II Test Excavations and Determinations of Significance for the Tejon Mountain Village Project, Kern County, California*. Report on file, Tejon Ranch Company.

Wedel, W.
1941 Archaeological Investigations at Buena Vista Lake, Kern County, California. *Bureau of American Ethnology Bulletin* 130.

Whitley, D.S.
1992 Shamanism and Rock Art in Far Western North America. *Cambridge Archaeological Journal* 2(1):89-113.
2000 *The Art of the Shaman: Rock Art of California*. Salt Lake City: University of Utah Press.

Whitley, D.S. and M.P. Beaudry
1991 Chiefs on the Coast: The Development of Complex Society in the Tiquisate Region in Ethnographic Perspective. *The Development of Complex Civilizations in Southeastern Mesoamerica,* W. Fowler, ed., pp. 101-120. Orlando: CRC Press.

Whitley, D.S., G. Gumerman IV, J. Simon and E. Rose
1988 The Late Prehistoric Period in the Coso Range and Environs. *Pacific Coast Archaeological Society Quarterly* 24(1):2-10.

Whitley, David S., Joseph M. Simon and Johannes H.N. Loubser
2007 The Carrizo Collapse: Art and Politics in the Past. In *Collected Papers in Honor of the Achievements of Archaeologist Jay von Werlhof,* edited by Russell L. Kaldenberg, pp. 199-208. Maturango Museum Press No. 20. Ridgecrest, California.

Woolley, J.E.
1963 *Review of River History and Second Point Water Rights*. On file with the Buena Vista Water Storage District in Buttonwillow, California.

Unknown Author
1927 *Report of Board of Directors of Buena Vista Water Storage District to Hon. Edward Hyatt, Jr. State Engineer Upon District Plan.* On file with the Buena Vista Water Storage District in Buttonwillow, California.

Zimmerman, K.L., C.L. Pruett, and M.Q. Sutton
1989 A Clovis-Like Projectile Point from the Southern Sierra Nevada. *Journal of California and Great Basin Anthropology* 11:89-91.

CONFIDENTIAL APPENDICES

CONFIDENTIAL APPENDIX A:

SITE RECORD

CONFIDENTIAL APPENDIX B:

ISOLATE RECORDS

Assessment of Potential Groundwater Impacts

Palms Groundwater Banking Project

Prepared for:
Buena Vista Water Storage District

Date: December 2, 2015
Project No: 1506650

ASSESSMENT OF POTENTIAL GROUNDWATER IMPACTS
PALMS GROUNDWATER BANKING PROJECT

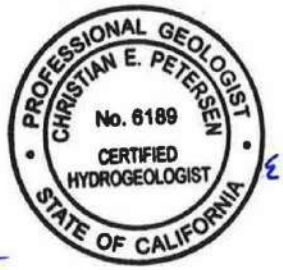
Certifications and Seals

This report and analysis was prepared by the following GEI Consultants Inc. professional geologists.

Exp 8/31/16

Date: 11/25/15

Project Geologist
David Fairman
California Certified Hydrogeologist 1000



Exp 4/30/16

Date: 11/25/15

Principal Hydrogeologist
Chris Petersen
California Certified Hydrogeologist 463

Table of Contents

1 Introduction 1
- 1.1 Project Location 2
- 1.2 Hydrologic Setting 2

2 Geologic Conditions 6
- 2.1 Regional Geology 6
- 2.2 Geologic Structures 8
- 2.3 Local Soils and Geology 11

3 Hydrogeologic Conditions 14
- 3.1 Aquifers 14
- 3.2 Confining Beds 14
- 3.3 Groundwater Levels 14
- 3.4 Groundwater Flow Direction 17
- 3.5 Hydraulic Characteristics 21
- 3.6 Sources of Water for Recharge 21

4 Water Quality and the Environment 24
- 4.1 Water Quality 24
  - 4.1.1 Groundwater Quality 24
  - 4.1.2 Source Water for Recharge 24
- 4.2 Environmental Records Search 24

5 Assessment of Project Effects 29
- 5.1 Approach 29
- 5.2 Project Effects on Groundwater Levels 29
- 5.3 Project Effects on Groundwater Quality 31
  - 5.3.1 Mitigation to Reduce Risk to Groundwater Quality Impacts 32
- 5.4 Summary of Project Impacts 32

6 References 34

Appendix A – Lower Kern River Rights and Obligations 36

Appendix B – State Water Project Delivery of Article 21 Water 37

Appendix C – Letter to Bureau of Reclamation 38

Appendix D – EDR Report for Palms Project 39

Appendix E – HECA Phase I Environmental Site Assessment 40

Appendix F – HECA Phase II Environmental Site Assessment 41

Figures

Figure 1: Project Location 4
Figure 2: Groundwater Subbasins 5
Figure 3: Regional Geology 7
Figure 4: Geologic Cross-Section G-G' 9
Figure 5: Extent and Depth of the E-clay 10
Figure 6: Hydrologic Soils Group 12
Figure 7: Sediment Logs near the Palms Project 13
Figure 8: Well Locations near the Palms Project 15
Figure 9: Groundwater Level Hydrographs of Nearby Wells 16
Figure 10: Regional Groundwater Elevation Contours - January to February 2009 18
Figure 11: March 2012 Groundwater Elevation Contours 19
Figure 12: Groundwater Flow Direction.The average gradient is 0.017 ft vertically/ft horizontally 20
Figure 13: Monthly Kern River Flow at Bakersfield 1990 to 2015 23
Figure 14: GeoTracker Sites 26
Figure 15: Depth to Groundwater Map 30
Figure 16: Predicted Recharge Mound Height 31

Tables

Table 1: Recent Water Quality Summary 27
Table 2: Maximum Measured Concentrations and Screening Levels for Constituents with Exceedances (mg/kg of soil) 28

1 Introduction

The Buena Vista Water Storage District (BVWSD or District) is planning to develop the Palms Groundwater Banking Project (Palms Project). The Palms Project is a groundwater replenishment and water banking project that will cover approximately 1,160 acres and will include features needed to apply surface water for groundwater recharge as well as facilities needed for recovery and treatment of stored groundwater. The Palms Project construction would include activities consistent with digging, trenching, and excavation of soil to create the water holding facilities and to install the new pipeline and wells for later recovery.

The Palms will enable the District to better sustain groundwater levels and improve groundwater quality, two objectives of California's Groundwater Sustainability Management Act. High quality water recharged by the Project will flow to aquifers that are sources for domestic and municipal wells providing water to residents of Taft and to the disadvantaged communities (DAC) of Buttonwillow and Tupman and to replenish groundwater under the Tule Elk Reserve.

Lands to be used by the Project have an established history of irrigated crop production but have not been farmed for 2 years. Retiring these lands from irrigated agriculture enables water to be delivered to the area based on availability of water for recharge rather than in response to the pattern of crop demand. Therefore, the timing of the deliveries will differ in a way that results in important benefits to groundwater in the Buttonwillow Service Area. Additionally, the surface water that would have been attributed to the project area will now be allocated to the balance of the District, providing all landowners an additional supply of surface water.

The District anticipates that removing irrigated land from production and converting this land to recharge facilities will reduce irrigation demand by approximately 3,300 acre-feet per year. While cessation of irrigation deliveries will eliminate deep percolation of irrigation water, the intentional recharge of high quality water will more than compensate for the reduction in deep percolation and will greatly reduce leaching of nitrates and other contaminants.

Earthwork would include construction of low berms with material for these berms being generated on-site by removal of surface soil that overlies shallow, highly permeable river-borne sand deposits. Recharge would be encouraged by retaining water in the canals and natural channels which run through the Palms Project area. Construction of recovery facilities would include installation of wells, pumps, pipelines and treatment facilities (if

required) needed for recovery of stored groundwater for use locally and for conveyance to banking associates.

The Project involves multiple stages: 1) construction of recharge facilities, 2) installation of pumps in existing wells and approximately 4 miles of pipeline, 3) construction and equipping additional recovery wells with associated piping, and 4) water treatment facilities if needed. Stages 3 and 4 primarily involve the recovery aspect and would be constructed at a later date. Construction of stages 1 and 2 would include activities consistent with digging, trenching, and excavation of soil to create water holding ponds and channels, and the installation new pipeline. Construction activity for recharge facilities would be completed within 6 months, while construction of recovery facilities would occur based on the rate of recovery and level of treatment needed to meet local needs and to fulfill banking agreements.

1.1 Project Location

BVWSD is located about 16 miles west of Bakersfield along the western edge of the southern San Joaquin Valley as shown on **Figure 1**. The District lies entirely in Kern County and covers about 48,810 acres in two distinct service areas, the Buttonwillow Service Area (BSA) and the Maples Service Area (MSA). The MSA is smaller and located about 10 miles south of the BSA. The Palms Project is located at the southern tip of the BSA as shown on **Figure 1**.

1.2 Hydrologic Setting

The Central Valley of California consists of the San Joaquin and the Sacramento valleys. The San Joaquin Valley, forming the southern two-thirds of the Central Valley, is a broad structural trough. It is bordered on the east by the Sierra Nevada and on the west by the Diablo and the Temblor ranges, which are a part of the Coast Ranges. The valley extends 220 miles southeastward from the confluence of the San Joaquin and the Sacramento rivers to the Tehachapi and the San Emigdio Mountains. The width of the valley ranges from 25 miles in the northern portion of the valley to 55 miles in the southern portion and averages about 35 miles (Croft, 1972).

BVWSD is located in the southwestern portion of the San Joaquin Valley. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern lakes.

BVWSD is located within the western edge of the Kern County groundwater subbasin (DWR, 2003) as shown in **Figure 2**. The subbasin is bounded on the north by the Kern County line and the Pleasant Valley, Tulare Lake, and Tule groundwater subbasins, on the east and southeast by the Sierra Nevada foothills and Tehachapi Mountains, and on the southwest and west by the San Emigdio Mountains and Temblor Range. The Tehachapi

Mountains run parallel to the Garlock Fault which runs in a northeasterly direction, while the San Emigdio Mountains and Temblor Range parallel the San Andreas Fault. The Principal rivers and streams include Kern River and Poso Creek as shown in **Figure 2.**

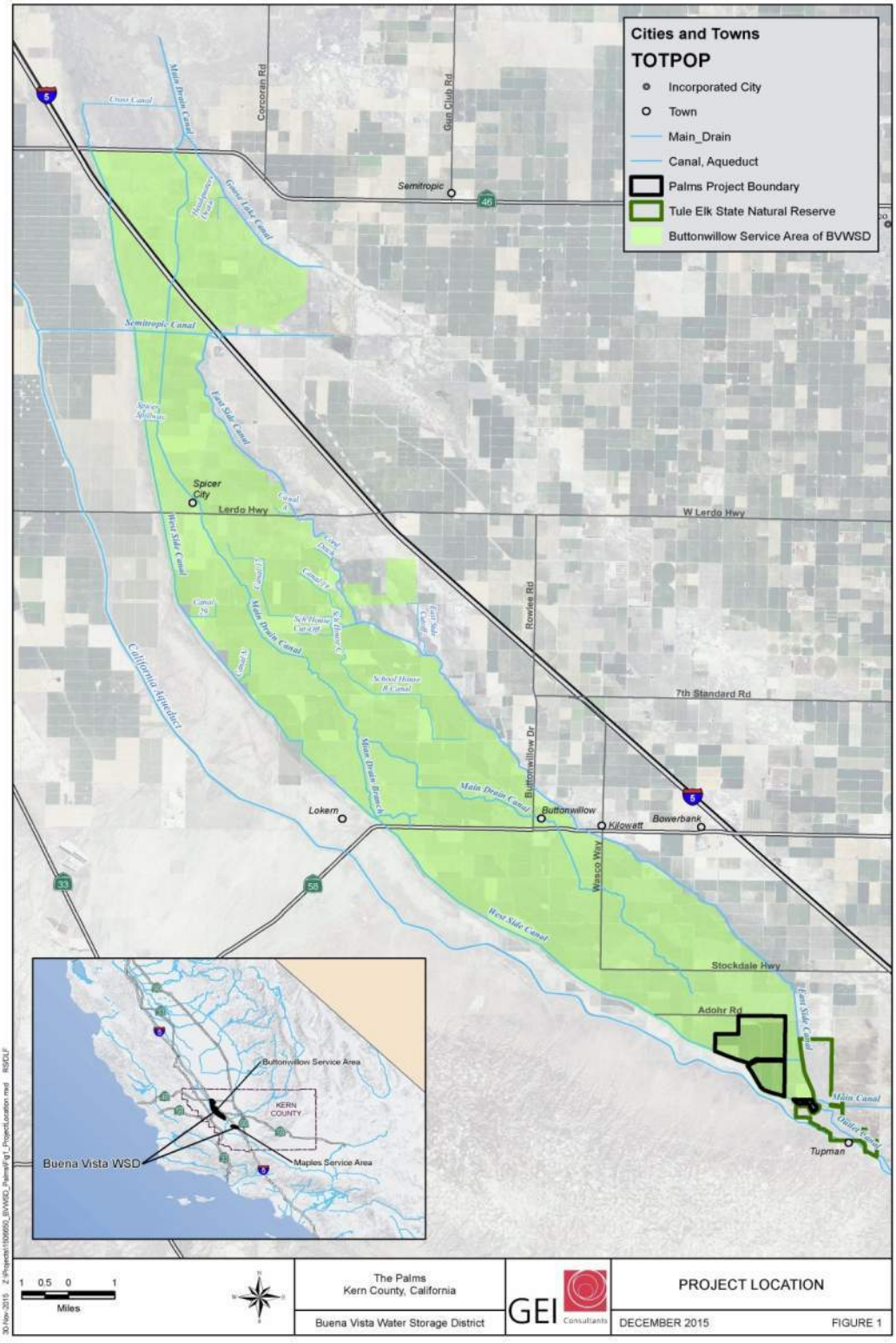


Figure 1: Project Location

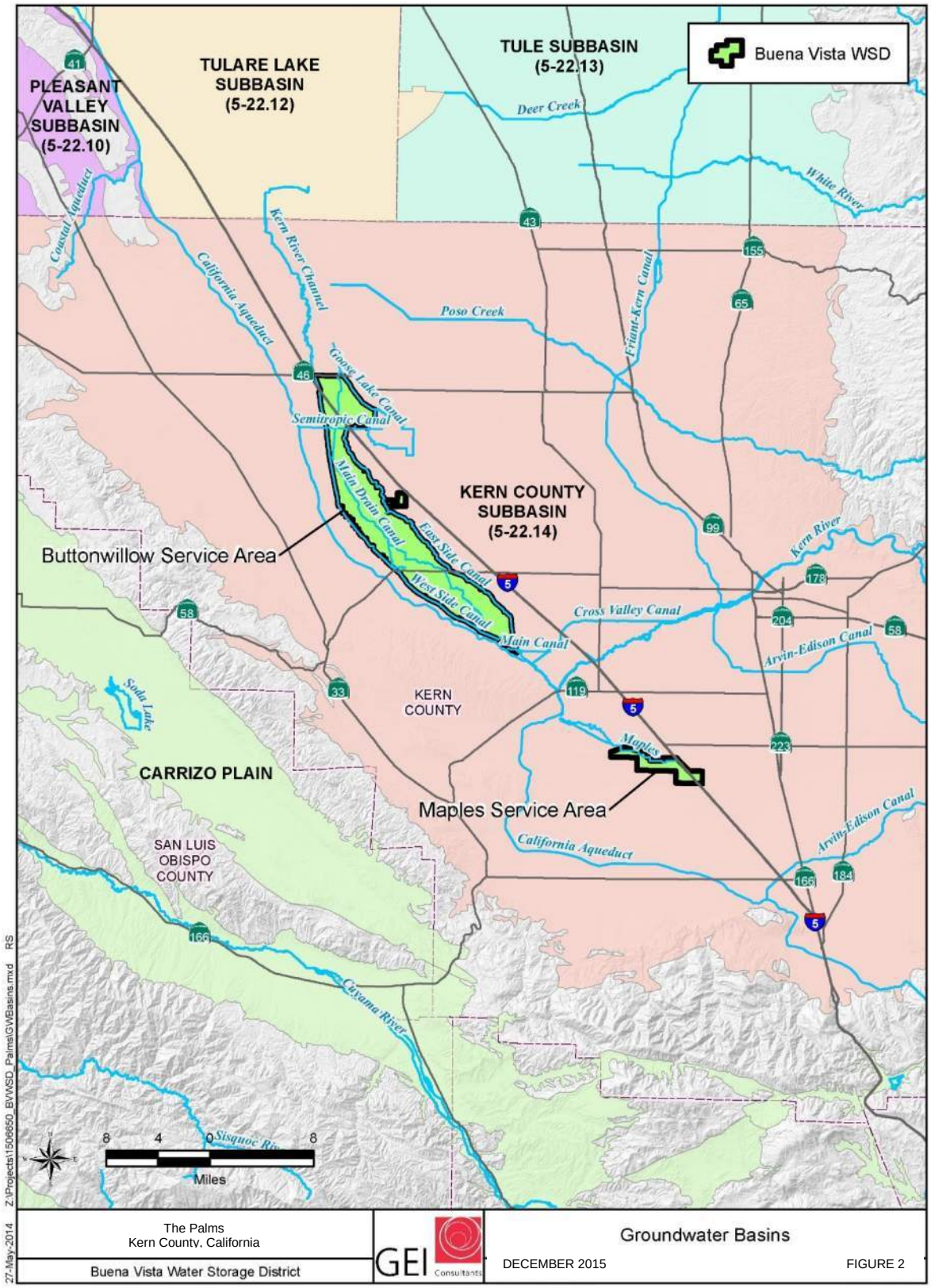


Figure 2: Groundwater Subbasins

2 Geologic Conditions

The San Joaquin Valley is a structural trough filled to a depth of up to 32,000 feet with marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains, respectively. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the valley's structural trough. This depositional axis is below to slightly west of the series of rivers, lakes, sloughs, and marshes, which mark the current and historic axis of surface drainage in the San Joaquin Valley.

2.1 Regional Geology

The southern part of the San Joaquin Valley is a broad structural trough of mostly interior drainage. The Sierra Nevada on the east is composed of consolidated igneous and metamorphic rocks of pre-Tertiary age (basement complex). The surface of these rocks slopes 4 to 6 degrees south-westward from the foothills and underlies the valley. The Coast Ranges on the west consist mostly of complexly folded and faulted consolidated marine and non-marine sedimentary rocks of Jurassic, Cretaceous, and Tertiary age, which dip eastward and overlie the basement complex (Croft, 1972). These deposits are considered non-water bearing.

Unconsolidated deposits of Late Pliocene to Holocene age blanket the underlying consolidated rocks in the valley and are the source of most of the fresh groundwater. The unconsolidated deposits are divided into informal stratigraphic units on the basis of source of sediment, environment of deposition, and texture (Croft, 1972).

The unconsolidated sediments that comprise the shallow to intermediate depth water-bearing deposits in the Kern County groundwater subbasin are primarily of continental origin. From youngest to oldest (shallowest to deepest) the informal stratigraphic units consist of flood basin deposits, continental rocks and deposits, and marine rocks and deposits. **Figure 3** shows the regional geology (Page, 1986).

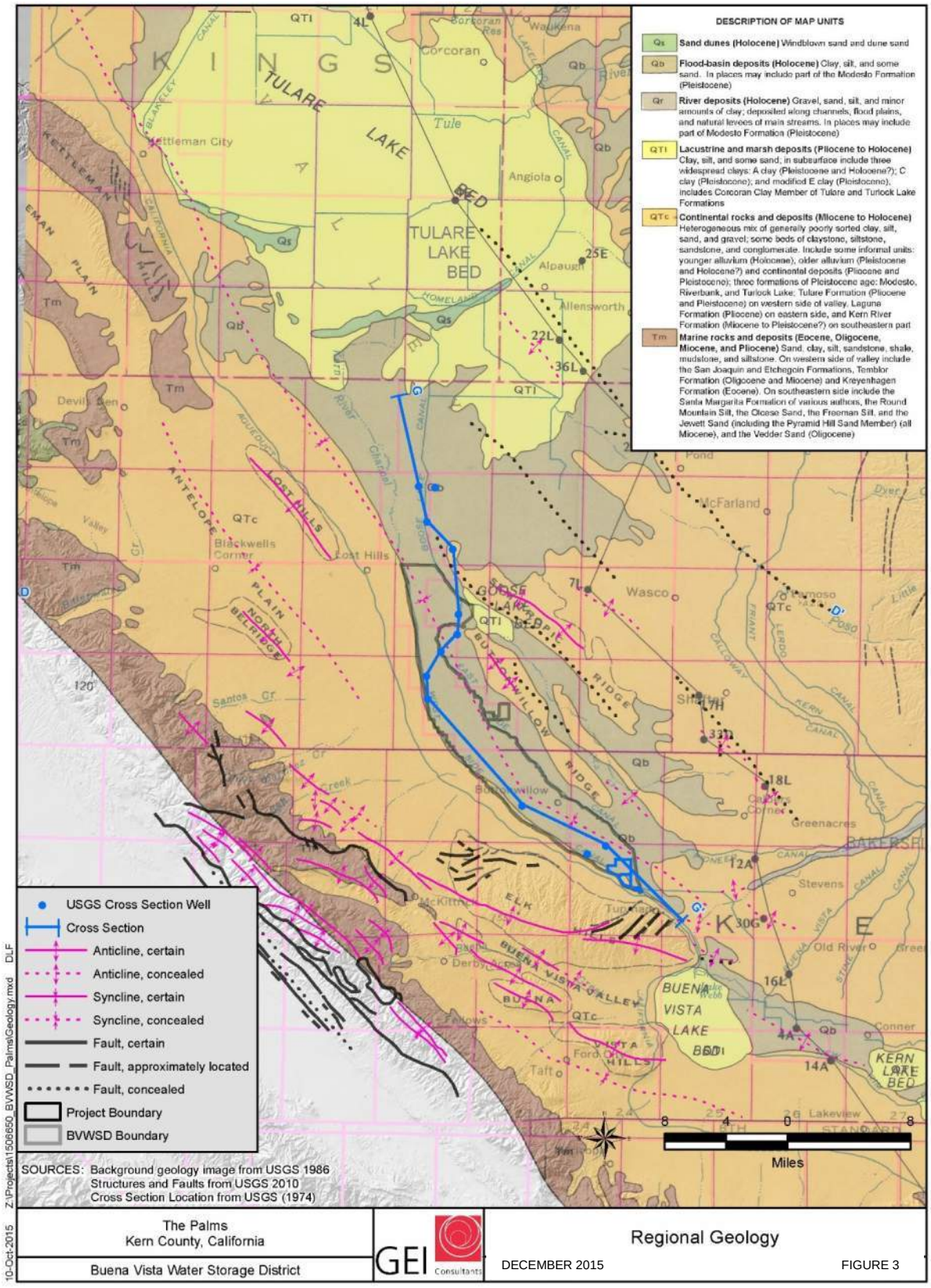


Figure 3: Regional Geology

The continental rocks and flood basin deposits in the San Joaquin Valley groundwater basin contain six distinctly identified clay layers, given letter designations A through F, from shallowest to deepest. All six clay layers are present beneath the center of the former Tulare Lake, and each has a unique lateral extent. The E-clay (also known as the Corcoran Clay) has the greatest lateral extent and has been documented to be present beneath BVWSD. The C-Clay occurs in the northern part of the district but does not extend to the southern part where the Palms Project is located. The A-Clay may also exist in the northern part of the district, causing perched groundwater, but does not extend to the south. The remaining clay layers of the Tulare Lake Formation are not present in the BVWSD area. Figure 4 is a north-south cross-section G-G' that shows the extent of the clay layers beneath BVWSD. (Croft, 1972)

2.2 Geologic Structures

The sediments deposited in the Kern County groundwater subbasin were deposited into a large trough that has since been compressed and subsided resulting in the sediments being folded into troughs and ridges, known in geologic terms as synclines and anticlines, respectively. In general, the anticlines are the Bakersfield arch, and the Buttonwillow and Semitropic ridges. The Buttonwillow and Semitropic ridges are surface expressions of two prominent north-south trending anticlines which could potentially be a barrier to groundwater flow to the East. **Figure 3** shows their locations. The intervening topographic troughs are the surface expressions of prominent synclines (Croft and Gordon, 1968). The synclines or troughs typically contain a significantly thicker sequence of young sediments than do the anticlines or broad highs (Pacific, 1991).

Associated with the Buttonwillow and Semitropic anticlines are two concealed faults (CGS, 1991) that dip to the west. The faults are not active and do not extend to ground surface.

There are varying interpretations of the extent of the E-clay in relation to the above described geologic structures. Reports prepared in 1972 and in 1991 show the E-clay to be continuous across the Buttonwillow and Semitropic ridges and their associated anticlines (Croft, 1972; Pacific, 1991). However, work by the United States Geologic Survey (USGS), which was used to prepare the Central Valley Hydrologic Model (CVHM) groundwater flow model, shows the E-clay does not extend across the Buttonwillow and Semitropic ridges and their associated anticlines. **Figure 5** shows the extent and depth of the modified E-clay and the contours of the top of the clay bed. It is possible the anticlines of the Buttonwillow and Semitropic ridges predate the E-clay and therefore the clay was not deposited onto these ridges. If this were the case, sedimentary beds on the east and west sides of the ridges would not be continuous unless they were deposited between the ridges.

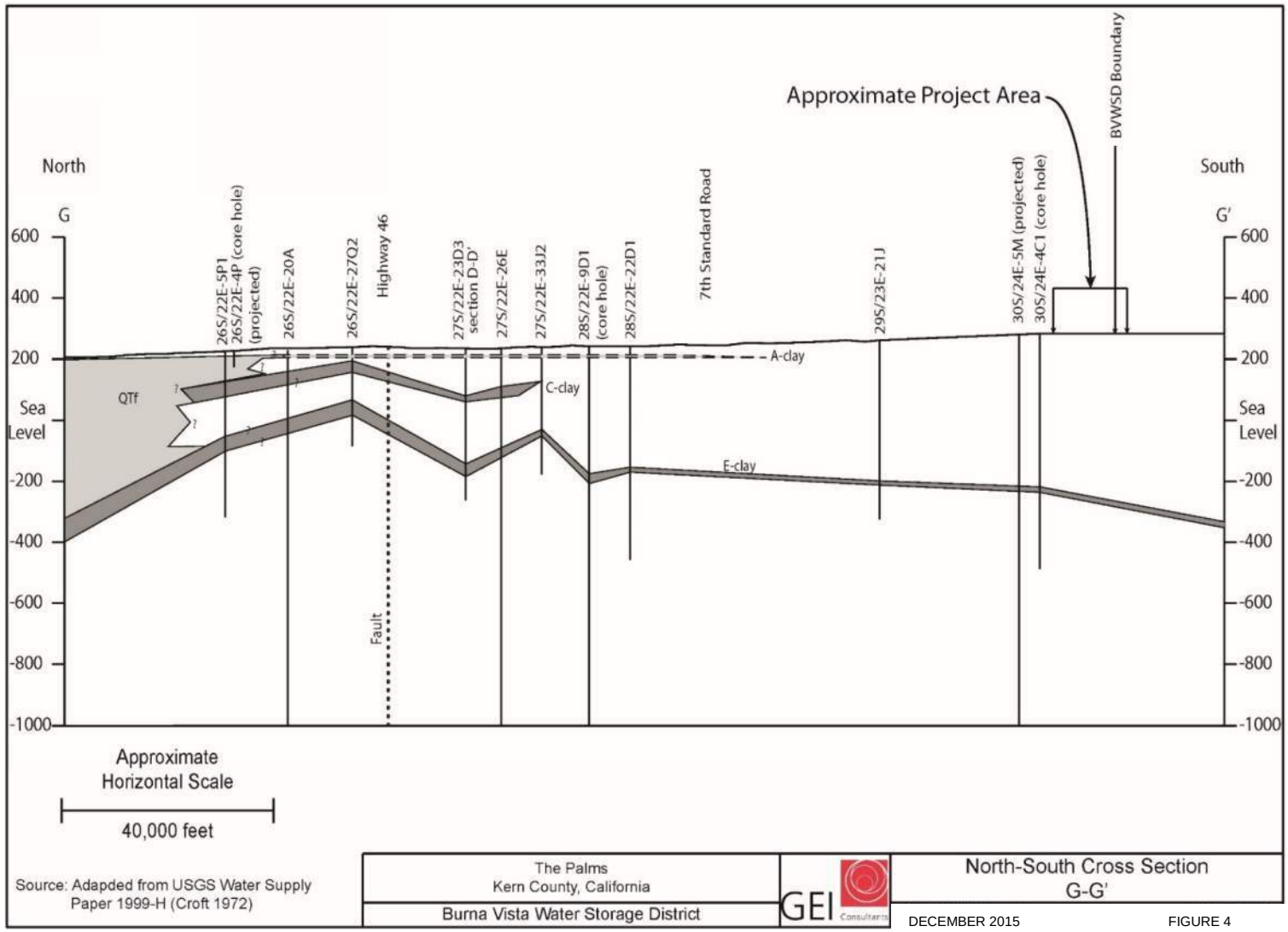


Figure 4: Geologic Cross-Section G-G'

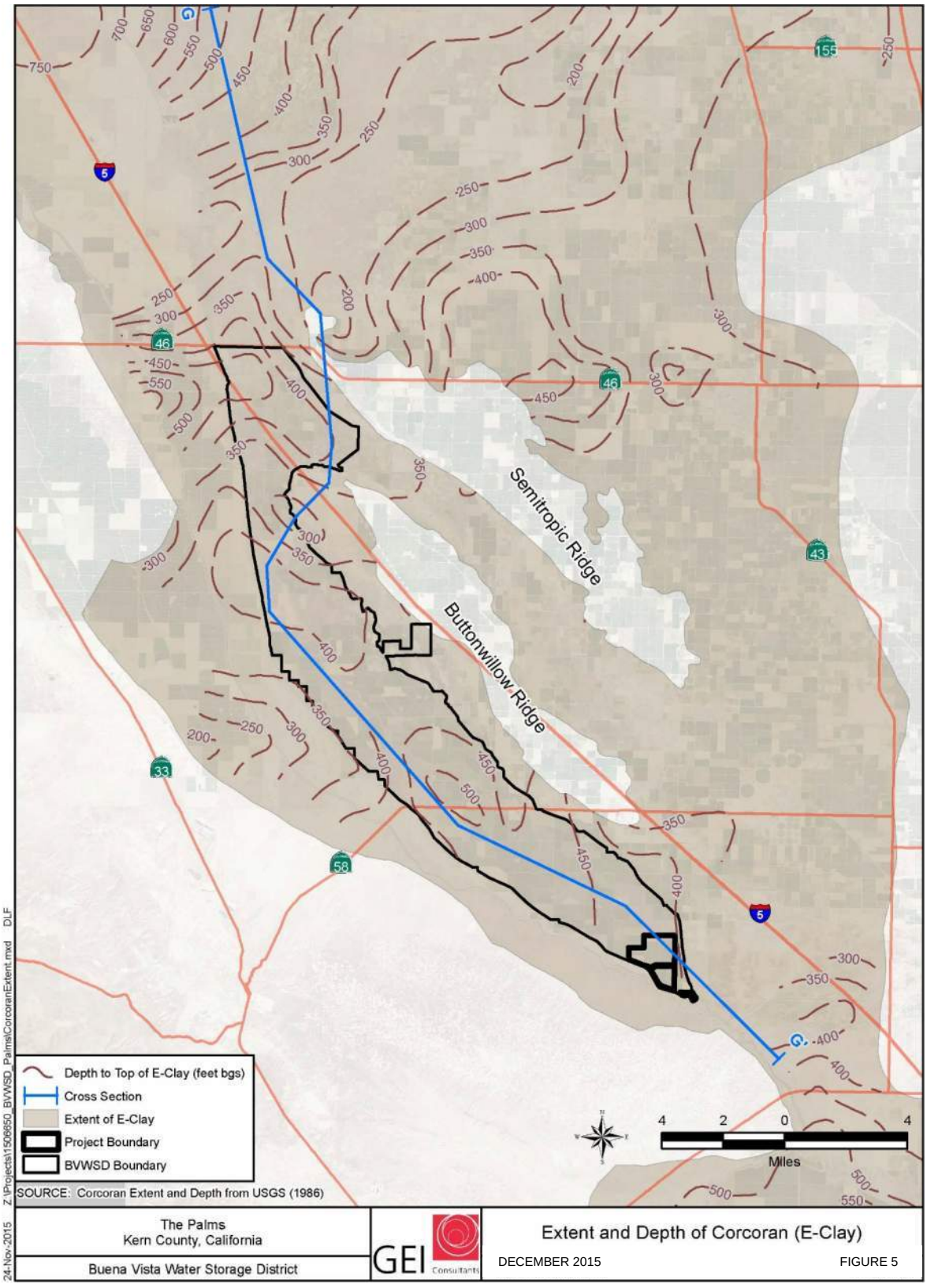


Figure 5: Extent and Depth of the E-clay

2.3 Local Soils and Geology

The National Resources Conservation Service (NRCS) produces soils maps which indicate the type of surface soils present in the top few feet of the subsurface as part of its SSURGO dataset. One of the soils properties that the NRCS designates is the hydrologic soils group (HSG) which indicates the degree to which water will percolate through the shallow soils. **Figure 6** shows the HSG's for the areas near the Palms Project and indicates that the entire Project area has been designated at HSG C, or having a moderately low seepage potential (moderately high runoff potential). NRCS documentation shows that HSG C soils have a saturated hydraulic conductivity of between 0.14 and 1.42 inches per hour.

Beneath the low permeability surficial soils are sands that transmit water at a higher rate than the overlying soils. **Figure 7** includes sediment logs from two exploratory borings and a well located in the Palms Project area as shown on **Figure 6.** These sands extend to a depth of at least 230 feet. Below 230 feet to a depth of 480 feet there are increasing amounts of silt and clay interbedded with the sand. Below 480 feet is a 50-foot thick clay layer, interpreted to be the modified E-clay, which is a regional confining stratigraphic unit and is assumed to define the base of the main aquifer. Sediments below the E-clay are not typically used as a water source in the area due to high TDS concentrations. Water recharged at the Palms Projects is expected to have greatest impact on groundwater above the E-clay since this low permeability unit extends regionally and continuously throughout the region as shown on **Figure 5**.

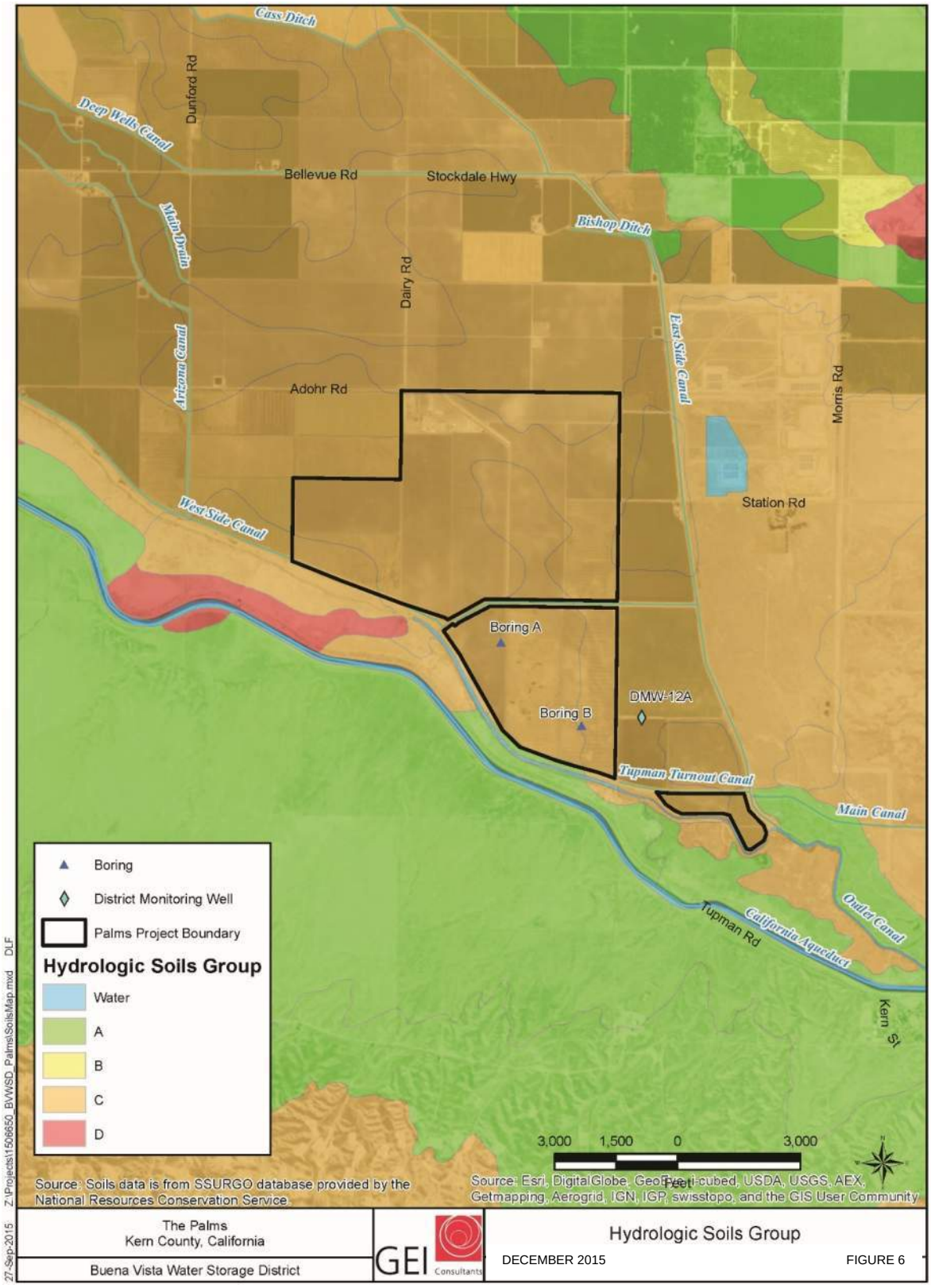


Figure 6: Hydrologic Soils Group

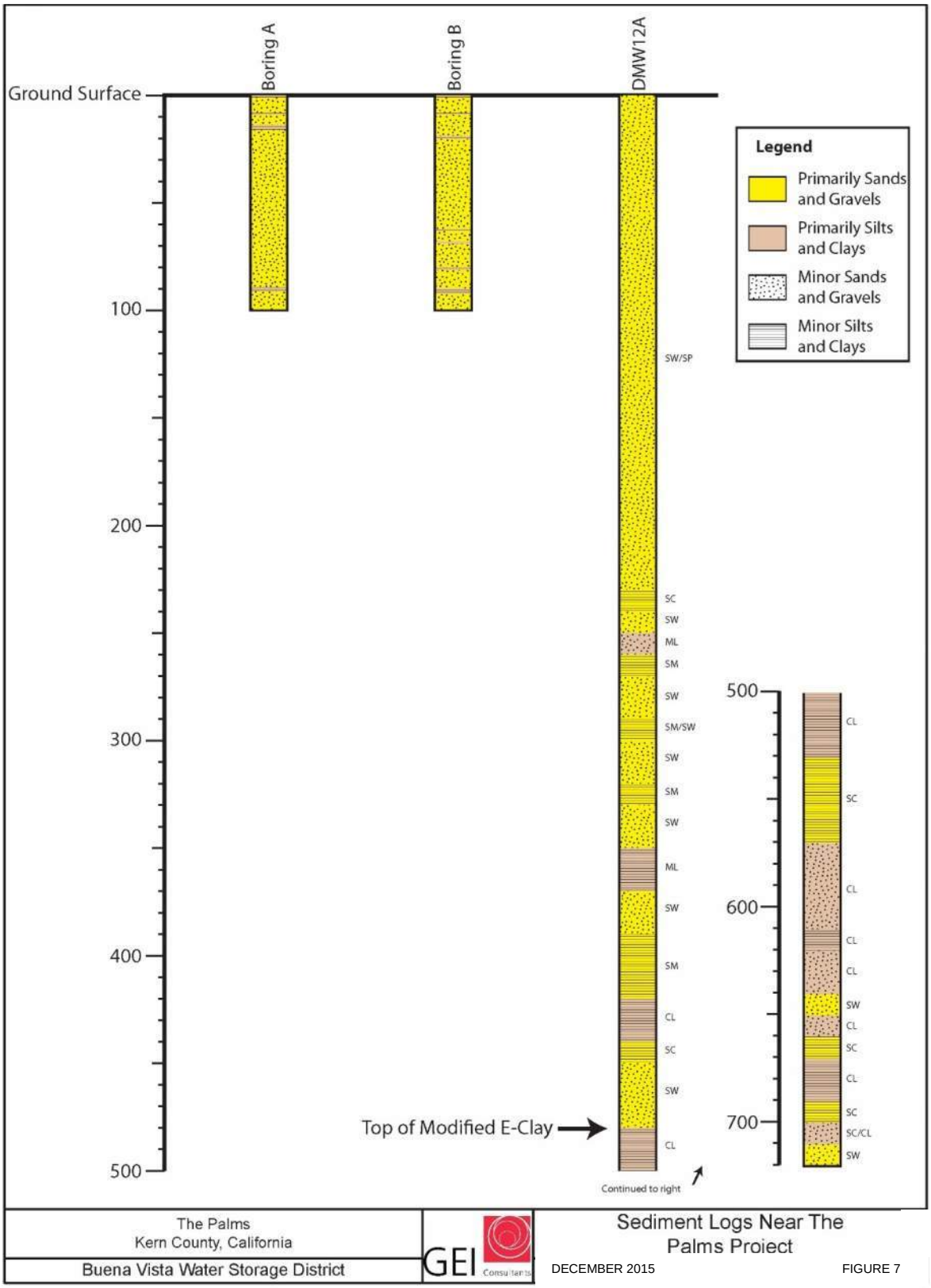


Figure 7: Sediment Logs near the Palms Project

3 Hydrogeologic Conditions

This chapter describes existing hydrogeologic data collected in the vicinity of the Palms Project and provides a summary of aquifer properties that govern the movement of water within the subsurface.

3.1 Aquifers

The majority of irrigation wells in the District are completed to depths between 200 and 600 feet with perforated intervals around 150 feet to the bottom (BVWSD, 2014). Wells in the area adjacent to BVWSD are also likely to have been completed in this manner. The main groundwater aquifer under the Palms Project extends from ground surface to the top of the modified E-clay at a depth of about 480 feet. As shown on **Figure 7**, the top portions of the aquifer (about 230 feet below ground surface [bgs]) has primarily clean sand and the lower portion has interbedded sand and silt with some clay.

3.2 Confining Beds

The E-clay is known regionally to be a low permeability barrier to vertical groundwater flow, but it is not completely impermeable. The top of the clay layer is about 480 feet bgs under the Palms Project area (Figure 7). Water bearing units below the modified E-clay are typically not used by BVWSD as they contain poor quality water in this part of the basin due to recharge from marine sediments of the Coast Ranges. Regionally, the layer divides the aquifer system into unconfined aquifers above and confined aquifers below. East of the Buttonwillow and Semitropic ridges wells are constructed both above and below the E-clay as the groundwater in this area is typically of better quality. This may suggest that the ridges restrict flow below the E-Clay between BVWSD and areas east of the ridges.

3.3 Groundwater Levels

BVWSD has measured groundwater levels in nearby wells between two and four times a year since about 1993. **Figure 8** shows the locations of nearby wells and **Figure 9** shows hydrographs for some of the wells. Depth to groundwater during the period 1993 to 2015 has ranged from 50 to over 220 feet bgs with levels generally declining since 2000.

DMW12A and DMW12B are located next to each other with DMW12A screened below the Modified E-clay and DMW12B screened above. The water levels in these two wells show similar patterns, but the well above the clay shows more dramatic fluctuations than the well below. The similar, but more muted pattern for the lower well may indicate that there is some interconnection between the two aquifers and that the Modified E-clay may transmit water between the two aquifers.

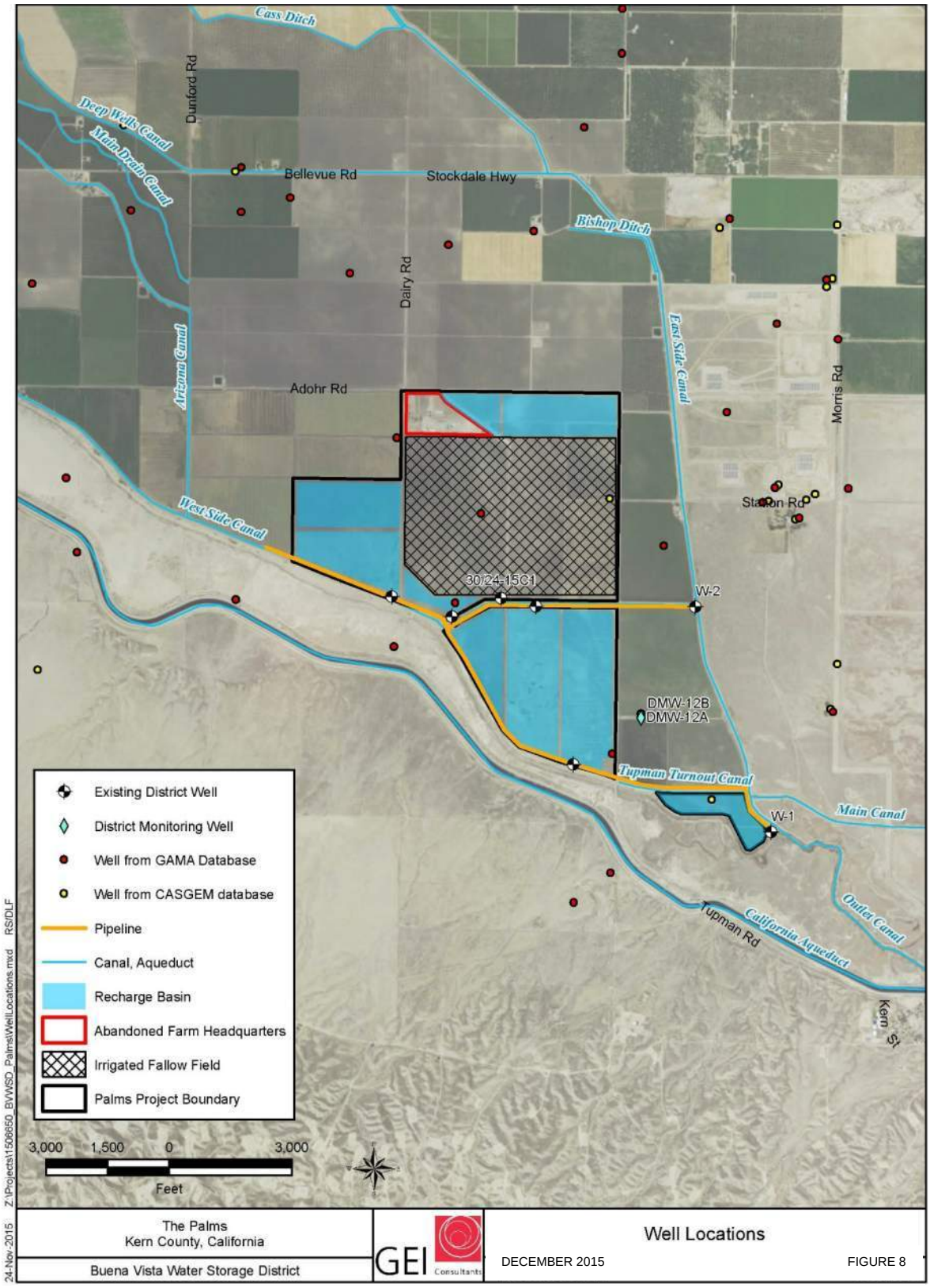


Figure 8: Well Locations near the Palms Project

Figure 9: Groundwater Level Hydrographs of Nearby Wells

3.4 Groundwater Flow Direction

The groundwater flow directions are interpreted from groundwater elevation contours or determined based on three known water level elevations. **Figure 10** shows regional groundwater level contours for 2009 (provided by BVWSD). The groundwater elevations near the Palms Project are lower than areas to the northwest of the project, and this indicates that water generally flows in a southeasterly direction. **Figure 11** shows that locally groundwater contours have a steep gradient east of the project where groundwater levels are greater than 160 feet above msl (feet msl) in the southeast corner of the BSA and drop to below 130 feet msl near the center of the project (Provost and Pritchard, 2013). Local groundwater flow direction near the Palms Project appears to be in a westerly direction and may indicate that the canal east of the project is currently providing recharge to the area. Three nearby wells with good records of groundwater level measurements were analyzed to determine the local flow direction (W-1, W-2, and DMW-12B). The three wells had 44 measurements that were taken simultaneously between 1994 and 2013, and the direction and gradient of the groundwater surface was calculated. **Figure 12** shows the range of flow directions and the average flow direction to the west-southwest. The average gradient was 0.017 ft vertically/ft horizontally.

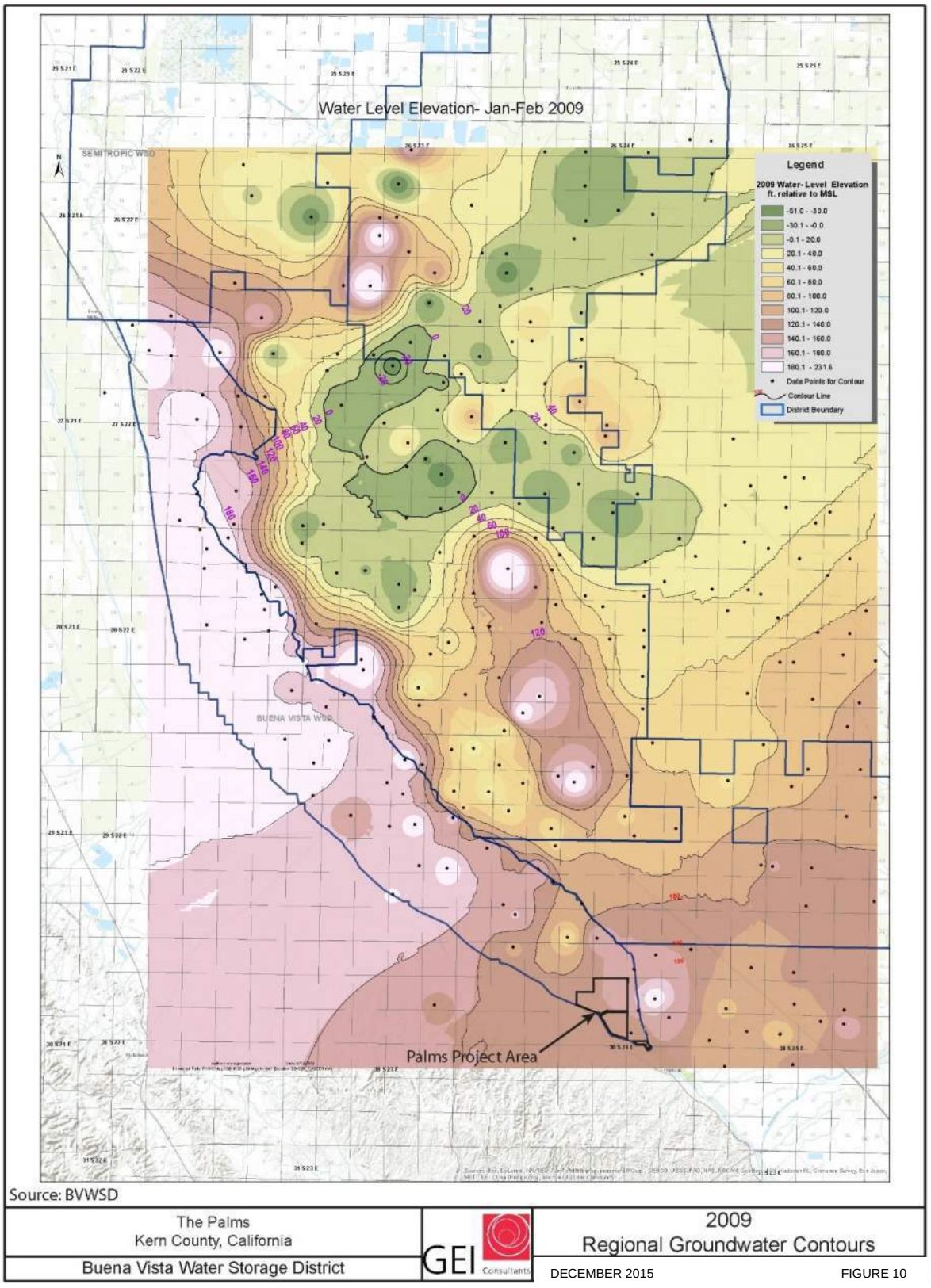


Figure 10: Regional Groundwater Elevation Contours - January to February 2009

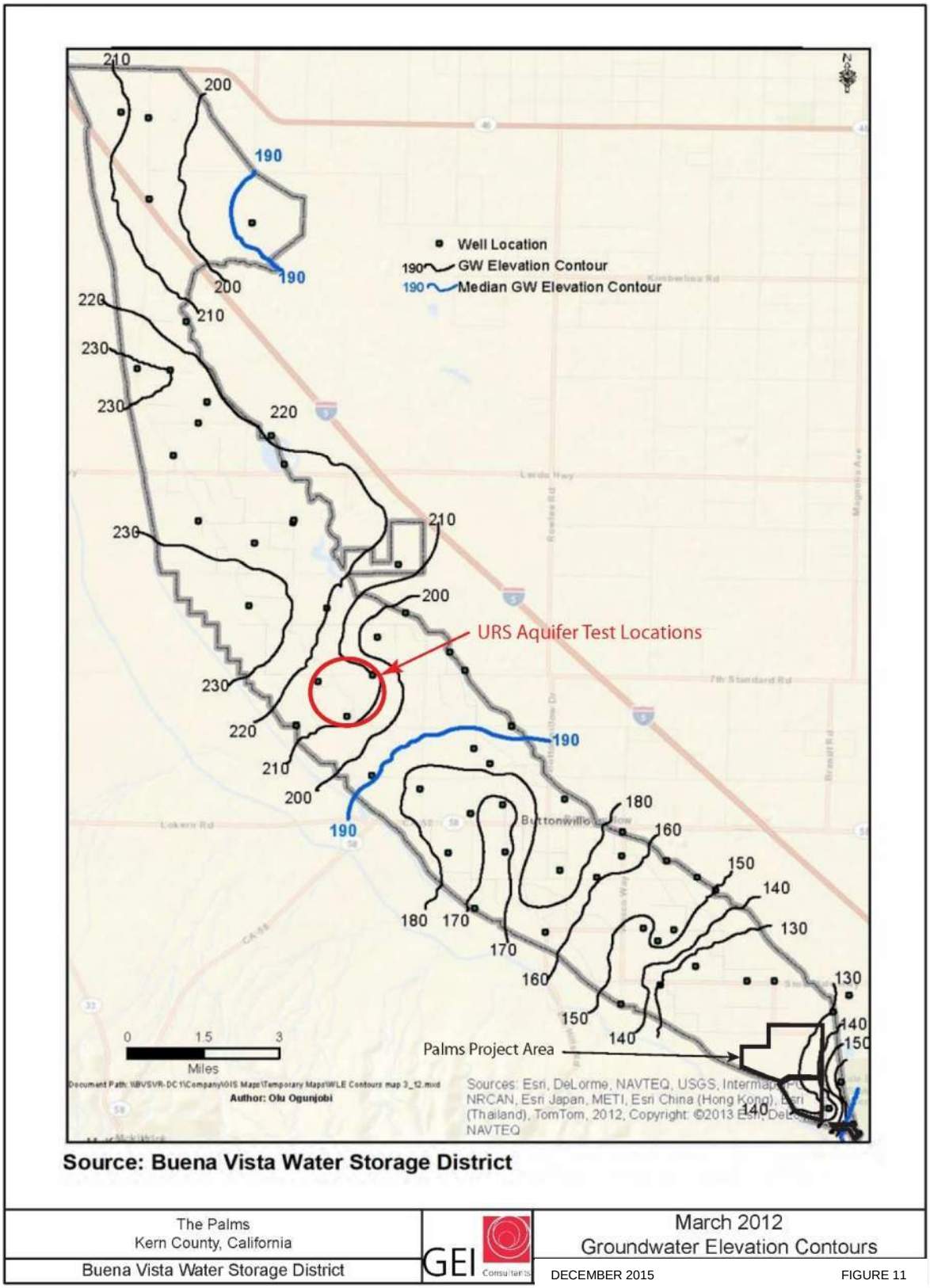


Figure 11: March 2012 Groundwater Elevation Contours

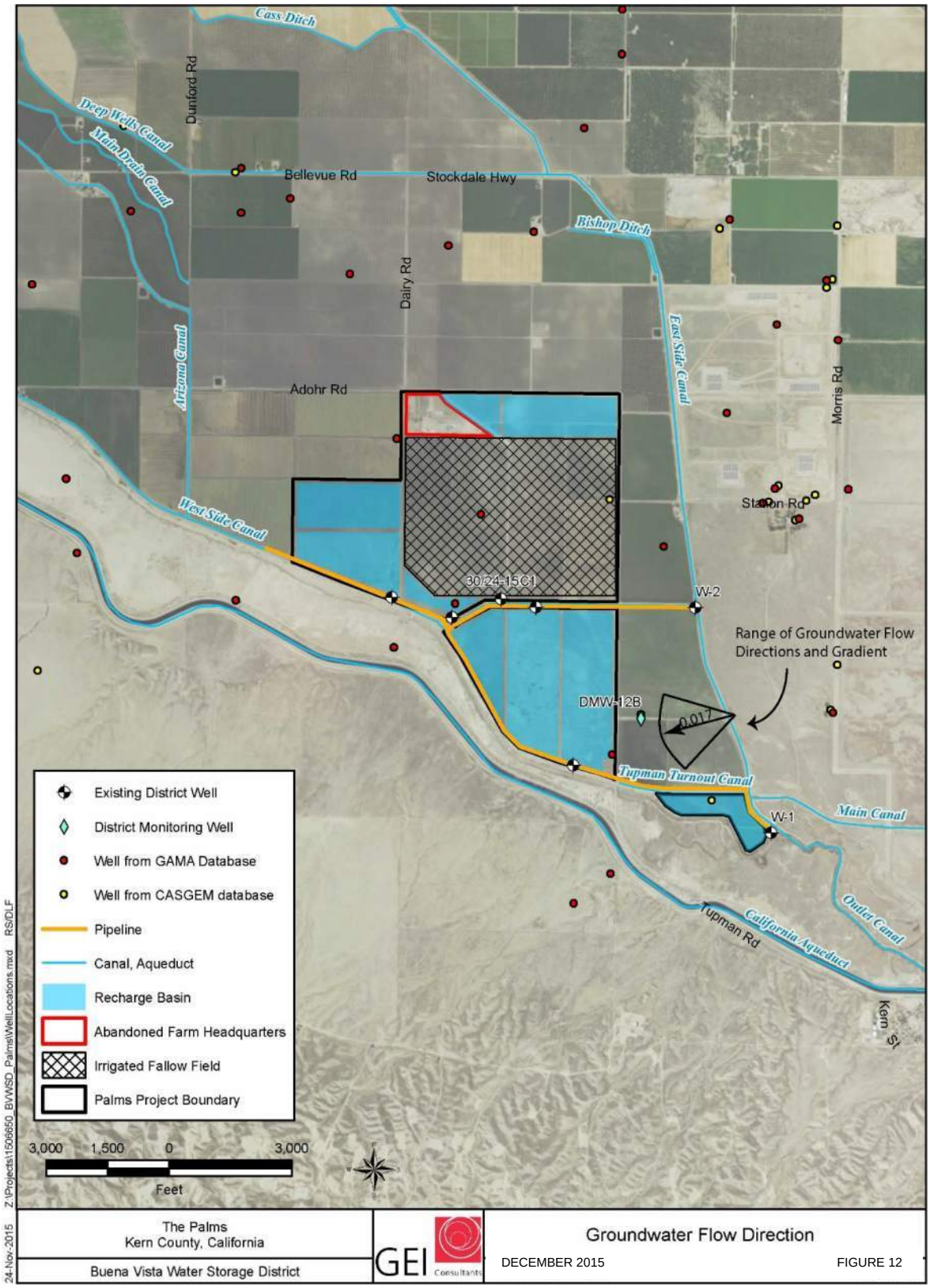


Figure 12: Groundwater Flow Direction 1994- 2013. The average gradient is 0.017 ft vertically/ft horizontally

3.5 Hydraulic Characteristics

The aquifer hydraulic characteristics govern the rate that water will recharge and move through the aquifers. Hydraulic characteristics can be estimated based on the type of aquifer material. However, a more reliable method is to perform an aquifer test where a well is pumped and changes in groundwater elevations are measured in the pumping and ideally in other nearby wells. No known aquifer tests have been performed for wells at the Palms Project.

The nearest known tests were performed by URS at three locations shown in **Figure 11**. (URS, 2010) These long-term aquifer tests were performed using one pumping well and one observation well.

Hydraulic Conductivity is an important hydraulic characteristic as it is a measure of how easily water will flow through an aquifer. Hydraulic Conductivity from the accepted URS test was 47 feet/day. Aquifer materials tend to have fewer fines in the southern part of the BSA. The boring shown in **Figure 7** indicates that aquifer material has very few fines, particularly in the upper portions. Aquifer materials are primarily SW/SP based on the boring log. Good aquifers with clean sands can have hydraulic conductivities in the range of 3 to 3000 ft/day (West, 1995). Fine to medium sands indicated by the log will fall in lower end of this range. For the purposes of this study, a hydraulic conductivity of 100 ft/day was used.

The infiltration rate of the recharged water is often estimated as being 10 times less than the horizontal hydraulic conductivity of the aquifer. However, the top few feet of soils are much less permeable and finer as shown by Borings A and B in **Figure 7**. Measures will be taken to remove as much of the fine surface soils as possible, but it is unlikely that all fines will be removed. Fine, suspended sediments will also be introduced to the basin in the recharge water which will tend to clog the pores of the surface soils. Therefore, a lower infiltration rate of 1.5 ft/day has been assumed for this Project.

Specific yield estimates are best determined by aquifer testing with pumping and observation wells. However, none have been made within the Project area. The test made by URS produced a very low value of 0.02, which would indicate the aquifers are confined in this area. Regional specific yield estimates made by the USGS for the San Joaquin Valley have an average specific yield of 0.15. Recent estimates made by the California Energy Commission for the BSA also used 0.15 as the specific yield (URS, 2012). Published values for sandy soils with few fines are around 0.25. (USGS 1967) A specific yield of 0.20 has been assumed for this Project.

3.6 Sources of Water for Recharge

Surface water available to BVWSD for use in the Palms Project may include water from the Kern River, and/or water imported to Kern County through the Friant-Kern Canal or

the California Aqueduct. **Figure 13** shows the monthly Kern River flow at Bakersfield for the 26-year period extending from 1990 through 2015. BVWSD holds rights to the use of Kern River water which are commonly referred to as the Second Point Entitlement. While this is the largest source of Kern River water available to the District, the Kern County Water Agency (KCWA) has developed a program to make some of its Lower River Entitlement (or "Hacienda Entitlement") available to its Basic Contract Member Units, including BVWSD. In this regard, KCWA's Board of Directors approved a long-term plan at its June 25, 2015 meeting (a copy of which is included in Appendix A). Lower River Entitlement occurs infrequently, in very "wet" years. During the 26-year hydrologic period included in **Figure 13**, Lower River Entitlement occurred in seven years; 1995, 1996, 1997, 1998, 2005, 2006, and 2011.

Another potential source of recharge water for the Palms Project is SWP water, which is imported through the California Aqueduct. BVWSD has a contract with KCWA for the delivery of SWP water. In addition to its contract entitlement, so-called SWP Article 21 water is available from time to time under this contract, typically early in the year when irrigation demands are relatively low. Appendix B shows the timing and amount of Article 21 water delivered to KCWA in "wet" years from 1996 to 2013. Going forward, DWR projects that Article 21 water will become less available. BVWSD has the right to purchase up to its share of this supply (as determined by KCWA), which represents another potential source of water for recharge at the Palms Project.

The Friant-Kern Canal was constructed in the 1950s to import Central Valley Project (CVP) water to Kern County from the CVP's Friant Division. While BVWSD is not a long-term CVP (Friant) contractor, it is possible to enter into a short-term contract with the U.S. Bureau of Reclamation for the purchase of water in a given year which has historically been referred to as "215 water". This is water which must be released from Millerton Reservoir and is beyond the demand of the long-term CVP contractors. In addition, floodwater from eastside streams (located to the north of Kern County) has been pumped into the Friant-Kern Canal from time to time. Some of this water has been discharged from the Friant-Kern Canal into the Kern River and this record indicates that the years with the largest discharge generally correspond to the years with Lower River Entitlement, i.e., the locally wettest years generally correspond with the wettest years from the San Joaquin River and south. In this regard, Appendix C includes a copy of a letter from the Kern River Watermaster to the Bureau of Reclamation which addresses the potential for diverting Kaweah River and/or Tule River floodwater into the Friant-Kern Canal during the 2015 and 2016 water year.

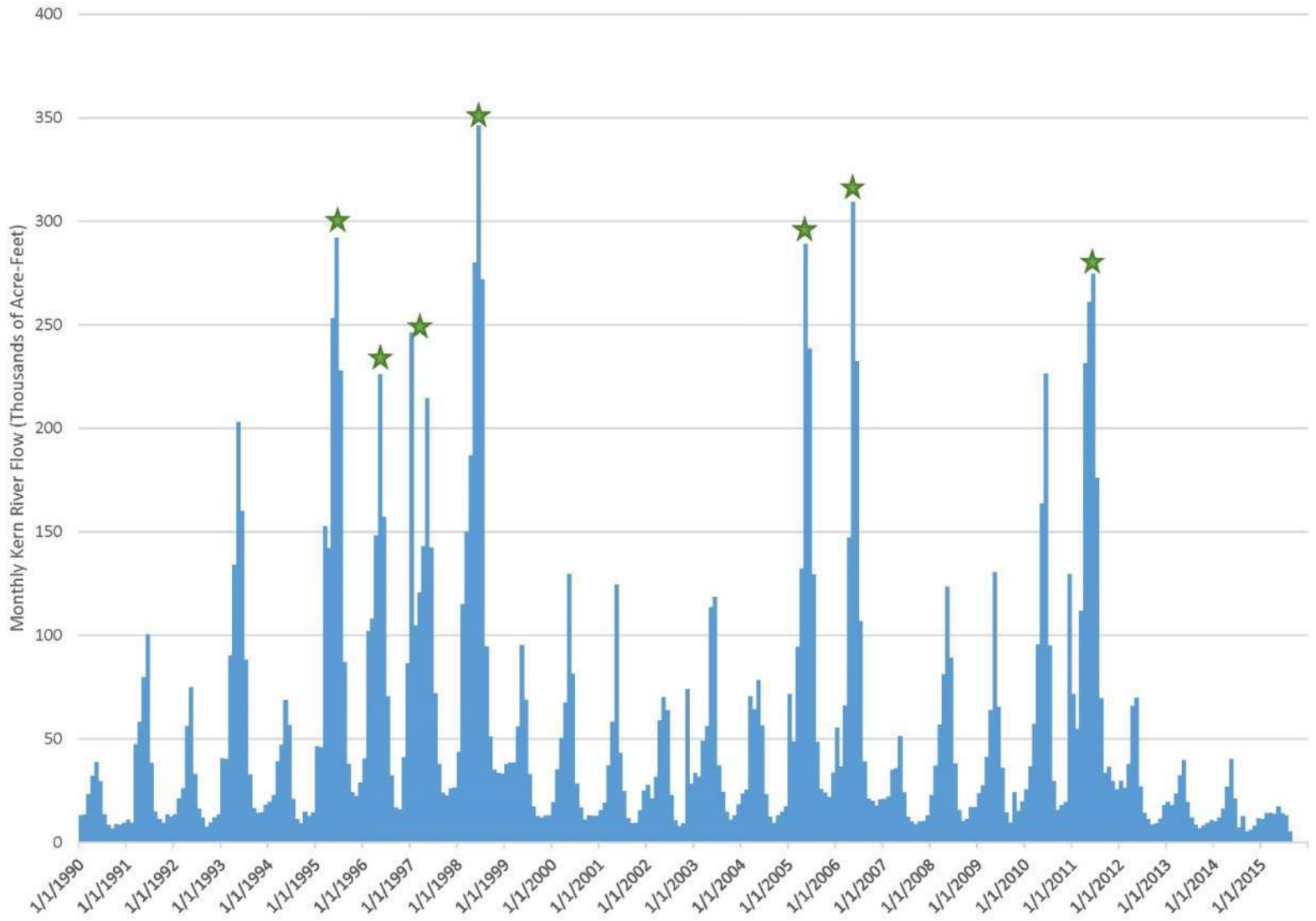


Figure 13: Monthly Kern River Flow at Bakersfield 1990 to 2015

4 Water Quality and the Environment

This section briefly summarizes native groundwater quality at the proposed project location as well as the quality of surface water that would be used as the source for recharge. In addition to surface and groundwater quality, this section also summarizes the potential threats to soil and groundwater quality resulting from current and past surface land use activities in the vicinity of the project.

4.1 Water Quality

4.1.1 *Groundwater Quality*

Table 1 summarizes groundwater quality. The table shows the most recent results for each source. DMW12A has total dissolved solids (TDS), chloride, and Specific Conductance concentrations above the mcl, but this well is screened below the Modified E-clay where poor quality water is recharged as the result of runoff from the Coast Range Mountains. Water quality in groundwater above the Modified E-clay is generally good with all constituents below the drinking water maximum contaminant level (mcl).

4.1.2 *Source Water for Recharge*

Table 1 also summarizes water quality for the potential surface water sources waters to be used for recharge. The table shows the most recent results for each source. Water quality in the source water is generally better quality than groundwater, with all constituents below the drinking water maximum contaminant level (mcl).

4.2 Environmental Records Search

Environmental data records were reviewed to determine potential sources of pollution to groundwater in the Palms Project area. Data were obtained from three sources. A records report was obtained from EDR®, the GeoTracker database was searched, and reports from the HECA power project were reviewed.

The EDR® report contained public records searches for historic land uses and known contamination sites. The report contained the records searches, aerial photos, and maps of the area and indicated that the property was not listed in any of the databases, except for a "Naval Petroleum Reserve" located south of the project. Reserve land status does not necessarily indicate that development of the petroleum reserve has occurred. The report did document an oil and gas well on the property that was reportedly abandoned in the 1950's and no evidence of the well remains. The full EDR report in included as **Appendix D**.

The GeoTracker database is maintained by the California State Water Resources Control Board (SWRCB) and is useful in locating regulated facilities and cleanup sites. **Figure 14** shows a map of all regulated sites near the Palms Project and indicates that the nearest sites are located near I-5, almost 2.5 miles from the site.

The HECA Project is a proposed power generation facility located on a large portion of the same lands as the Palms Project. An Application for Certification (AFC) was submitted, and as part of the AFC, a Phase I Environmental Site Assessment (ESA) was performed and is included in **Appendix E**. The Phase I ESA reported several potential sources of contamination to groundwater. Five underground storage tanks (USTs) which held diesel and gasoline fuels, an air strip for crop dusters where stained soils were observed, several above ground storage tanks (ASTs), and storage of agricultural chemicals. Most of these facilities are shown in **Figure 2 of Appendix E**. The remainder are shown in **Appendix F**.

The Phase I ESA was followed up by a Phase II Environmental assessment, included in Appendix F. This Phase II ESA shows additional detail of the site and locations of potential contaminating activities which are shown in **Figure 3** of Appendix F. Most of the facilities that could have a potential for contamination of soils and groundwater are located near the "Farm Operations Area" (FOA). This area is not intended to be used to recharge groundwater.

The Phase II ESA did not include groundwater quality analyses, but did include soil samples of the shallow subsurface (up to 15 feet) where the stained soils were located along with 44 other locations throughout the property, shown in **Figures 4 and 5 of Appendix F**. TPH - Mineral Oil was detected at four sites near the FOA, and the pesticides dieldrin, endrin, and endosulfan were detected at seven sites located both at the FOA and along the drainage ditch the runs south from the FOA.

The ESA uses three screening levels for comparison of results: the California Human Health Screening Levels (CHHSL), the US EPA Region 9 Regional Screening Levels (RSL), and the San Francisco Bay Regional Water Quality Control Board Environmental Screening Level (SFBRWQCB ESL). It should be noted that the SFBRWQCB ESLs are guidance values and are not established by policy or regulation. Exceedance of the ESL "does not necessarily indicate adverse effects on human health or the environment, rather that additional evaluation is warranted". (SFBRWQCB, 2013) These ESLs are many orders of magnitude lower than the other two regulatory-based screening levels. **Table 2** shows the highest exceedance in comparison to the three types of screening levels and indicates that the ESLs are exceeded for TPH and pesticides but the maximum concentrations are significantly lower than other state or federal screening levels (CHHSLs or RSLs). Arsenic is a naturally occurring constituent in soils in this area and soil concentrations are above all screening levels.

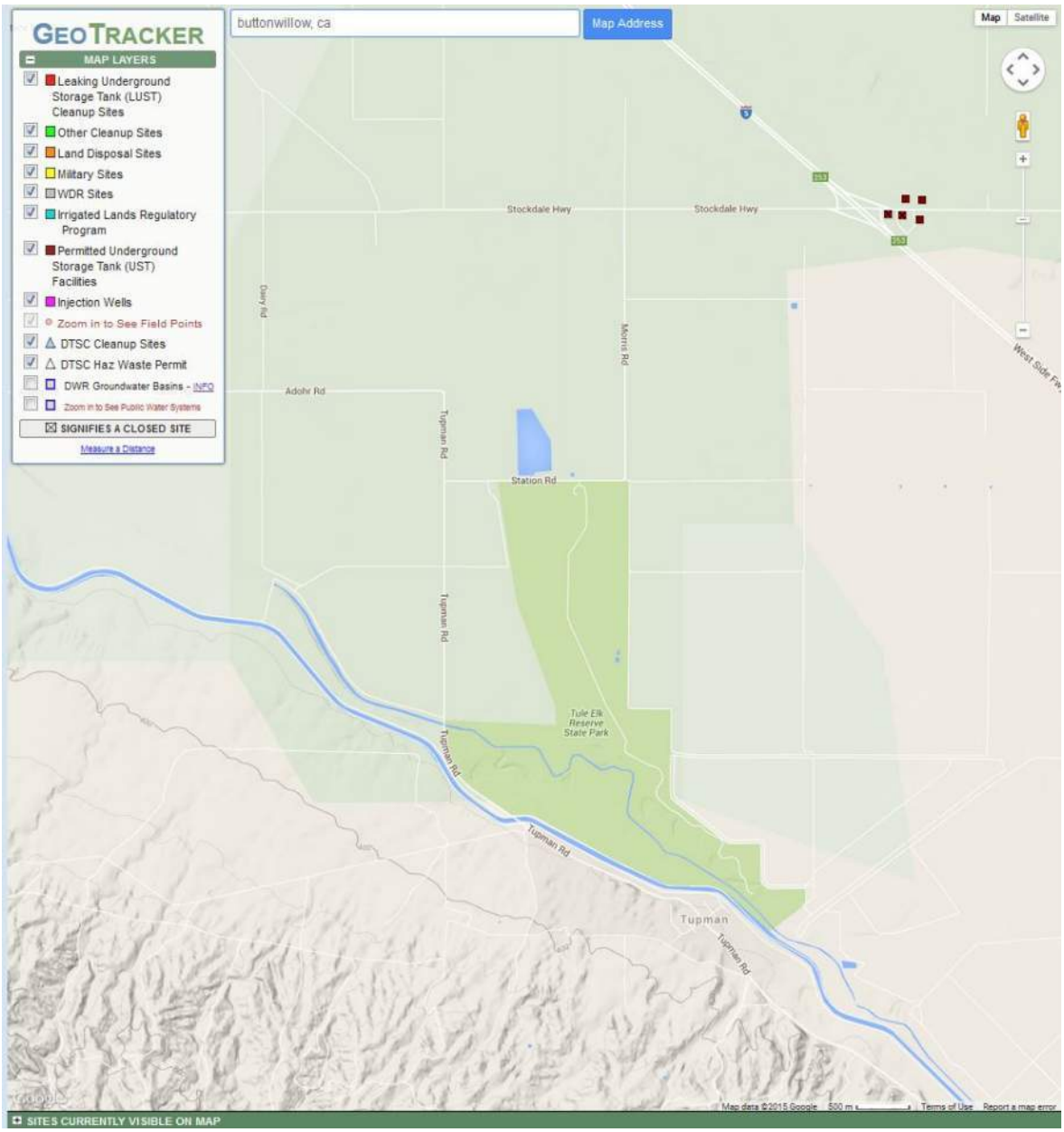


Figure 14: GeoTracker Sites

Table 1: Recent Water Quality Summary

			Alkalinity	Aluminum	Arsenic	Bicarbonate	Boron	Calcium	Carbonate	Chloride	Chromium (Total)	Chromium (Hexavalent)	Color	Fluoride (natural)	Hardness	Iron	Magnesium	Manganese	Nitrate (as NO3)	pH, Laboratory	Potassium	Sodium	Specific Conductance	Sulfate	Total Dissolved Solids	Turbidity	Zinc
Constituent																											
mcl				1	10		1*			500	0.05	0.01	15	2		0.3		0.05	45				1600	500	1000	5	5000
units			mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L	uS/cm	mg/L	mg/L	Units	ug/L
Source Water (Surface Water)	Source	Analysis Year																									
	Friant Kern Canal	2012	86	0.114	ND	105	0.15	35.9	ND	29.2	0.0014	0.0007	< 2.5	0.16	97.8	ND	1.99	ND	8.83	8.33	1.15	25.8	328	26.8	196	0.46	ND
	California Aqueduct	2012	80	0.113	2.2	97.6	0.2	26.2	ND	89.1	ND	ND	12.5	ND	121	ND	13.4	ND	2.75	8.48	2.97	60.4	551	50.9	284	1.16	ND
	Kern River	2012	63	0.262	3.4	76.9	0.13	16	ND	5.04	ND	ND	20	0.22	51.4	0.19	2.77	0.0323	ND	7.92	1.76	14.3	171	13.9	104	3.09	ND
Receiving Water (Groundwater)	Well	Screen Depth (feet)	Sample Date																								
	DMW12A	600-700	7/7/2015	35		16	42		200	0	1100				0.58	540		9.5		0	7.15	2.9	530	3550	170			13
	DMW12B	355-455	7/24/2013	60		0.67	55		16	8.9	63				0.014	43		0.53			9.09	0.95	110	585	140	390		
	DW01	120-511	7/2/2014	36			36	0.32	77	0	41				0.37			18		0	6.8	2.3	60	860	340	630		
	DW02	460	6/30/2014	160		0	160	0.25	97	0	50				0			7		2.7	7.9	0	60	780	170	530		

Blank indicates no chemical analysis was available.
Yellow highlighting indicates a value above the state drinking water MCL.
ND indicates constituent was not detected.
Surface water data source is Improvement District 4
Groundwater data source is BVWSD
* Value identified as MCL is Notification Level or Advisory Level for constituent lacking MCL
Note: Surface water was also tested by ID4 for additional constituents regulated for drinking water standards. All other constituents were ND, including Regulated Volatile Organic Chemicals and Regulated Non-Volatile Synthetic Organic Chemicals

Table 2: Maximum Measured Concentrations and Screening Levels for Constituents with Exceedances (mg/kg of soil)

	TPH 8015 FF			Organochlorine Pesticides 8081			Metals
	Diesel	Motor Oil	Mineral Oil	Dieldrin	Endo-sulfan II	Endrin	Arsenic
Max Concentration from Phase II ESA	23	20000	93000	0.0036	0.0048	0.014	35
California Human Health Screening Level	NS	NS	NS	0.13	NS	230	0.24
US EPA region 9 Regional Screening Level	NS	NS	310000	0.11	26000	180	1.6
SFBWQCB ESL	83	1000	1000	0.0023	0.0046	0.00065	5.5

NS = No standard established

5 Assessment of Project Effects

5.1 Approach

The proposed project will affect groundwater levels and groundwater quality during recharge operations. Our approach to evaluating changes in groundwater levels included use of a groundwater mounding tool to estimate a reasonable range of changes in groundwater levels given a range of basin sizes expected in the project, estimated infiltration rate, aquifer properties and depth to groundwater (supported by well and geotechnical information available for the site and detailed in **Section 5**). Our approach to evaluating changes in groundwater quality is to qualitatively compare surface and groundwater quality to forecast long term changes in groundwater quality likely to result from the mixing with surface water from the Kern River watershed and California Aqueduct.

5.2 Project Effects on Groundwater Levels

Figure 15 and **Figure 9** show that depth to groundwater in the vicinity of the Palms Project is currently between 160 and 180 feet below ground surface (bgs). Before the current drought, levels were higher at between 120 and 140 feet bgs. For purposes of this analysis an average, uniform groundwater level of 150 feet bgs was assumed for mounding analyses. The mounding analysis was performed using a tool developed by the USGS (2010) which uses the Hantush analytical equation for groundwater flow. The analysis assumes a square recharge basin and doesn't consider groundwater flow based on partially saturated sediments.

The results of the mound analysis indicate that the proposed project will have the beneficial impact of locally raising groundwater levels in the vicinity of the groundwater recharge basins resulting in lower energy costs to lift water from wells in the area. **Figure 16** shows a reasonable range of anticipated groundwater level rise based on a variety of basin sizes and a continuous fixed recharge duration of 120 days. The figure indicates that the project could raise groundwater levels by 39 to 150 feet (ground surface) in the center of the basin, and that levels could rise 1 to about 10 feet at a distance of 2.5 miles.

It is anticipated the Palm recharge project would be built in phases. Mounding results shown on **Figure 16** includes various sizes of recharge facility, including the "build out" facility size of 1,100 acres. Empirical information on actual mound height and width will be measured during operation of the initial project facility. This information will be used in the design of subsequent project phases.

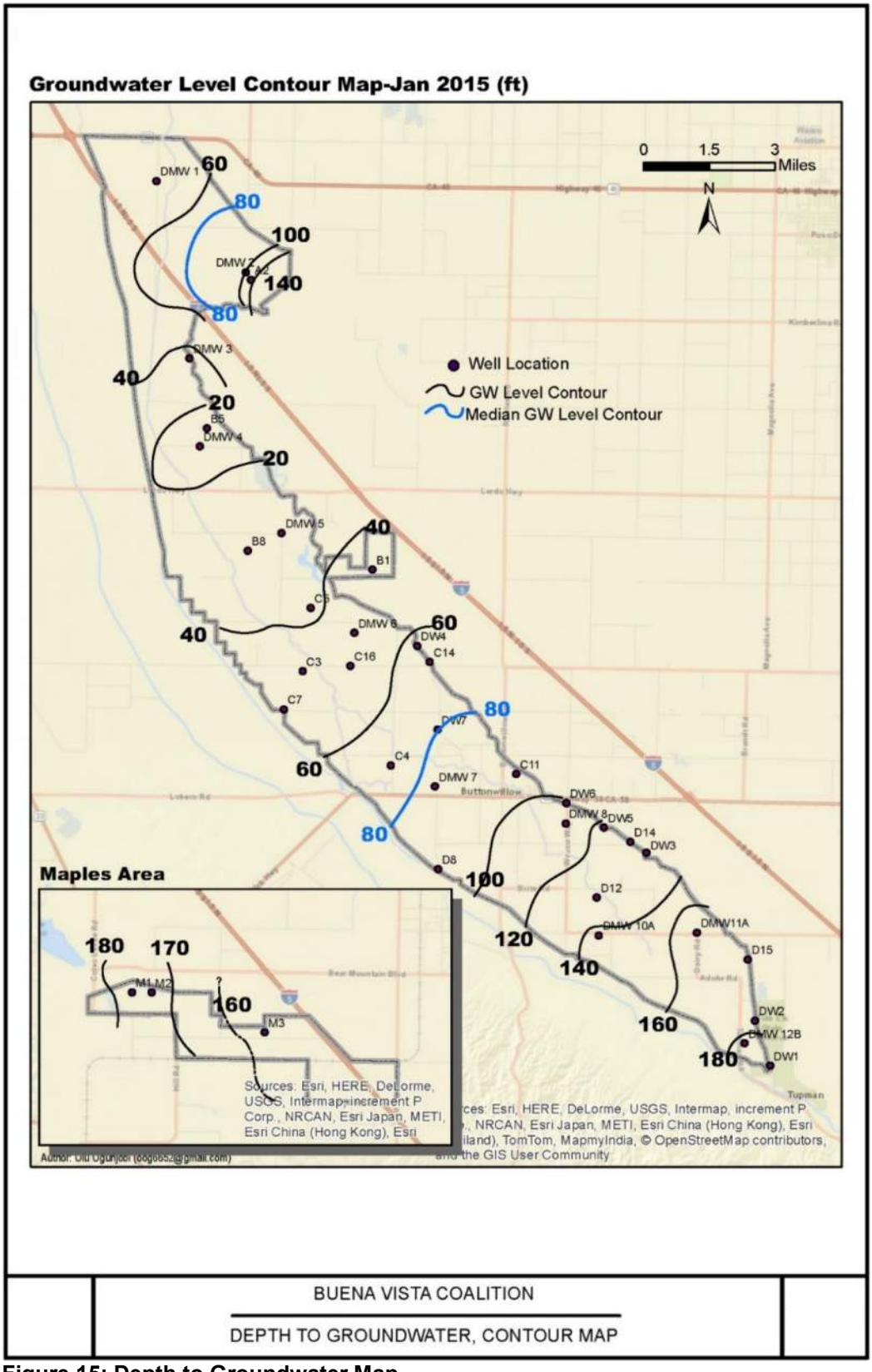


Figure 15: Depth to Groundwater Map

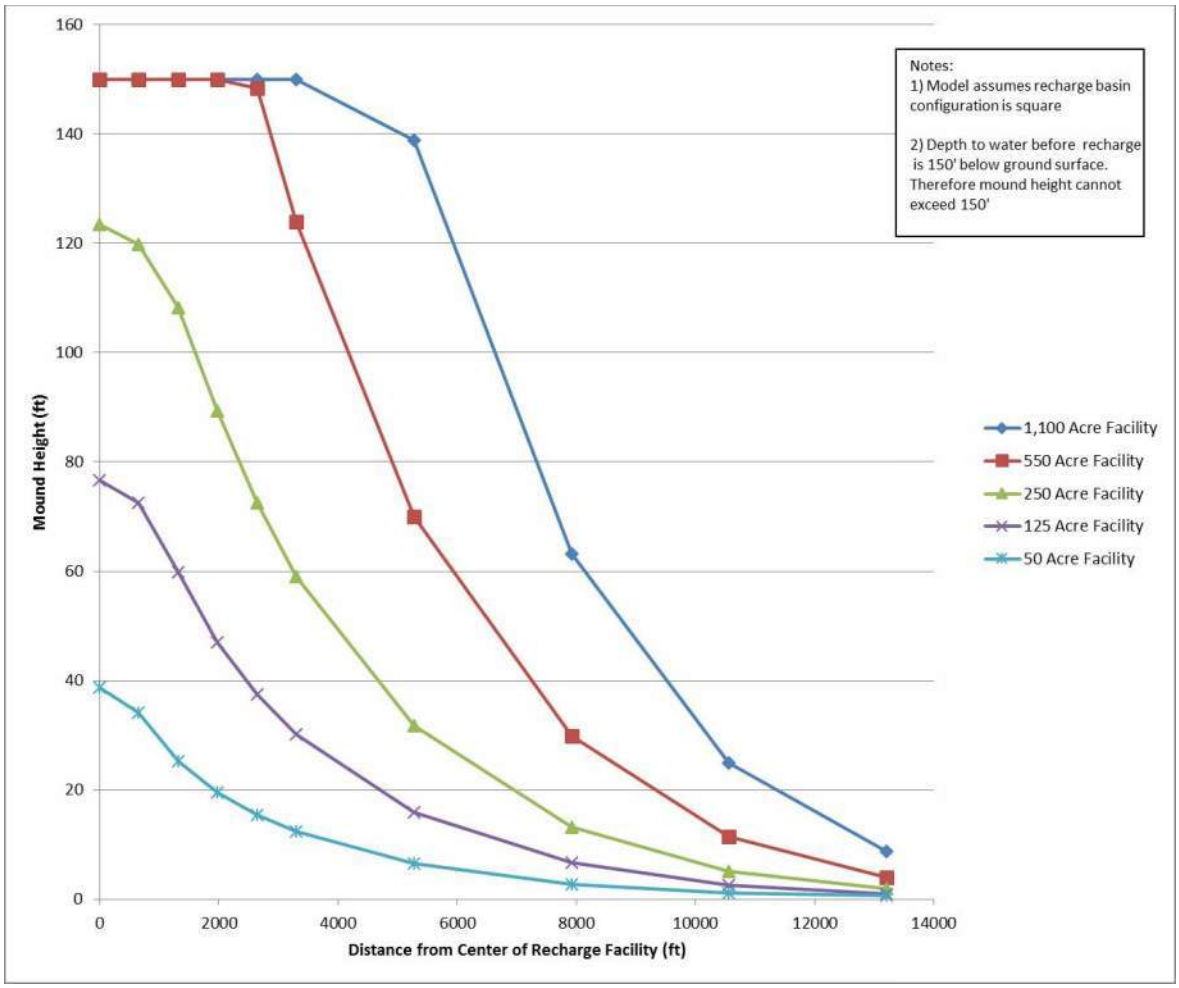


Figure 16: Predicted Recharge Mound Height

5.3 Project Effects on Groundwater Quality

Section 4.1 of this report summarizes groundwater quality as well as the quality of surface water used for replenishment at the Palms Project. The recharge of surface water with groundwater through recharge operations will result in a blended water quality. The actual aquifer water quality resulting from the mixing of surface and groundwater will depend on the volume of water recharged, the duration of recharge and the distance away from the project. No adverse geochemical reactions are predicted based on the mixing of surface and groundwater quality at the Palms Project. Because both surface water sources have lower levels of dissolved solids, trace minerals and major ions, the blended mix that results from recharge will result in lower levels of total dissolved solids, major ions and trace minerals in the mixing zone within the aquifer.

Section 4.2 explains that the Phase II ESA conducted for the HECA project, encountered soils impacted by fuel and farm chemicals resulting from previous land uses in the northern area of the Palms Recharge Facility. If these chemicals are still present in soils at

this project site, then surface water recharge through these soils could cause migration of these chemicals into the groundwater aquifer. It is unknown if these chemicals are already present in the groundwater. The most likely areas of impact are near the Farm Operations Area (FOA) and near the drainage ditch that runs south from the FOA where chemicals may have been transported if there was a spill. **Section 5.3.1** explains how this risk will be mitigated.

5.3.1 *Mitigation to Reduce Risk to Groundwater Quality Impacts*

The potential threat to groundwater quality resulting from the potential migration of fuel and farm chemicals from soil into groundwater will be mitigated as follows:

GW 1 – Groundwater monitoring wells will be constructed on site before recharge operations begin. Groundwater samples will be collected from each of these wells before recharge operations begin. The purpose of this monitoring is to verify that shallow and deep groundwater beneath the site is free of priority pollutions before initiating recharge activities.

GW 2 – During construction of the recharge basins, approximately 5 feet of fine ground soils (silts and clays) will be excavated from each recharge basin to expose the underlying fine to medium grained sand in the base of each recharge basin. During soil excavation and removal the contractor and inspecting engineer will monitor for evidence of soil contamination (color, odor, buried tanks, pipelines). If contaminated soils are encountered during excavation, these soils will be analyzed to identify the type and extent (vertically and horizontally) of contamination present. Contaminated soils will either be treated on site or disposed of at a hazardous waste landfill.

GW 3 – If contaminated soils are encountered during construction, additional groundwater monitoring wells may be installed to verify that groundwater has not been impacted. As an added measure of protection, BVWSD will cease the construction of recharge basins in and adjacent to contaminated soils. During the operational phase of the Palms project, BVWSD will conduct annual monitoring to verify that groundwater quality is not being adversely impacted by the recharge operation.

5.4 Summary of Project Impacts

The analysis documented in this report indicates that groundwater levels and groundwater quality will be affected by Palms Recharge Project. In both cases, the changes to groundwater levels and groundwater quality are beneficial to existing and potential users of the groundwater resource. Groundwater levels will rise and total dissolved solid levels will drop in response to recharge. The absolute amount of changes depends on the volume and duration of recharge. Due to the regionally extensive nature of the E-clay as described

in **Section 2.2**, the recharge benefits described above pertain to wells screened above the E-clay, but will provide the benefit of reduced risk that poor quality water could migrate vertically from below the E-clay. The only potentially negative impact to groundwater quality would be the migration of pollutants (if present) from soil into the groundwater system during recharge. To mitigate for this condition, BVWSD will establish a baseline water quality at the site through sampling of groundwater monitoring wells. BVWSD will also monitor for the presence of contaminated soils during construction of the recharge basins. If contamination is detected, these areas will not be used for recharge basins.

6 References

Buena Vista Water Storage District (BVWSD). 2014. Agricultural Water Management Plan.

California Department of Water Resources (DWR). 2003. California's Groundwater. Bulletin 118 – Update 2003.

California Geologic Survey (CGS), 1991. California Geologic Data Map Series – Map No. 2 – Geologic Map of California.

Croft, M.G. and Gordon, G.V. 1968. Geology, Hydrology, and Quality of Water in the Hanford-Visalia Area, San Joaquin Valley, California. USGS Open-File Report 68-67.

Croft. 1972. Subsurface Geology of the Late Tertiary and Quaternary Water-bearing Deposits of the Southern Part of the San Joaquin Valley, California. Geological Water-Supply Paper 1999-H.

Pacific Geotechnical Associates. 1991. Study of the Regional Geologic Structure related to Ground Water Aquifers in the Southern San Joaquin Valley Groundwater Basin, Kern County, California (Phase 1A and Phase 1B).

Page R. W. 1986. Geology of the Fresh Ground-Water Basin of the Central Valley, California with Texture Maps and Sections. Professional Paper 1401-C.

Provost and Pritchard. 2013. Groundwater Management Plan, Buena Vista Water Storage District (DRAFT).

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), 2013. User's Guide: Derivation and Application of Environmental Screening Levels. Interim Final 2013. Available at: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml

URS, 2012. Amended Application for Certification for Hydrogen Energy California (HECA), 08-AFC-8, Kern County California. May 2012. Available at: http://www.energy.ca.gov/sitingcases/hydrogen_energy/documents/applicant/amended_afc/

URS March, 2010. Hydrogeologic Data Acquisition Report, Groundwater Monitoring and Process-Water Well-Field Development Project.

United States Geological Survey (USGS), 1967. Specific yield — compilation of specific yields for various materials. By Johnson, A.I., U.S. Geological Survey Water Supply Paper 1662-D. 74 p.

United States Geological Survey (USGS), 2010. Simulation of Groundwater Mounding Beneath Hypothetical Stormwater Infiltration Basins. USGS Scientific Investigations Report 2010–5102 by Glen B. Carleton.

West, T.R., 1995. Geology applied to engineering. Prentice Hall, 560 pp.

Appendix A – Lower Kern River Rights and Obligations

TO: Water Resources Committee
Agenda Item No. 8

FROM: Holly Melton

DATE: September 24, 2015

SUBJECT: Authorization to Offer a Long-Term Plan for a Portion of the Kern County Water Agency's Lower Kern River Rights and Obligations to the Basic Contract Member Units

Issue:
Consider authorizing the General Manager to Execute the Contract for a Portion of Kern County Water Agency Kern River Lower River Rights and Obligations.

Recommended Motion:
Adopt Resolution No. 32-15 authorizing the General Manager to Execute the Contract for a Portion of Kern County Water Agency Kern River Lower River Rights and Obligations.

Discussion:
In 2001, the Kern County Water Agency (Agency) acquired the Lower Kern River (Lower River) water rights from the Nickel Family, LLC. In July 2014, Agency staff and the Kern River/Lower River Rights Issues ad hoc committee (President Page, Director Radon and Director Milobar) began with working a team of Member Unit representatives (Scott Hamilton, Mark Mulkay and Phil Nixon) to develop a long-term plan for the allocation of Lower River water benefits and obligations. At the June 25, 2015 Agency Board of Directors (Board) meeting, the Agency Board approved offering a long-term plan for a portion of the Agency's Lower River water rights and obligations to the Basic Contract Member Units (Member Units) with the following provisions:

1. Member Units, excluding Improvement District No. 4 (ID4), shall receive annual Lower River yield between 40,001 and 125,000 acre-feet (af), as determined by the Agency after meeting the Agency's current year obligations and targeted storage amounts needed to meet future year obligations;
2. Member Units, including ID4, shall receive annual Lower River yield above 125,000 af;
3. Member Units may receive Isabella Reservoir storage within the year Lower River yield as received, subject to the Agency's needs;
4. Lower River yield and charges shall be allocated among participating Member Units on Table A Amounts;
5. Member Units shall pay an administrative charge of $0.50 per af;
6. Member Units shall pay an annual banked water repayment charge of $0.16 per af;
7. Member Units shall pay $5 per af for each af of Lower River water delivered;
8. Lower River water received must be used within the Agency's service area; and
9. 10-year term, renewable for an additional 10 years, subject to mutually agreeable terms and conditions.

Following the June 25, 2015 Agency Board meeting, the Kern River/Lower River Rights Issues ad hoc committee met with the Member Unit representatives. Pursuant to this meeting, Provision No. 9 of the offer was changed as follows:

9. 10-year term, renewable for additional 10-year terms, subject to mutually agreeable terms and conditions.

All of the Member Units accepted the offer with this revised provision.

In order to maximize Lower River water made available to the Member Units while minimizing Member Units' costs, the Agency is contributing the following to the long-term plan:

1. Dedicating $750,000 of monies within the Lower River Fund;
2. Offering 45,718 af of the Agency's previously banked groundwater stored in the Kern Fan banking projects to the Member Units at $50 per af and financed over 20 years with 2 percent interest to meet future Nickel obligations;
3. Dedicating 35,460 af of the Agency's previously banked Lower River water stored in the Kern Fan banking projects to meet future Nickel obligations;
4. Using a portion of the Agency's Pioneer Project recharge and recovery capacity to meet the annual Nickel obligation;
5. After 2017, using the Agency's State Water Project water supplies to meet the annual obligation to Western Hills Water District;
6. Continuing to meet all obligations of the Contract to Transfer the Kern River Lower River Water; and
7. Continuing to represent and defend the Lower River water rights, including funding all legal expenses.

Agency staff and the ad hoc committee have drafted the Contract for a Portion of Kern County Water Agency Kern River Lower River Rights and Obligations (Contract), and recommend the Contract be distributed to the Member Units for execution.

Appendix B – State Water Project Delivery of Article 21 Water

Historical Article 21 Deliveries and Carryover Spill
Data Source: DWR SWP Delivery Finalization Report Spreadsheets

ALLOCATION %																		
Article 21 Deliveries	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
FEATHER RIVER																		
COUNTY OF BUTTE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PLUMAS COUNTY FC&WCD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CITY OF YUBA CITY	-	-	-	-	-	-	-	-	-	-	1,194	-	-	-	-	-	-	-
Subtotal	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,194**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
NORTH BAY																		
NAPA COUNTY FC&WCD	-	-	-	754	297	996	827	376	1,450	606	300	3,597	1,219	1,588	2,207	-	-	-
SOLANO COUNTY WA	-	-	9,982	-	1,040	2,304	2,242	2,280	7,787	10,421	18,195	8,217	1,510	4,444	5,298	15,000	1,027	510
Subtotal	**-**	**-**	**9,982**	**754**	**1,337**	**3,300**	**3,069**	**2,656**	**9,237**	**11,027**	**18,495**	**11,814**	**2,729**	**6,032**	**7,505**	**15,000**	**1,027**	**510**
SOUTH BAY																		
ALAMEDA COUNTY FC&WCD-ZONE 7	-	-	-	2,910	3,740	-	1,484	-	-	-	-	912	-	-	-	-	-	-
ALAMEDA COUNTY WD	-	-	-	2,781	2,380	10	83	-	-	846	1,922	550	-	-	-	1,959	-	-
SANTA CLARA VALLEY WD	-	-	-	15,480	18,381	-	202	936	2,983	6,298	26,769	4,840	-	-	-	970	-	-
Subtotal	**-**	**-**	**-**	**21,171**	**24,501**	**10**	**1,769**	**936**	**2,983**	**7,144**	**28,691**	**6,302**	**-**	**-**	**-**	**2,929**	**-**	**-**
SAN JOAQUIN VALLEY																		
OAK FLAT WATER DISTRICT	-	-	-	-	-	-	50	19	-	-	-	41	-	-	-	-	-	-
COUNTY OF KINGS	-	-	12	-	-	-	-	58	3,157	11,504	366	474	-	-	-	552	-	-
DEVIL'S DEN WATER DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DUDLEY RIDGE WATER DISTRICT	4,457	7,141	984	4,990	7,454	933	1,861	1,928	7,393	28,197	18,429	8,953	-	-	-	11,666	-	-
EMPIRE WEST SIDE ID	-	-	-	176	528	253	26	175	626	1,799	1,124	1,172	-	-	-	138	-	-
HACIENDA WATER DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KERN COUNTY WA	15,653	10,264	-	58,241	78,908	23,233	21,951	27,891	86,513	453,078	247,914	99,861	-	-	-	194,119	-	-
TULARE LAKE BASIN WSD	8,537	1,213	9,310	49,898	56,818	8,755	3,749	6,243	15,299	47,267	58,059	12,902	-	-	-	6,909	-	-
Subtotal	**28,647**	**18,618**	**10,306**	**113,305**	**143,708**	**33,174**	**27,637**	**36,314**	**112,988**	**541,845**	**325,892**	**123,403**	**-**	**-**	**-**	**213,384**	**-**	**-**
CENTRAL COASTAL																		
SAN LUIS OBISPO COUNTY FC&WCD	-	-	-	-	-	-	-	36	69	245	827	24	-	-	-	-	-	-
SANTA BARBARA COUNTY FC&WCD	-	-	-	-	-	396	436	339	-	-	4,020	1,070	-	-	-	-	-	-
Subtotal	**-**	**-**	**-**	**-**	**-**	**396**	**436**	**375**	**69**	**245**	**4,847**	**1,094**	**-**	**-**	**-**	**-**	**-**	**-**
SOUTHERN CALIFORNIA																		
ANTELOPE VALLEY-EAST KERN WA	-	641	-	-	-	-	-	-	-	-	-	-	-	-	-	7,629	-	-
CASTAIC LAKE WA	-	-	-	-	-	850	280	991	1,618	2,451	2,089	-	-	-	-	400	-	-
COACHELLA VALLEY WD	-	-	-	-	17,820	-	111	204	-	-	-	-	-	-	-	-	-	-
CRESTLINE-LAKE ARROWHEAD WA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DESERT WATER AGENCY	-	-	-	-	17,820	-	189	330	-	-	-	-	-	-	-	-	-	-
LITTLEROCK CREEK ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
THE METROPOLITAN WATER DISTRICT OF	-	-	-	22,840	103,124	10,415	9,624	17,622	91,601	168,300	238,478	166,517	-	-	-	181,610	-	-
MOJAVE WATER AGENCY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PALMDALE WATER DISTRICT	-	-	-	-	-	-	-	-	-	-	1,653	843	-	-	-	-	-	-
SAN BERNARDINO VALLEY MWD	-	-	-	-	-	-	-	200	-	56	-	-	-	-	-	-	-	-
SAN GABRIEL VALLEY MWD	-	2,173	-	-	475	-	-	200	-	-	-	-	-	-	-	-	-	-
SAN GORGONIO PASS WA	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-
VENTURA COUNTY WPD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	**-**	**2,814**	**-**	**22,840**	**139,239**	**11,265**	**10,204**	**19,547**	**93,219**	**170,822**	**242,220**	**167,360**	**-**	**-**	**-**	**189,639**	**-**	**-**
TOTAL	**28,647**	**21,432**	**20,288**	**158,070**	**308,785**	**48,145**	**43,115**	**59,828**	**218,496**	**731,083**	**621,339**	**309,973**	**2,729**	**6,032**	**7,505**	**420,952**	**1,027**	**510**

																			AVG
KCWA % of Total Art 21 Deliv.	55%	48%		37%	26%	48%	51%	47%	40%	62%	40%	32%				46%			**44%**

Carryover Spill	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
FEATHER RIVER																		
COUNTY OF BUTTE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PLUMAS COUNTY FC&WCD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CITY OF YUBA CITY	-	-	-	-	12,765	-	-	-	-	-	12,789	1,332	-	-	-	8,996	-	-
Subtotal	**-**	**-**	**-**	**-**	**12,765**	**-**	**-**	**-**	**-**	**-**	**12,789**	**1,332**	**-**	**-**	**-**	**8,996**	**-**	**-**
NORTH BAY																		
NAPA COUNTY FC&WCD	-	-	-	-	23,339	-	-	-	-	7,426	43,058	10,277	-	-	-	8,895	-	-
SOLANO COUNTY WA	-	-	-	-	22,362	-	-	397	397	12,611	51,274	21,831	-	-	-	22,329	-	-
Subtotal	**-**	**-**	**-**	**-**	**45,701**	**-**	**-**	**397**	**27,388**	**20,037**	**94,332**	**32,108**	**-**	**-**	**-**	**31,224**	**-**	**-**
SOUTH BAY																		
ALAMEDA COUNTY FC&WCD-ZONE 7	-	-	-	-	59,461	-	-	-	-	5,658	66,433	22,940	-	-	-	7,340	-	-
ALAMEDA COUNTY WD	-	-	-	-	58,870	-	-	-	-	-	367	327	-	-	-	-	-	-
SANTA CLARA VALLEY WD	-	-	-	-	71,521	-	-	-	-	-	7,334	41,839	-	-	-	-	-	-
Subtotal	**-**	**-**	**-**	**-**	**189,852**	**-**	**-**	**-**	**27,734**	**5,658**	**74,134**	**65,106**	**-**	**-**	**-**	**7,340**	**-**	**-**
SAN JOAQUIN VALLEY																		-
OAK FLAT WATER DISTRICT	-	-	-	-	3,372	-	-	-	-	-	2,385	1,513	-	-	-	367	-	-
COUNTY OF KINGS	-	-	-	-	3,915	-	-	-	-	-	-	9	-	-	-	48	-	-
DEVIL'S DEN WATER DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DUDLEY RIDGE WATER DISTRICT	-	-	-	-	4,359	-	-	-	-	75	2,619	-	-	-	-	-	-	-
EMPIRE WEST SIDE ID	-	-	-	-	4,163	-	-	-	-	53	647	985	-	-	-	1,349	-	-
HACIENDA WATER DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KERN COUNTY WA	-	-	-	-	741,828	-	-	-	-	-	44,784	8,396	-	-	-	-	-	-
TULARE LAKE BASIN WSD	-	-	-	-	100,166	-	-	-	-	449	166	31,102	-	-	-	13	-	-
Subtotal	**-**	**-**	**-**	**-**	**857,803**	**-**	**-**	**-**	**795**	**577**	**50,601**	**42,005**	**-**	**-**	**-**	**1,777**	**-**	**-**
CENTRAL COASTAL																		
SAN LUIS OBISPO COUNTY FC&WCD	-	-	-	-	25,996	-	-	-	-	-	51,816	12,500	-	-	-	6,009	-	-
SANTA BARBARA COUNTY FC&WCD	-	-	-	-	79,494	-	-	-	-	-	49,786	21,353	-	-	-	9,109	-	-
Subtotal	**-**	**-**	**-**	**-**	**105,490**	**-**	**-**	**-**	**-**	**-**	**101,602**	**33,853**	**-**	**-**	**-**	**15,118**	**-**	**-**
SOUTHERN CALIFORNIA																		
ANTELOPE VALLEY-EAST KERN WA	-	-	-	-	261,238	-	-	21	21	38,752	214,050	60,413	-	-	-	43,999	-	-
CASTAIC LAKE WA	-	-	-	-	96,507	-	-	-	-	12,820	41,586	34,226	-	-	-	16,883	-	-
COACHELLA VALLEY WD	-	-	-	-	-	-	-	-	-	-	60,550	-	-	-	-	-	-	-
CRESTLINE-LAKE ARROWHEAD WA	-	-	-	-	8,332	-	-	-	-	1,764	11,596	2,900	-	-	-	3,797	-	-
DESERT WATER AGENCY	-	-	-	-	-	-	-	-	-	-	11,832	-	-	-	-	-	-	-
LITTLEROCK CREEK ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
THE METROPOLITAN WATER DISTRICT OF	-	-	-	-	581,820	-	-	-	-	3,853	114,812	201,902	-	-	-	-	-	-
MOJAVE WATER AGENCY	-	-	-	-	42,730	-	-	262	262	36,699	130,852	37,163	-	-	-	-	-	-
PALMDALE WATER DISTRICT	-	-	-	-	23,036	-	-	-	-	1,758	31,510	9,665	-	-	-	46	-	-
SAN BERNARDINO VALLEY MWD	-	-	-	-	136,569	-	-	1,708	1,708	30,891	128,060	51,300	-	-	-	9,639	-	-
SAN GABRIEL VALLEY MWD	-	-	-	-	49,771	-	-	-	-	-	14,693	1,636	-	-	-	4	-	-
SAN GORGONIO PASS WA	-	-	-	-	-	-	-	-	-	-	9,769	2,972	-	-	-	1,961	-	-
VENTURA COUNTY WPD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,110	-	-
Subtotal	**-**	**-**	**-**	**-**	**1,200,003**	**-**	**-**	**1,991**	**29,569**	**126,537**	**769,310**	**402,177**	**-**	**-**	**-**	**83,439**	**-**	**-**
TOTAL	**-**	**-**	**-**	**-**	**2,411,614**	**-**	**-**	**2,388**	**85,486**	**152,809**	**1,102,768**	**576,581**	**-**	**-**	**-**	**147,894**	**-**	**-**

Appendix C – Letter to Bureau of Reclamation

Kern River Watermaster

16294 Highway 43
❖
P.O. Box 1168
Wasco, California 93280
❖
Office: (661) 758-5153
Fax: (661) 758-6167

September 28, 2015

Bureau of Reclamation
South Central California Area Office
1243 "N" Street
Fresno, CA. 93721-1813
Attn: George Bushard

Re: Delta Lands Reclamation District No. 770 Floodwater Disposal-2015 and 2016 water year

Dear Mr. Bushard:

Delta Lands RD No. 770 indicated that it anticipates a need to dispose of potentially damaging floodwater diverted from the Kaweah and Tule Rivers into the Friant-Kern Canal (FKC) system. I understand this water to be floodwater that will be diverted so as to reduce potential damages to lands within the area served by DLRD No. 770. I also understand that the portions of the floodwater diverted into the FKC can be disposed of by discharging it into the Kern River at the terminus of the FKC. I have no objection to accepting the floodwater for disposition in the Kern River basin, provided that Delta Lands coordinates its operations with the Kern River Watermaster or designee on behalf of the water users, as it has in the past, and it is understood that I reserve the right (after providing reasonable notice to all parties sufficient to allow the disposition of water already in the FKC and destined for the Kern River) to decide acceptance of that

water if Delta Lands fails to provided adequate coordination or conditions develop with local supplies that require termination of Delta Lands program. Further, it is my understanding that DLRD No. 770 has agreed to take responsibility for the safe disposal of the floodwater.

Please feel free to contact me if you have any questions.

Very truly yours,

DANA S. MUNN
Kern River Watermaster

Cc: Kern River Interests (by email)

Appendix D – EDR Report for Palms Project

Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Inquiry Number: 4394757.2s
August 26, 2015

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	9
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-8
Physical Setting Source Map Findings	A-10
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

BVWSD
BUTTONWILLOW, CA 93206

COORDINATES

Latitude (North):	35.3204000 - 35° 19' 13.44''
Longitude (West):	119.3826000 - 119° 22' 57.36''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	283408.8
UTM Y (Meters):	3910981.2
Elevation:	288 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5639479 EAST ELK HILLS, CA
Version Date:	2012
East Map:	5639513 TUPMAN, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20120630
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
BVWSD
BUTTONWILLOW, CA 93206

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	NAVAL PETROLEUM RESE		DOD	Same	4084, 0.773, South

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System

Federal CERCLIS NFRAP site List

CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE ---------- State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR ---------- EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Information System

State and tribal leaking storage tank lists

LUST ---------- Geotracker's Leaking Underground Fuel Tank Report
INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land
SLIC ---------- Statewide SLIC Cases

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
UST ---------- Active UST Facilities
AST ---------- Aboveground Petroleum Storage Tank Facilities
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

VCP ---------- Voluntary Cleanup Program Properties
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Considered Brownfieds Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT ---------- Waste Management Unit Database
SWRCY ---------- Recycler Database
HAULERS ---------- Registered Waste Tire Haulers Listing
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands
ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations

EXECUTIVE SUMMARY

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL	National Clandestine Laboratory Register
HIST Cal-Sites	Historical Calsites Database
SCH	School Property Evaluation Program
CDL	Clandestine Drug Labs
Toxic Pits	Toxic Pits Cleanup Act Sites
US CDL	Clandestine Drug Labs

Local Lists of Registered Storage Tanks

SWEEPS UST	SWEEPS UST Listing
HIST UST	Hazardous Substance Storage Container Database
CA FID UST	Facility Inventory Database

Local Land Records

LIENS	Environmental Liens Listing
LIENS 2	CERCLA Lien Information
DEED	Deed Restriction Listing

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
CHMIRS	California Hazardous Material Incident Report System
LDS	Land Disposal Sites Listing
MCS	Military Cleanup Sites Listing
SPILLS 90	SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing

DOT OPS ---- Incident and Accident Data
CONSENT ---- Superfund (CERCLA) Consent Decrees
INDIAN RESERV ---- Indian Reservations
UMTRA ---- Uranium Mill Tailings Sites
LEAD SMELTERS ---- Lead Smelter Sites
US AIRS ---- Aerometric Information Retrieval System Facility Subsystem
US MINES ---- Mines Master Index File
FINDS ---- Facility Index System/Facility Registry System
CA BOND EXP. PLAN ---- Bond Expenditure Plan
Cortese ---- "Cortese" Hazardous Waste & Substances Sites List
CUPA Listings ---- CUPA Resources List
DRYCLEANERS ---- Cleaner Facilities
EMI ---- Emissions Inventory Data
ENF ---- Enforcement Action Listing
Financial Assurance ---- Financial Assurance Information Listing
HAZNET ---- Facility and Manifest Data
HIST CORTESE ---- Hazardous Waste & Substance Site List
HWP ---- EnviroStor Permitted Facilities Listing
HWT ---- Registered Hazardous Waste Transporter Database
MINES ---- Mines Site Location Listing
MWMP ---- Medical Waste Management Program Listing
NPDES ---- NPDES Permits Listing
PEST LIC ---- Pesticide Regulation Licenses Listing
PROC ---- Certified Processors Database
Notify 65 ---- Proposition 65 Records
UIC ---- UIC Listing
WASTEWATER PITS ---- Oil Wastewater Pits Listing
WDS ---- Waste Discharge System
WIP ---- Well Investigation Program Case List

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---- EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat ---- EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners ---- EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF ---- Recovered Government Archive Solid Waste Facilities List
RGA LUST ---- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

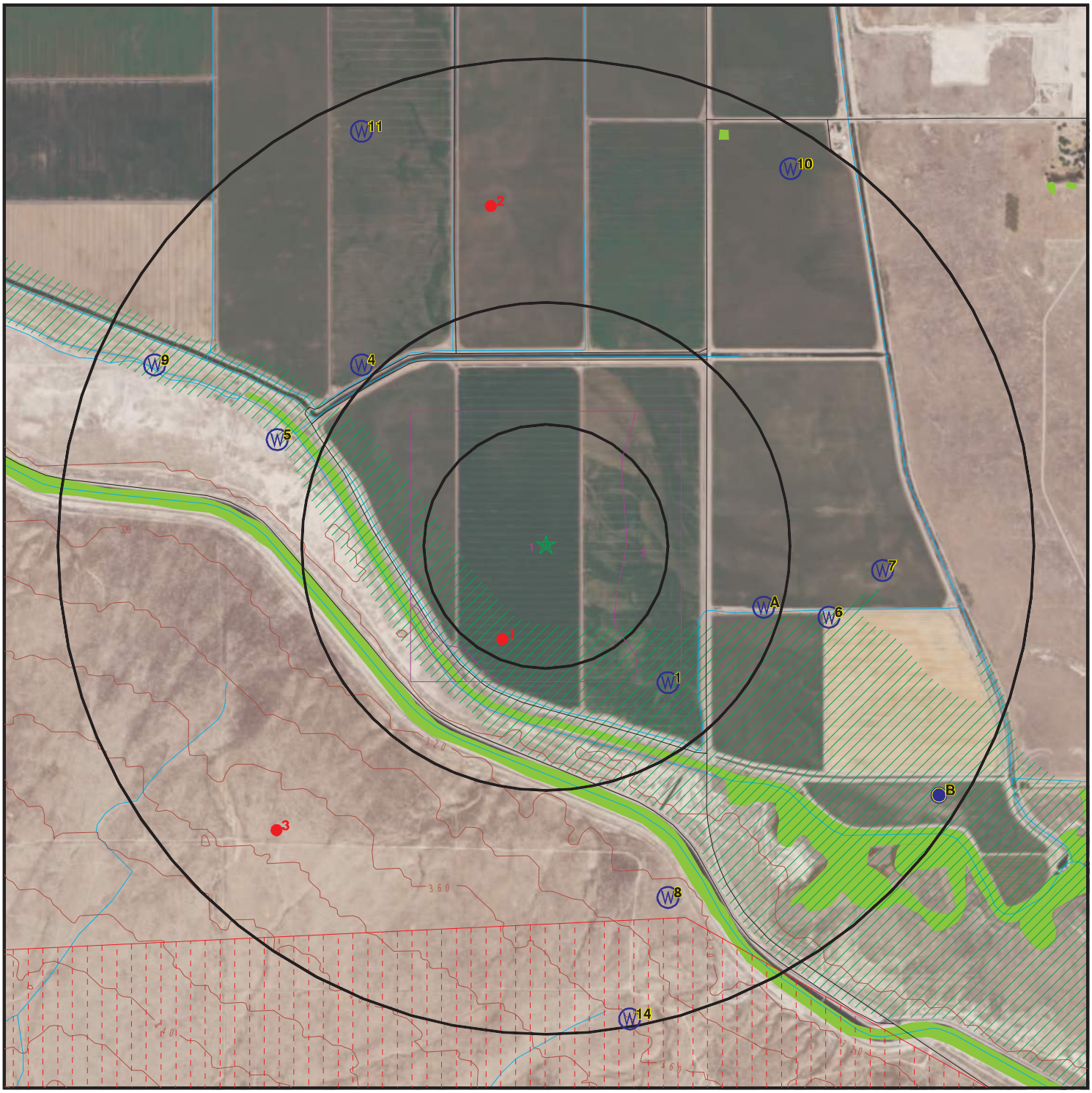
A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NAVAL PETROLEUM RESE		S 1/2 - 1 (0.773 mi.)	0	8

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4394757.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites

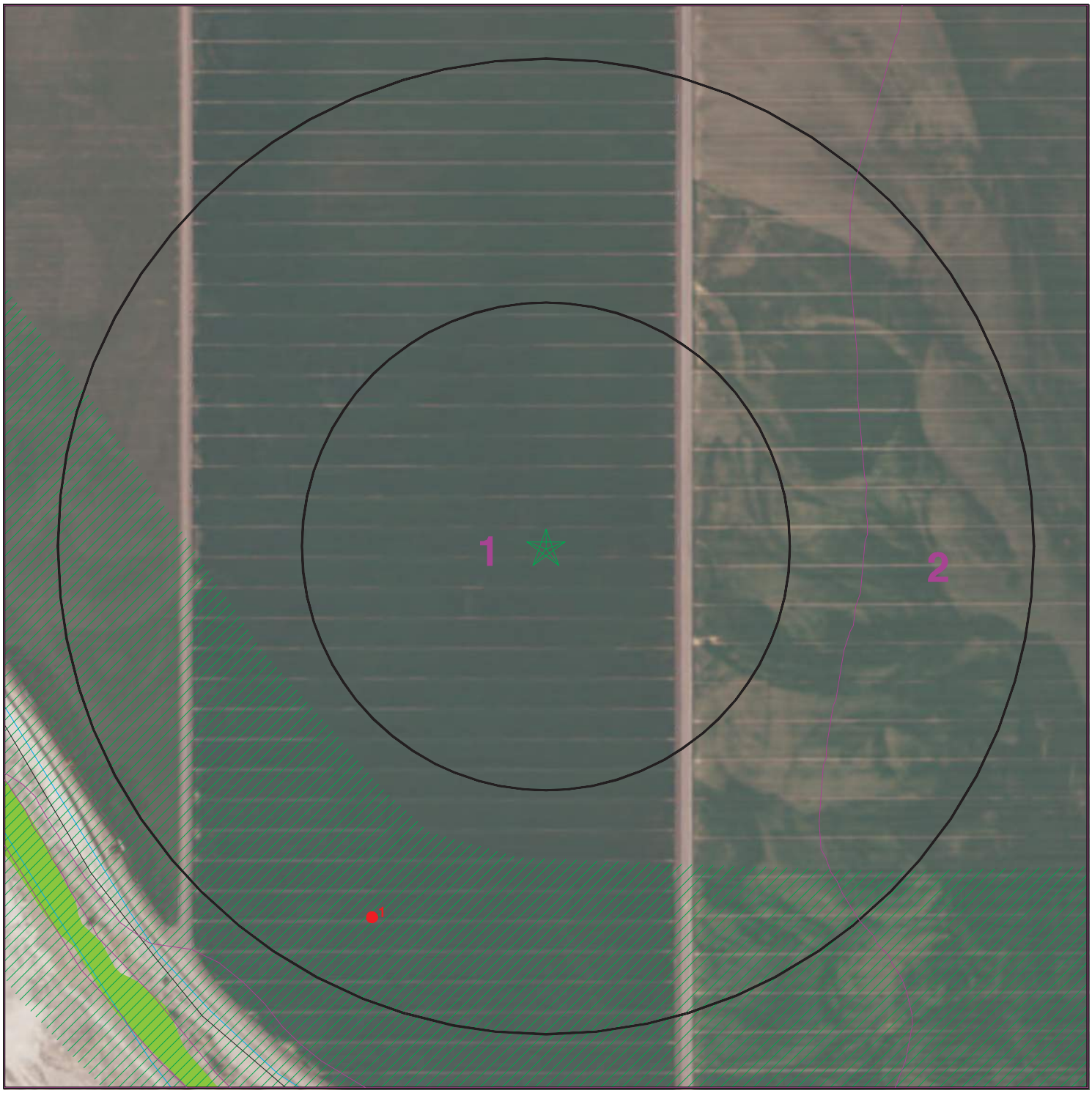
0 1/4 1/2 1 Miles

- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Buena Vista Palms	CLIENT:	GEI Consultants
ADDRESS:	BVWSD	CONTACT:	Stephanie
	Buttonwillow CA 93206	INQUIRY #:	4394757.2s
LAT/LONG:	35.3204 / 119.3826	DATE:	August 26, 2015 5:23 pm

DETAIL MAP - 4394757.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Buena Vista Palms	CLIENT:	GEI Consultants
ADDRESS:	BVWSD Buttonwillow CA 93206	CONTACT:	Stephanie
LAT/LONG:	35.3204 / 119.3826	INQUIRY #:	4394757.2s
		DATE:	August 26, 2015 5:24 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
CERCLIS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	1	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	TP		NR	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PEST LIC	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	0	0	0	1	0	1

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

DOD **NAVAL PETROLEUM RESERVE NUMBER ONE** **DOD** **CUSA139675**
Region **N/A**
South **NAVAL PETROLEUM RESERVE N (County), CA**
1/2-1
4084 ft.

DOD:

Feature 1:	Navy DOD
Feature 2:	Not reported
Feature 3:	Not reported
URL:	Not reported
Name 1:	Naval Petroleum Reserve Number One
Name 2:	Not reported
Name 3:	Not reported
State:	CA
DOD Site:	Yes
Tile name:	CAKERN

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/26/2015
Date Data Arrived at EDR: 04/08/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 75

Source: EPA
Telephone: N/A
Last EDR Contact: 07/09/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/26/2015
Date Data Arrived at EDR: 04/08/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 75

Source: EPA
Telephone: N/A
Last EDR Contact: 07/09/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/26/2015
Date Data Arrived at EDR: 04/08/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 75

Source: EPA
Telephone: N/A
Last EDR Contact: 07/09/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 03/26/2015
Date Data Arrived at EDR: 04/08/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/10/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Varies

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 05/29/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 05/29/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/12/2015
Next Scheduled EDR Contact: 11/30/2015
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2015
Date Data Arrived at EDR: 03/17/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2015
Date Data Arrived at EDR: 03/17/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 63

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Annually

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 05/04/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 05/14/2015
Number of Days to Update: 9

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 05/04/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 05/14/2015
Number of Days to Update: 9

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/18/2015
Date Data Arrived at EDR: 05/20/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 16

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 08/31/2015
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List
Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST: Geotracker's Leaking Underground Fuel Tank Report

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/08/2015
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/03/2015
Date Data Arrived at EDR: 02/12/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 29

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land

Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 24

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 48

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 04/28/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 03/17/2015
Date Data Arrived at EDR: 05/01/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 52

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Semi-Annually

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/03/2015
Date Data Arrived at EDR: 04/30/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 53

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

SLIC: Statewide SLIC Cases
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36

Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11

Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/10/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 19

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 21

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 03/17/2015
Date Data Arrived at EDR: 05/01/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 52

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/03/2015
Date Data Arrived at EDR: 04/30/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 53

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 12/14/2014
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 28

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/06/2015
Date Data Arrived at EDR: 05/19/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 34

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/26/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 27

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 09/30/2014
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 10

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Semi-Annually

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 48

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/29/2014
Date Data Arrived at EDR: 10/01/2014
Date Made Active in Reports: 11/06/2014
Number of Days to Update: 36

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 05/04/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 05/14/2015
Number of Days to Update: 9

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing

A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 06/08/2015
Date Data Arrived at EDR: 06/09/2015
Date Made Active in Reports: 07/10/2015
Number of Days to Update: 31

Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/23/2015
Date Data Arrived at EDR: 03/24/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 70

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/24/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: No Update Planned

SWRCY: Recycler Database

A listing of recycling facilities in California.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 47

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing

A listing of registered waste tire haulers.

Date of Government Version: 05/26/2015
Date Data Arrived at EDR: 05/28/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 8

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 08/12/2015
Next Scheduled EDR Contact: 11/30/2015
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 05/01/2015
Next Scheduled EDR Contact: 08/17/2015
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/25/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/29/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 05/04/2015
Date Data Arrived at EDR: 05/05/2015
Date Made Active in Reports: 05/14/2015
Number of Days to Update: 9

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/18/2015
Number of Days to Update: 8

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 08/07/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/25/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/29/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Quarterly

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 8

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 06/11/2015
Date Data Arrived at EDR: 06/16/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 28

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 06/08/2015
Date Data Arrived at EDR: 06/09/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 35

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 06/09/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Annually

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 07/28/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 6

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 07/28/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/10/2015
Date Data Arrived at EDR: 03/31/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 72

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 09/18/2014
Number of Days to Update: 8

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 07/08/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/14/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/14/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/21/2015
Next Scheduled EDR Contact: 08/31/2015
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/09/2015
Date Data Arrived at EDR: 03/10/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 15

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 08/12/2015
Next Scheduled EDR Contact: 11/30/2015
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/14/2015
Next Scheduled EDR Contact: 08/24/2015
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/25/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/12/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 110

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 01/29/2015
Next Scheduled EDR Contact: 06/08/2015
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/12/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 02/01/2015
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35
Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 05/14/2015
Next Scheduled EDR Contact: 08/24/2015
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/17/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/06/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 31
Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 07/09/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/31/2015
Date Data Arrived at EDR: 04/09/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 63
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/04/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/12/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/07/2015
Date Data Arrived at EDR: 04/09/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/09/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/04/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 46

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/29/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/14/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/26/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 11/25/2014
Date Data Arrived at EDR: 11/26/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/07/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/16/2014
Date Data Arrived at EDR: 10/31/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 17

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/22/2015
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 12/30/2014
Date Data Arrived at EDR: 12/31/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/03/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Varies

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 01/18/2015
Date Data Arrived at EDR: 02/27/2015
Date Made Active in Reports: 03/25/2015
Number of Days to Update: 26

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/10/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 06/24/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 18

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 02/18/2015
Date Data Arrived at EDR: 02/20/2015
Date Made Active in Reports: 03/12/2015
Number of Days to Update: 20

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 03/25/2014
Date Made Active in Reports: 04/28/2014
Number of Days to Update: 34

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/25/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/01/2015
Date Made Active in Reports: 05/13/2015
Number of Days to Update: 12

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 08/07/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 04/30/2015
Date Data Arrived at EDR: 05/01/2015
Date Made Active in Reports: 05/13/2015
Number of Days to Update: 12

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 07/24/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/18/2015
Date Data Arrived at EDR: 05/22/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 14

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/18/2015
Next Scheduled EDR Contact: 08/31/2015
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/19/2014
Number of Days to Update: 35

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 07/17/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Annually

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 05/26/2015
Date Data Arrived at EDR: 05/28/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 8

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/28/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 07/13/2015
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 20

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 07/14/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing

A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Varies

MWMP: Medical Waste Management Program Listing

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 05/07/2015
Date Data Arrived at EDR: 06/09/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 35

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 06/09/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

Date of Government Version: 05/18/2015
Date Data Arrived at EDR: 05/20/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 22

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 08/31/2015
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing

A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 06/07/2015
Date Data Arrived at EDR: 06/10/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 34

Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 06/10/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Quarterly

PROC: Certified Processors Database

A listing of certified processors.

Date of Government Version: 06/15/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 27

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records

Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 10/21/1993
Date Data Arrived at EDR: 11/01/1993
Date Made Active in Reports: 11/19/1993
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: No Update Planned

UIC: UIC Listing

A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 11/19/2014
Date Data Arrived at EDR: 12/15/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 45

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/19/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing

Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water board?s review found that more than one-third of the region?s active disposal pits are operating without permission.

Date of Government Version: 04/15/2015
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/23/2015
Number of Days to Update: 67

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Varies

WDS: Waste Discharge System

Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Quarterly

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners
EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 07/21/2015
Date Data Arrived at EDR: 07/24/2015
Date Made Active in Reports: 08/05/2015
Number of Days to Update: 12

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 08/10/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 07/21/2015
Date Data Arrived at EDR: 07/22/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 12

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CUPA Facility List
Cupa Facility List

Date of Government Version: 06/05/2015
Date Data Arrived at EDR: 06/09/2015
Date Made Active in Reports: 07/10/2015
Number of Days to Update: 31

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing
Cupa facility list.

Date of Government Version: 11/20/2014
Date Data Arrived at EDR: 11/24/2014
Date Made Active in Reports: 01/07/2015
Number of Days to Update: 44

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 07/15/2015
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 17

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 06/11/2014
Date Data Arrived at EDR: 06/13/2014
Date Made Active in Reports: 07/07/2014
Number of Days to Update: 24

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 08/10/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Varies

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 05/26/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 08/03/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 05/19/2015
Date Data Arrived at EDR: 05/22/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 14

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 05/26/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 7

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 08/03/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 07/13/2015
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 20

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 07/06/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Semi-Annually

HUMBOLDT COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 03/11/2015
Date Data Arrived at EDR: 03/13/2015
Date Made Active in Reports: 03/24/2015
Number of Days to Update: 11

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 07/14/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

IMPERIAL COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 04/27/2015
Date Data Arrived at EDR: 04/28/2015
Date Made Active in Reports: 05/13/2015
Number of Days to Update: 15

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 08/07/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 09/10/2013
Date Data Arrived at EDR: 09/11/2013
Date Made Active in Reports: 10/14/2013
Number of Days to Update: 33

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/21/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 05/19/2015
Date Data Arrived at EDR: 06/18/2015
Date Made Active in Reports: 07/22/2015
Number of Days to Update: 34

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 08/07/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 05/26/2015
Date Data Arrived at EDR: 05/28/2015
Date Made Active in Reports: 06/15/2015
Number of Days to Update: 18

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/21/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/05/2015
Date Data Arrived at EDR: 05/07/2015
Date Made Active in Reports: 05/20/2015
Number of Days to Update: 13

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 07/20/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 11/24/2014
Date Data Arrived at EDR: 01/30/2015
Date Made Active in Reports: 03/04/2015
Number of Days to Update: 33
Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 07/10/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 07/20/2015
Date Data Arrived at EDR: 07/21/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 13
Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 07/21/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2015
Date Data Arrived at EDR: 07/27/2015
Date Made Active in Reports: 08/10/2015
Number of Days to Update: 14
Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 07/20/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 01/15/2015
Date Data Arrived at EDR: 01/29/2015
Date Made Active in Reports: 03/10/2015
Number of Days to Update: 40
Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 07/15/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 04/02/2015
Date Made Active in Reports: 04/13/2015
Number of Days to Update: 11
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 07/17/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/03/2015
Date Data Arrived at EDR: 05/26/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 16
Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 07/27/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 06/03/2015
Date Data Arrived at EDR: 06/04/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 32
Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 06/04/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/15/2015
Number of Days to Update: 17

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/22/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites

Currently permitted USTs in Marin County.

Date of Government Version: 10/08/2014
Date Data Arrived at EDR: 10/22/2014
Date Made Active in Reports: 12/15/2014
Number of Days to Update: 54

Source: Public Works Department Waste Management
Telephone: 415-499-6647
Last EDR Contact: 07/06/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 05/22/2015
Date Data Arrived at EDR: 05/26/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 10

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 05/22/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List

CUPA Facility List

Date of Government Version: 06/01/2015
Date Data Arrived at EDR: 06/03/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 33

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA Facility Listing

CUPA Program listing from the Environmental Health Division.

Date of Government Version: 06/30/2015
Date Data Arrived at EDR: 07/07/2015
Date Made Active in Reports: 07/16/2015
Number of Days to Update: 9

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 05/26/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 12/05/2011
Date Data Arrived at EDR: 12/06/2011
Date Made Active in Reports: 02/07/2012
Number of Days to Update: 63
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 06/03/2015
Date Data Arrived at EDR: 06/04/2015
Date Made Active in Reports: 07/22/2015
Number of Days to Update: 48
Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2015
Date Data Arrived at EDR: 05/12/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 24
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/06/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 05/01/2015
Date Data Arrived at EDR: 05/12/2015
Date Made Active in Reports: 06/08/2015
Number of Days to Update: 27
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/06/2015
Next Scheduled EDR Contact: 08/24/2015
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/01/2015
Date Data Arrived at EDR: 05/12/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 30
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/11/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

PLACER COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 07/01/2015
Date Data Arrived at EDR: 07/07/2015
Date Made Active in Reports: 08/05/2015
Number of Days to Update: 29

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Semi-Annually

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 07/15/2015
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 17

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 07/15/2015
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 17

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 05/07/2015
Date Data Arrived at EDR: 07/24/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 10

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 05/07/2015
Date Data Arrived at EDR: 07/27/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 7

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Quarterly

SAN BERNARDINO COUNTY:

Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 06/30/2015
Date Data Arrived at EDR: 07/07/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 7

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 08/10/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 09/23/2013
Date Data Arrived at EDR: 09/24/2013
Date Made Active in Reports: 10/17/2013
Number of Days to Update: 23

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Quarterly

Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 10/31/2014
Date Data Arrived at EDR: 11/21/2014
Date Made Active in Reports: 12/29/2014
Number of Days to Update: 38

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 07/22/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 06/03/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 08/06/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/29/2010
Date Data Arrived at EDR: 03/10/2011
Date Made Active in Reports: 03/15/2011
Number of Days to Update: 5

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 08/06/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/22/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 10

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 05/22/2015
Date Data Arrived at EDR: 05/26/2015
Date Made Active in Reports: 06/10/2015
Number of Days to Update: 15

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/20/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 07/20/2015
Date Data Arrived at EDR: 07/22/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 12

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/15/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 06/10/2015
Date Data Arrived at EDR: 06/16/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 28

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/10/2015
Next Scheduled EDR Contact: 06/29/2015
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/22/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 06/10/2015
Date Data Arrived at EDR: 06/16/2015
Date Made Active in Reports: 07/10/2015
Number of Days to Update: 24

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 06/01/2015
Next Scheduled EDR Contact: 09/14/2015
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 05/07/2015
Date Data Arrived at EDR: 05/12/2015
Date Made Active in Reports: 06/08/2015
Number of Days to Update: 27

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 08/07/2015
Next Scheduled EDR Contact: 11/23/2015
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 05/22/2015
Date Data Arrived at EDR: 05/26/2015
Date Made Active in Reports: 06/08/2015
Number of Days to Update: 13

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/22/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/12/2015
Date Data Arrived at EDR: 06/16/2015
Date Made Active in Reports: 07/10/2015
Number of Days to Update: 24

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/26/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/19/2015
Date Data Arrived at EDR: 06/24/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 20

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/10/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 06/19/2015
Date Data Arrived at EDR: 06/30/2015
Date Made Active in Reports: 07/07/2015
Number of Days to Update: 7

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/10/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

SONOMA COUNTY:

Cupa Facility List
Cupa Facility list

Date of Government Version: 06/22/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 18

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 07/01/2015
Date Data Arrived at EDR: 07/07/2015
Date Made Active in Reports: 07/14/2015
Number of Days to Update: 7

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 06/22/2015
Next Scheduled EDR Contact: 10/12/2015
Data Release Frequency: Quarterly

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 06/05/2015
Date Data Arrived at EDR: 06/09/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 27

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 06/05/2015
Next Scheduled EDR Contact: 09/21/2015
Data Release Frequency: Semi-Annually

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 07/13/2015
Date Data Arrived at EDR: 07/28/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 6

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 07/24/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks

The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 06/26/2015
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/03/2015
Number of Days to Update: 17

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/12/2015
Next Scheduled EDR Contact: 11/30/2015
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites

Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/26/2015
Next Scheduled EDR Contact: 10/19/2015
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites

Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/12/2015
Next Scheduled EDR Contact: 11/30/2015
Data Release Frequency: Quarterly

Medical Waste Program List

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 04/27/2015
Date Data Arrived at EDR: 04/29/2015
Date Made Active in Reports: 05/13/2015
Number of Days to Update: 14

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 07/27/2015
Next Scheduled EDR Contact: 11/09/2015
Data Release Frequency: Quarterly

Underground Tank Closed Sites List

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 05/27/2015
Date Data Arrived at EDR: 06/17/2015
Date Made Active in Reports: 07/06/2015
Number of Days to Update: 19

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/17/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report

Underground storage tank sites located in Yolo county.

Date of Government Version: 07/08/2015
Date Data Arrived at EDR: 07/13/2015
Date Made Active in Reports: 07/22/2015
Number of Days to Update: 9

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 07/06/2015
Next Scheduled EDR Contact: 10/05/2015
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 05/18/2015
Date Data Arrived at EDR: 05/19/2015
Date Made Active in Reports: 06/05/2015
Number of Days to Update: 17

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 07/31/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/18/2015
Next Scheduled EDR Contact: 08/31/2015
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/12/2015
Number of Days to Update: 26

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/13/2015
Next Scheduled EDR Contact: 10/28/2015
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 08/01/2015
Date Data Arrived at EDR: 08/06/2015
Date Made Active in Reports: 08/24/2015
Number of Days to Update: 18

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/06/2015
Next Scheduled EDR Contact: 11/16/2015
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/24/2015
Date Made Active in Reports: 08/18/2015
Number of Days to Update: 25

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/20/2015
Next Scheduled EDR Contact: 11/02/2015
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/19/2015
Date Made Active in Reports: 07/15/2015
Number of Days to Update: 26

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/26/2015
Next Scheduled EDR Contact: 09/07/2015
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 03/19/2015
Date Made Active in Reports: 04/07/2015
Number of Days to Update: 19

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/11/2015
Next Scheduled EDR Contact: 09/28/2015
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Telephone: 281-546-1505
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: 800-823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

BUENA VISTA PALMS
BVWSD
BUTTONWILLOW, CA 93206

TARGET PROPERTY COORDINATES

Latitude (North):	35.3204 - 35° 19' 13.44''
Longitude (West):	119.3826 - 119° 22' 57.36''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	283408.8
UTM Y (Meters):	3910981.2
Elevation:	288 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5639479 EAST ELK HILLS, CA
Version Date:	2012
East Map:	5639513 TUPMAN, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

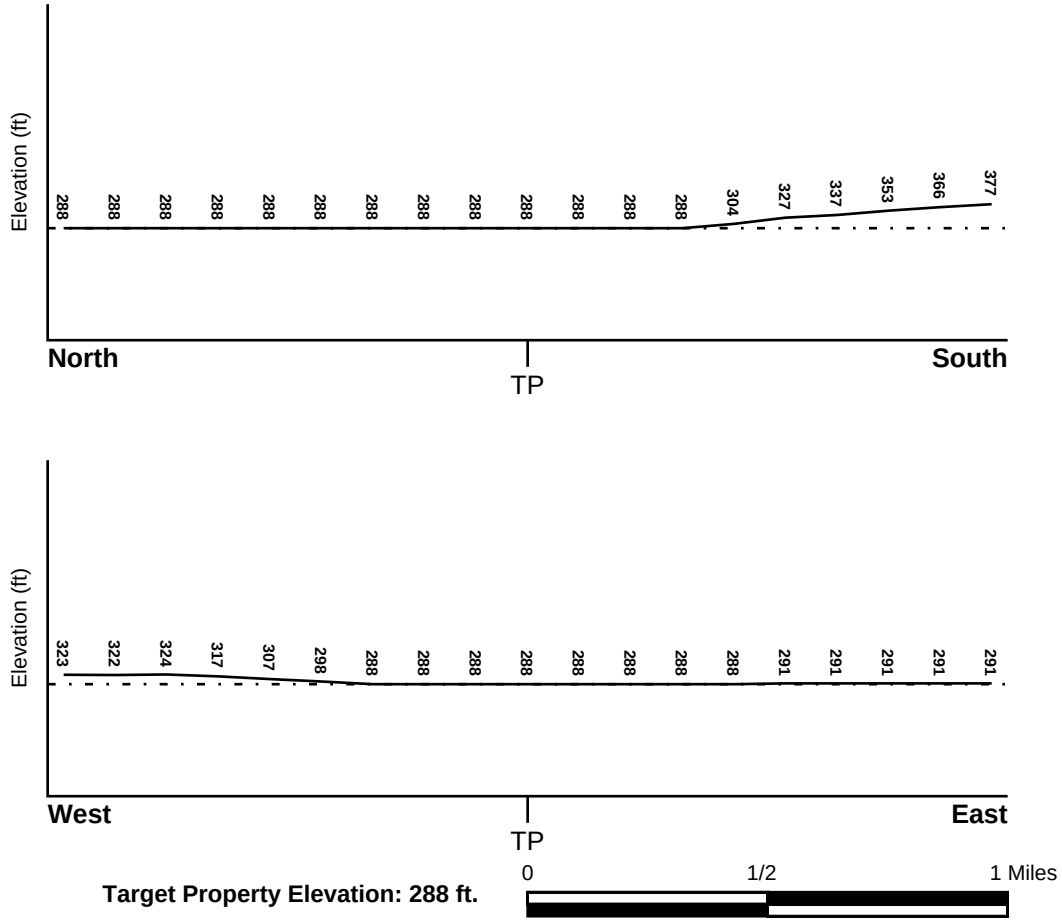
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General East

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
KERN, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 06029C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EAST ELK HILLS	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

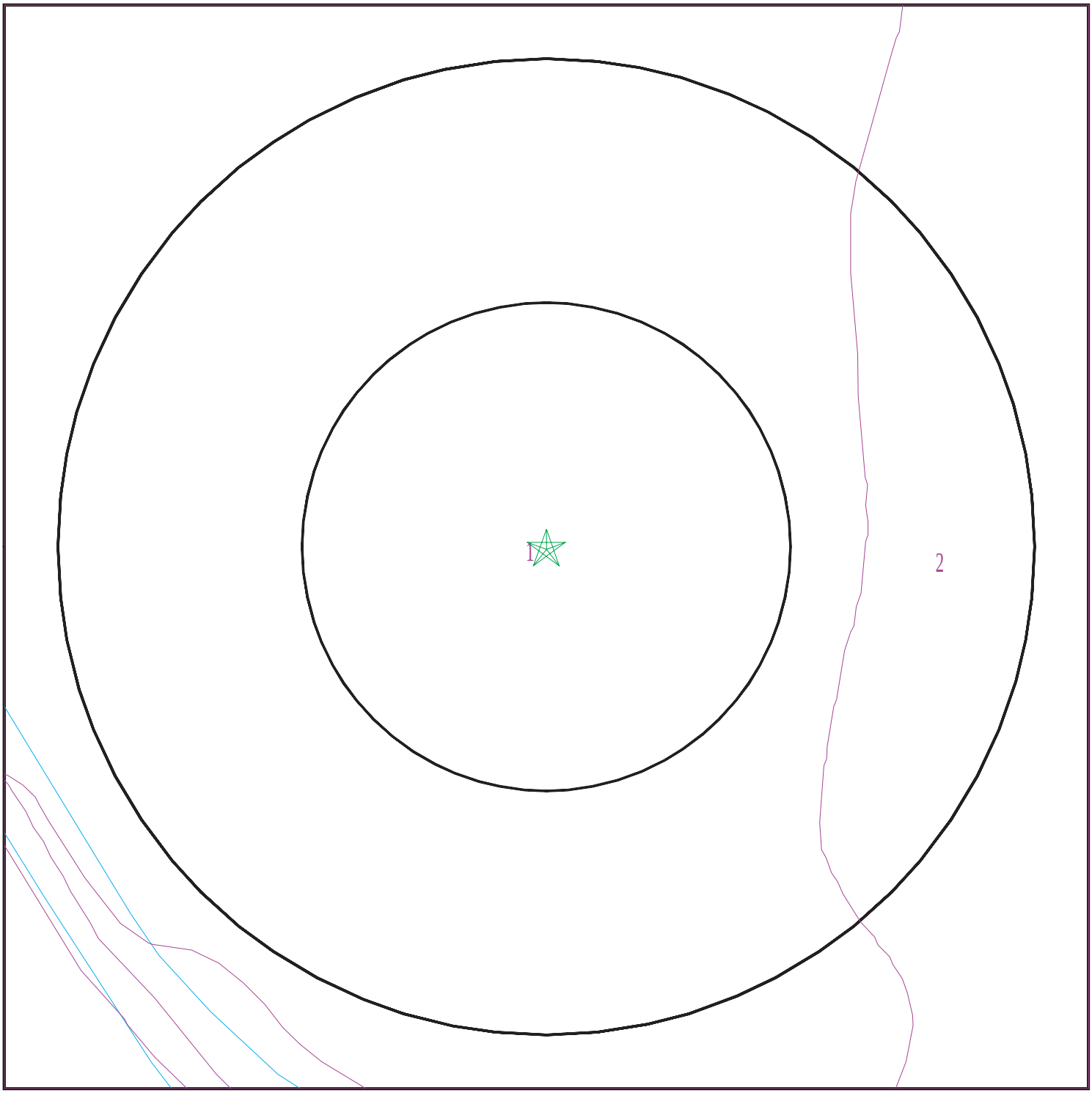
Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4394757.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Buena Vista Palms	CLIENT:	GEI Consultants
ADDRESS:	BVWSD	CONTACT:	Stephanie
	Buttonwillow CA 93206	INQUIRY #:	4394757.2s
LAT/LONG:	35.3204 / 119.3826	DATE:	August 26, 2015 5:25 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: BUTTONWILLOW

Soil Surface Texture:
Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches		Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.9
2	27 inches	55 inches		Not reported	Not reported	Max: 42 Min: 14	Max: 8.4 Min: 7.9
3	55 inches	64 inches		Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.9

Soil Map ID: 2

Soil Component Name: LOKERN

Soil Surface Texture:
Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches		Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.9
2	7 inches	48 inches		Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.9
3	48 inches	66 inches		Not reported	Not reported	Max: 14 Min: 4	Max: 8.4 Min: 7.9

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS40000162704	1/4 - 1/2 Mile SE
4	USGS40000162830	1/2 - 1 Mile NW
5	USGS40000162792	1/2 - 1 Mile WNW
6	USGS40000162732	1/2 - 1 Mile ESE
7	USGS40000162754	1/2 - 1 Mile East
8	USGS40000162601	1/2 - 1 Mile SSE
9	USGS40000162831	1/2 - 1 Mile WNW
10	USGS40000162916	1/2 - 1 Mile NNE
11	USGS40000162938	1/2 - 1 Mile NNW
B13	USGS40000162649	1/2 - 1 Mile ESE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
14	USGS40000162532	1/2 - 1 Mile South

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

No PWS System Found

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

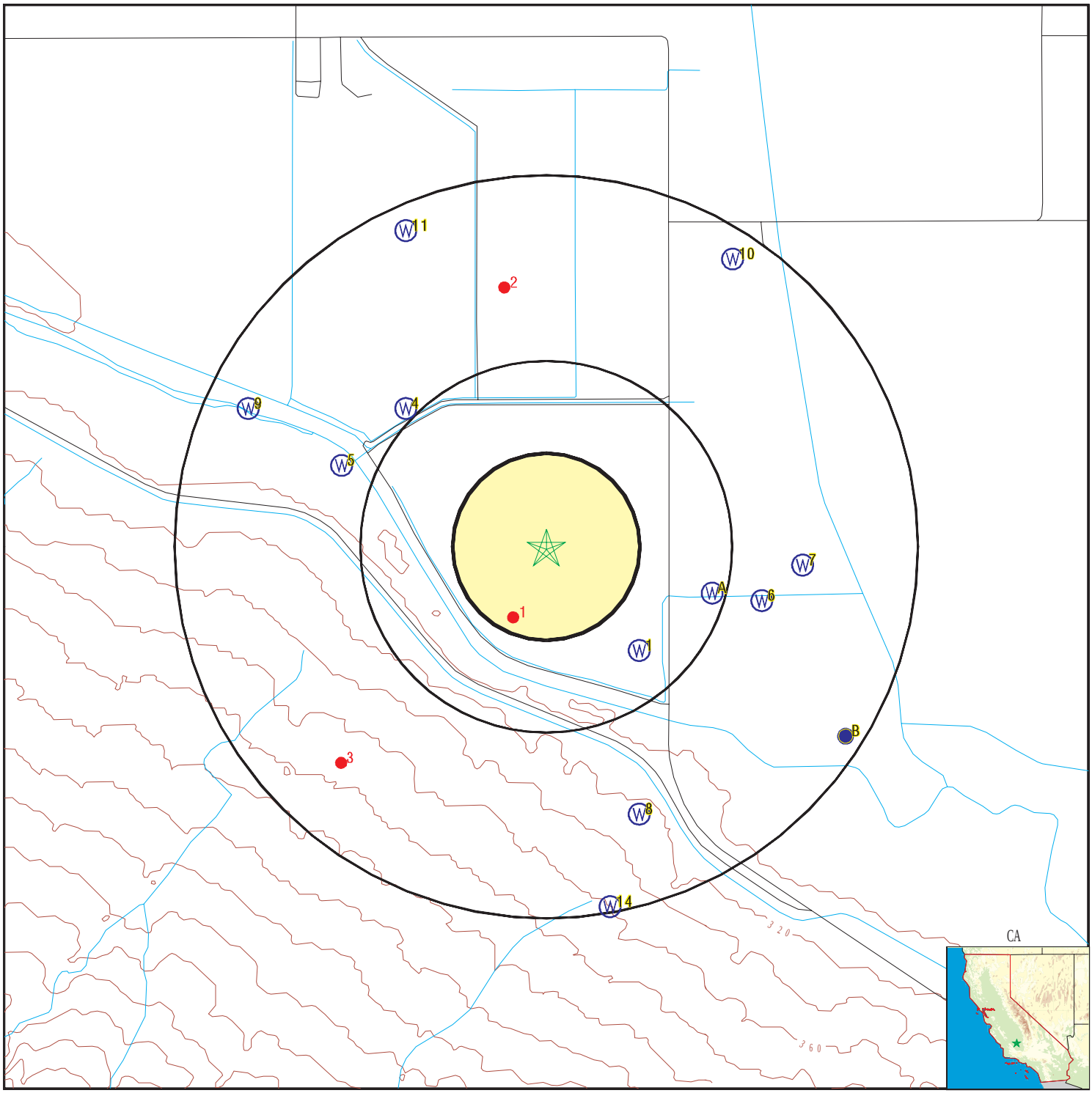
MAP ID	WELL ID	LOCATION FROM TP
A2	CADW60000015105	1/4 - 1/2 Mile ESE
A3	CADW60000005539	1/4 - 1/2 Mile ESE
B12	CADW60000031013	1/2 - 1 Mile ESE

OTHER STATE DATABASE INFORMATION

STATE OIL/GAS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CAOG11000047015	1/8 - 1/4 Mile SSW
2	CAOG11000073221	1/2 - 1 Mile North
3	CAOG11000039217	1/2 - 1 Mile SW

PHYSICAL SETTING SOURCE MAP - 4394757.2s



County Boundary
Major Roads
Contour Lines
Earthquake Fault Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location
HD Closest Hydrogeological Data
Oil, gas or related wells

N

SITE NAME:	Buena Vista Palms	CLIENT:	GEI Consultants
ADDRESS:	BVWSD Buttonwillow CA 93206	CONTACT:	Stephanie
		INQUIRY #:	4394757.2s
LAT/LONG:	35.3204 / 119.3826	DATE:	August 26, 2015 5:25 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
SE **FED USGS** **USGS40000162704**
1/4 - 1/2 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351859119223801		
Monloc name:	030S024E15J001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3163515
Longitude:	-119.37817	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	287.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1954	Welldepth:	504
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-02-19	51.00	

A2
ESE **CA WELLS** **CADW60000015105**
1/4 - 1/2 Mile
Higher

Objectid:	15105
Latitude:	35.31871
Longitude:	-119.374709
Site code:	353187N1193747W001
State well numbe:	30S24E14M003M
Local well name:	'DMW12b'
Well use id:	1
Well use descrip:	Observation
County id:	15
County name:	Kern
Basin code:	'5-22.14'
Basin desc:	Kern County
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000015105

Map ID Direction Distance Elevation		Database	EDR ID Number
A3 **ESE** **1/4 - 1/2 Mile** **Higher**		**CA WELLS**	**CADW60000005539**

Objectid:	5539
Latitude:	35.31847
Longitude:	-119.374694
Site code:	353185N1193747W001
State well numbe:	30S24E14M002M
Local well name:	'DMW12a'
Well use id:	1
Well use descrip:	Observation
County id:	15
County name:	Kern
Basin code:	'5-22.14'
Basin desc:	Kern County
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000005539

---

4 **NW** **1/2 - 1 Mile** **Lower**		**FED USGS**	**USGS40000162830**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351933119231801		
Monloc name:	031S024E10P002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3257958
Longitude:	-119.3892815	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	300.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

---

5 **WNW** **1/2 - 1 Mile** **Higher**		**FED USGS**	**USGS40000162792**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351925119232901		
Monloc name:	030S024E15D001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3235737
Longitude:	-119.3923372	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1954	Welldepth:	502
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

6
ESE **FED USGS** **USGS40000162732**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351906119221701		
Monloc name:	030S024E14F001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3182959
Longitude:	-119.3723365	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	291.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1933	Welldepth:	593
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-10-04	35.00	

7
East **FED USGS** **USGS40000162754**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351911119221001		
Monloc name:	030S014E14F001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3196848
Longitude:	-119.370392	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	287.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-02-19	48.00	

8
SSE **FED USGS** **USGS40000162601**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351836119223801		
Monloc name:	031S014E22A001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3099628
Longitude:	-119.37817	Sourcemap scale:	63360

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	310.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	80
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

9
WNW **FED USGS** **USGS40000162831**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351933119234501		
Monloc name:	030S024E09R001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3257959
Longitude:	-119.3967818	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	285.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1957	Welldepth:	522
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-02-20	70.00	

10
NNE **FED USGS** **USGS40000162916**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351954119222201		
Monloc name:	030S024E11L001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.331629
Longitude:	-119.3737254	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	488.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

11
NNW **FED USGS** **USGS40000162938**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351958119231801		
Monloc name:	030S024E10F001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3327402
Longitude:	-119.3892815	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	286.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

B12
ESE
1/2 - 1 Mile
Higher

CA WELLS **CADW60000031013**

Objectid:	31013
Latitude:	35.313
Longitude:	-119.3688
Site code:	353130N1193688W001
State well numbe:	30S24E14Q001M
Local well name:	'Anton'
Well use id:	6
Well use descrip:	Unknown
County id:	15
County name:	Kern
Basin code:	'5-22.14'
Basin desc:	Kern County
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000031013

B13
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40000162649**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351847119220101		
Monloc name:	030S024E14Q001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3130182
Longitude:	-119.3678919	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	290.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1955	Welldepth:	672
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-10-03	57.00	

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

14
South
1/2 - 1 Mile
Higher | **FED USGS** | **USGS40000162532**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-351823119224301		
Monloc name:	030S024E22H001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	35.3063518
Longitude:	-119.379559	Sourcemap scale:	63360
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	335.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1955	Welldepth:	548
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-02-19	97.00	

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

1
SSW **OIL_GAS** **CAOG11000047015**
1/8 - 1/4 Mile

District nun:	4	Api number:	02937474
Blm well:	N	Redrill can:	Not Reported
Dryhole:	Y	Well status:	P
Operator name:	E. A. Bender, Operator		
County name:	Kern	Fieldname:	Any Field
Area name:	Any Area	Section:	15
Township:	30S	Range:	24E
Base meridian:	MD	Elevation:	299 KB
Locationde:	Fr ctr 330S 330E		
Gissourcec:	hud		
Comments:	Not Reported		
Leasename:	Palm Farms	Wellnumber:	55
Epawell:	N	Hydraulica:	N
Confidenti:	N	Spuddate:	Not Reported
Welldeptha:	0		
Redrillfoo:	0		
Abandonedd:	Not Reported	Completion:	Not Reported
Directiona:	Unknown	Gissymbol:	PDH
Site id:	CAOG11000047015		

2
North **OIL_GAS** **CAOG11000073221**
1/2 - 1 Mile

District nun:	4	Api number:	02952932
Blm well:	N	Redrill can:	Not Reported
Dryhole:	Y	Well status:	P
Operator name:	Quintana Production Co.		
County name:	Kern	Fieldname:	Any Field
Area name:	Any Area	Section:	10
Township:	30S	Range:	24E
Base meridian:	MD	Elevation:	286 MAT
Locationde:	Fr SE cor 1750N 2450W		
Gissourcec:	hud		
Comments:	Not Reported		
Leasename:	Union-Gamay	Wellnumber:	56X-10
Epawell:	N	Hydraulica:	N
Confidenti:	N	Spuddate:	Not Reported
Welldeptha:	0		
Redrillfoo:	0		
Abandonedd:	Not Reported	Completion:	Not Reported
Directiona:	Unknown	Gissymbol:	PDH
Site id:	CAOG11000073221		

3
SW **OIL_GAS** **CAOG11000039217**
1/2 - 1 Mile

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

District nun:	4	Api number:	02929611
Blm well:	N	Redrill can:	Not Reported
Dryhole:	Y	Well status:	P
Operator name:	Section 15 Oil Co.		
County name:	Kern	Fieldname:	Any Field
Area name:	Any Area	Section:	15
Township:	30S	Range:	24E
Base meridian:	MD	Elevation:	Not Reported
Locationde:	Fr SW cor 250N 660E		
Gissourcec:	hud		
Comments:	Not Reported		
Leasename:	Not Reported	Wellnumber:	1
Epawell:	N	Hydraulica:	N
Confidenti:	N	Spuddate:	Not Reported
Welldeptha:	0		
Redrillfoo:	0		
Abandonedd:	Not Reported	Completion:	Not Reported
Directiona:	Unknown	Gissymbol:	PDH
Site id:	CAOG11000039217		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
93206	1	0

Federal EPA Radon Zone for KERN County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 93206

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.900 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Inquiry Number: 4394757.3
August 26, 2015

Certified Sanborn® Map Report

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

8/26/15

Site Name:
Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Client Name:
GEI Consultants
700 NE Multnomah Street,
Portland, OR 97232

EDR Inquiry # 4394757.3

Contact: Stephanie

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by GEI Consultants were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Site Name: Buena Vista Palms
Address: BVWSD
City, State, Zip: Buttonwillow, CA 93206
Cross Street:
P.O. # NA
Project: BVWSD Palms
Certification # 571A-4CC3-B373

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results
Certification # 571A-4CC3-B373

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✓ Library of Congress
- ✓ University Publications of America
- ✓ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

GEI Consultants (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Inquiry Number: 4394757.4
August 26, 2015

EDR Historical Topographic Map Report

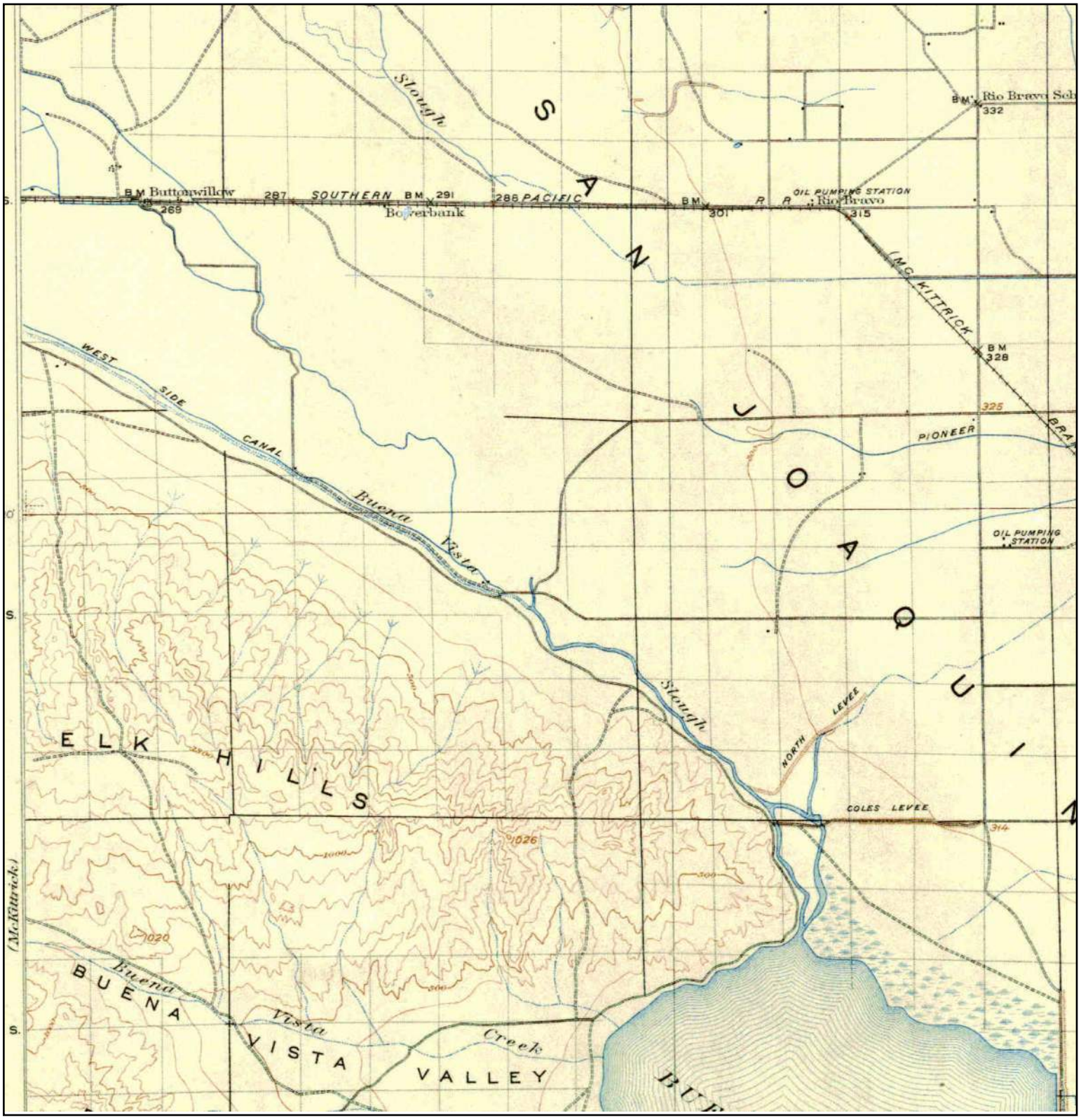
6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

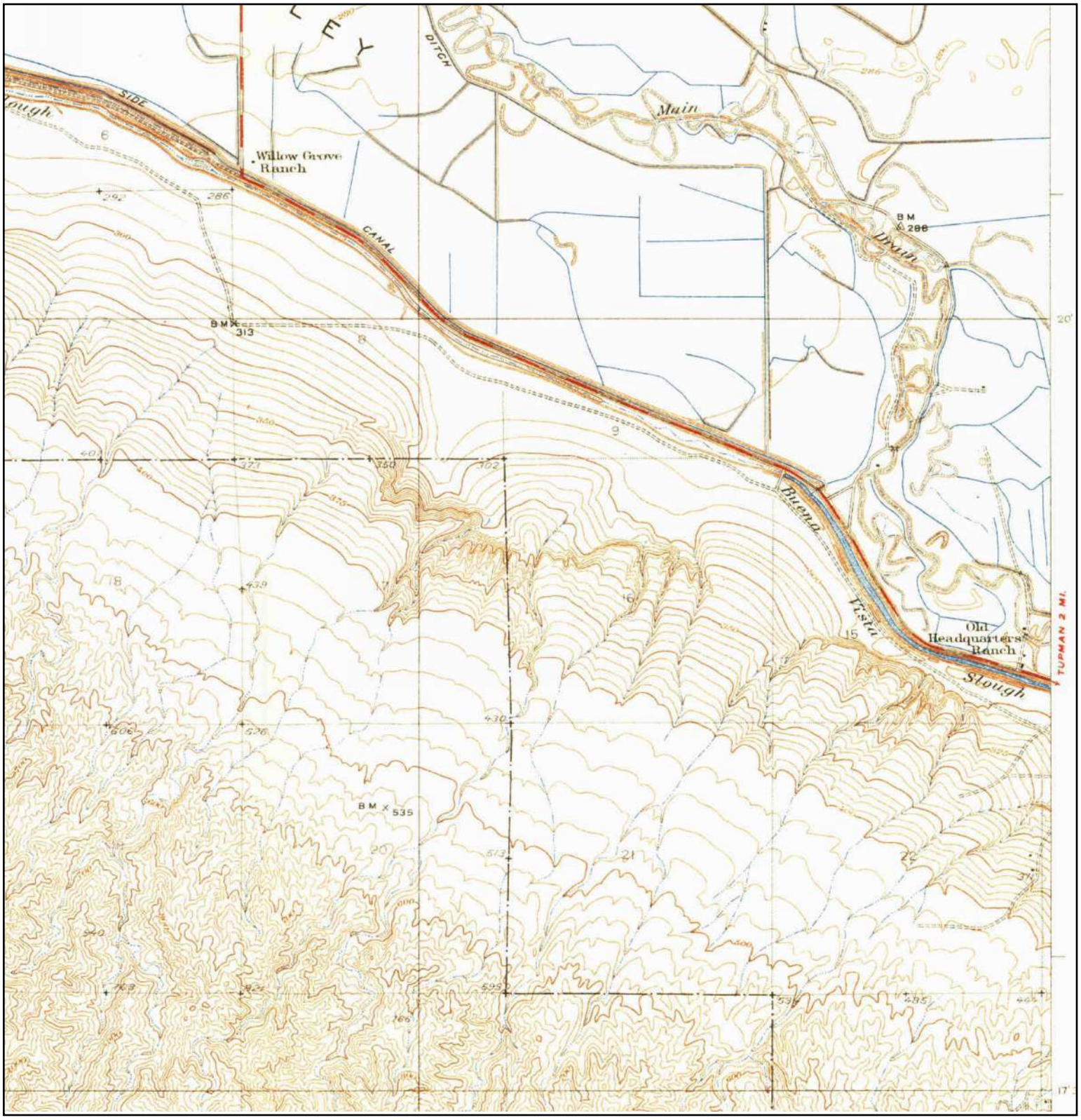
Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



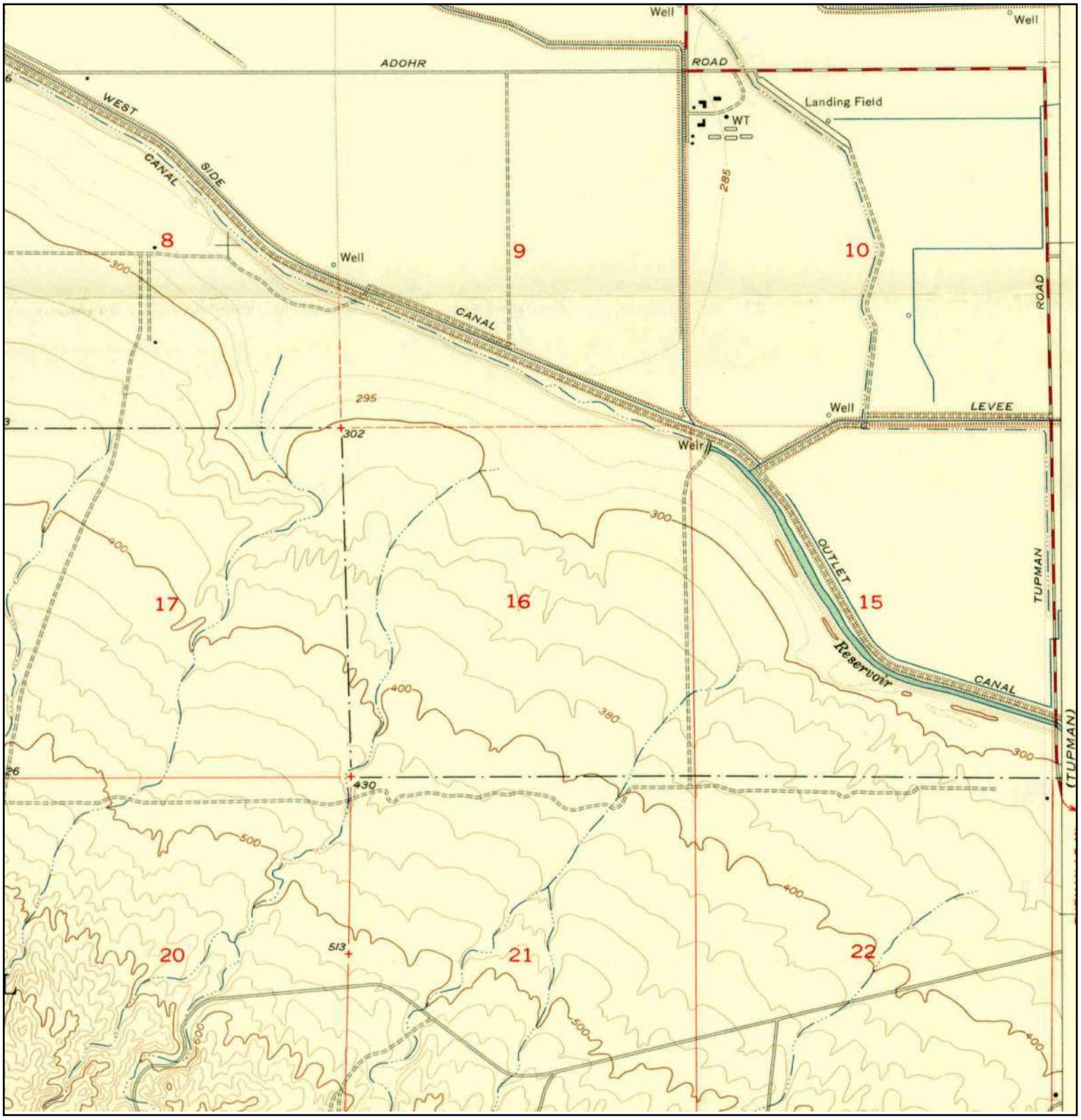
N	TARGET QUAD NAME: BUENA VISTA LAKE MAP YEAR: 1912 SERIES: 30 SCALE: 1:125000	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



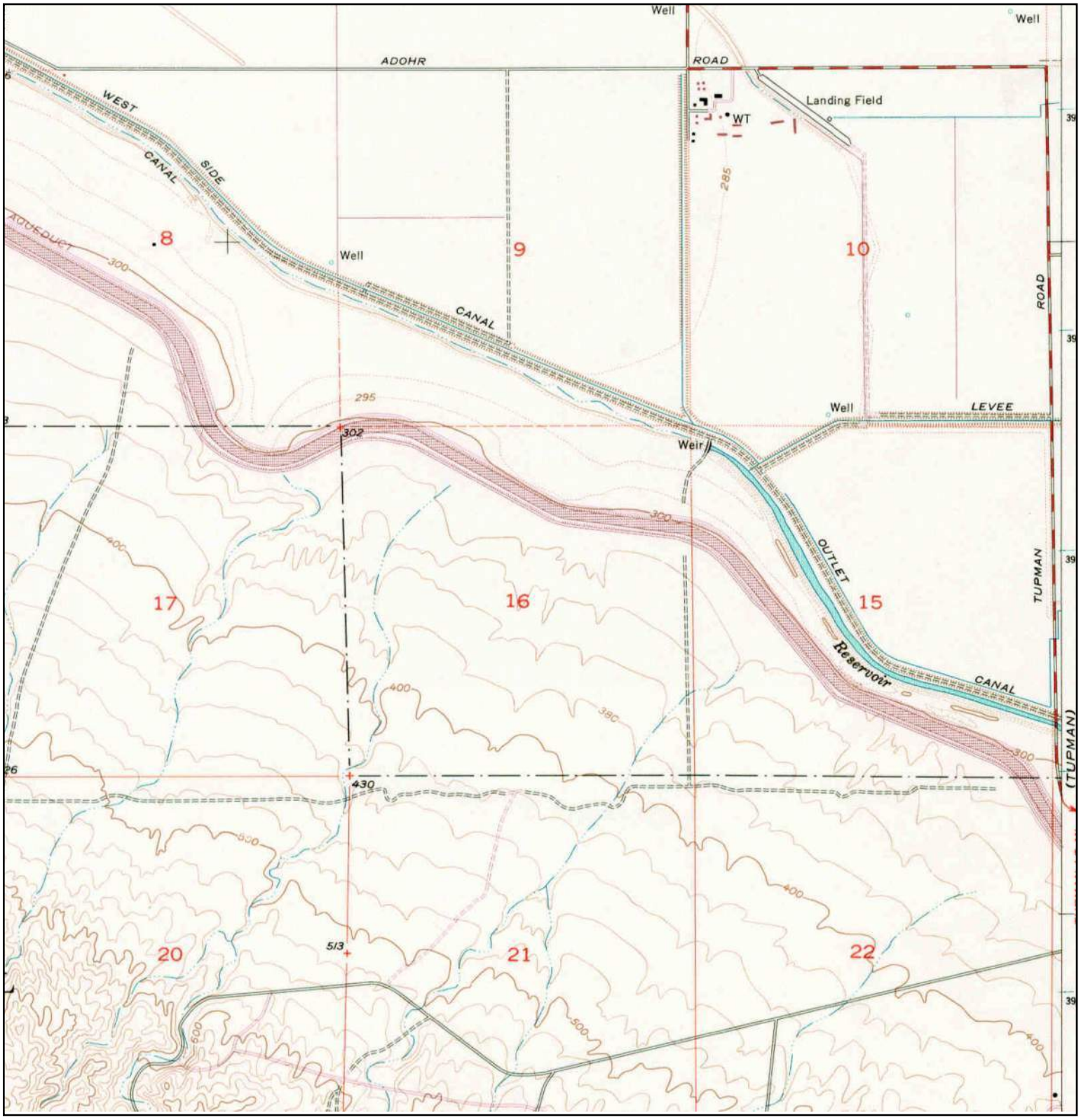
N	TARGET QUAD NAME: EAST ELK HILLS MAP YEAR: 1932 SERIES: 7.5 SCALE: 1:31680	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



N	TARGET QUAD		SITE NAME:	Buena Vista Palms	CLIENT:	GEI Consultants
	NAME:	EAST ELK HILLS	ADDRESS:	BVWSD	CONTACT:	Stephanie
	MAP YEAR:	1954		Buttonwillow, CA 93206	INQUIRY#:	4394757.4
			LAT/LONG:	35.3204 / -119.3826	RESEARCH DATE:	08/26/2015
	SERIES:	7.5				
	SCALE:	1:24000				

Historical Topographic Map

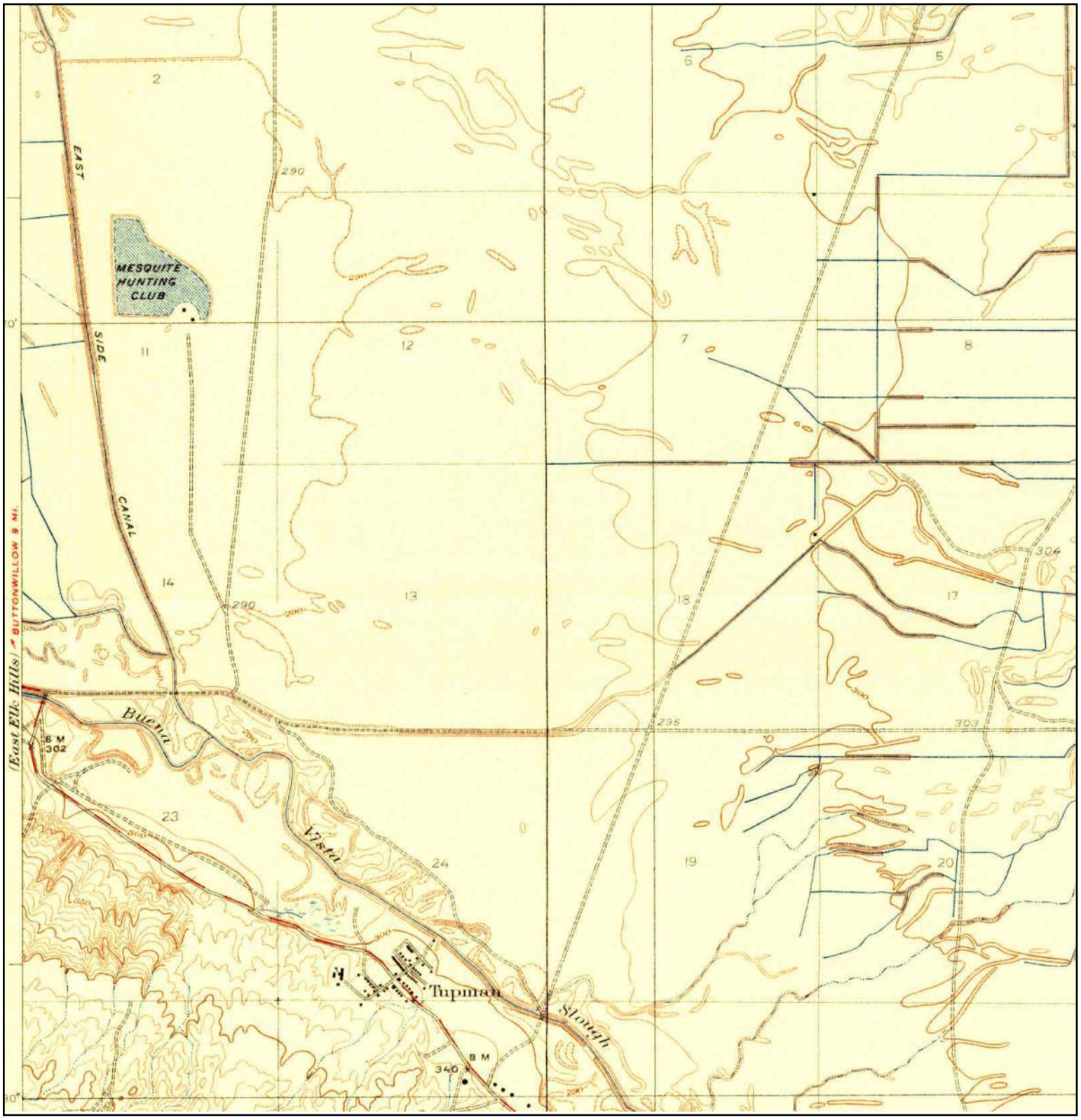


N	TARGET QUAD NAME: EAST ELK HILLS MAP YEAR: 1973 PHOTOREVISED FROM :1954 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map

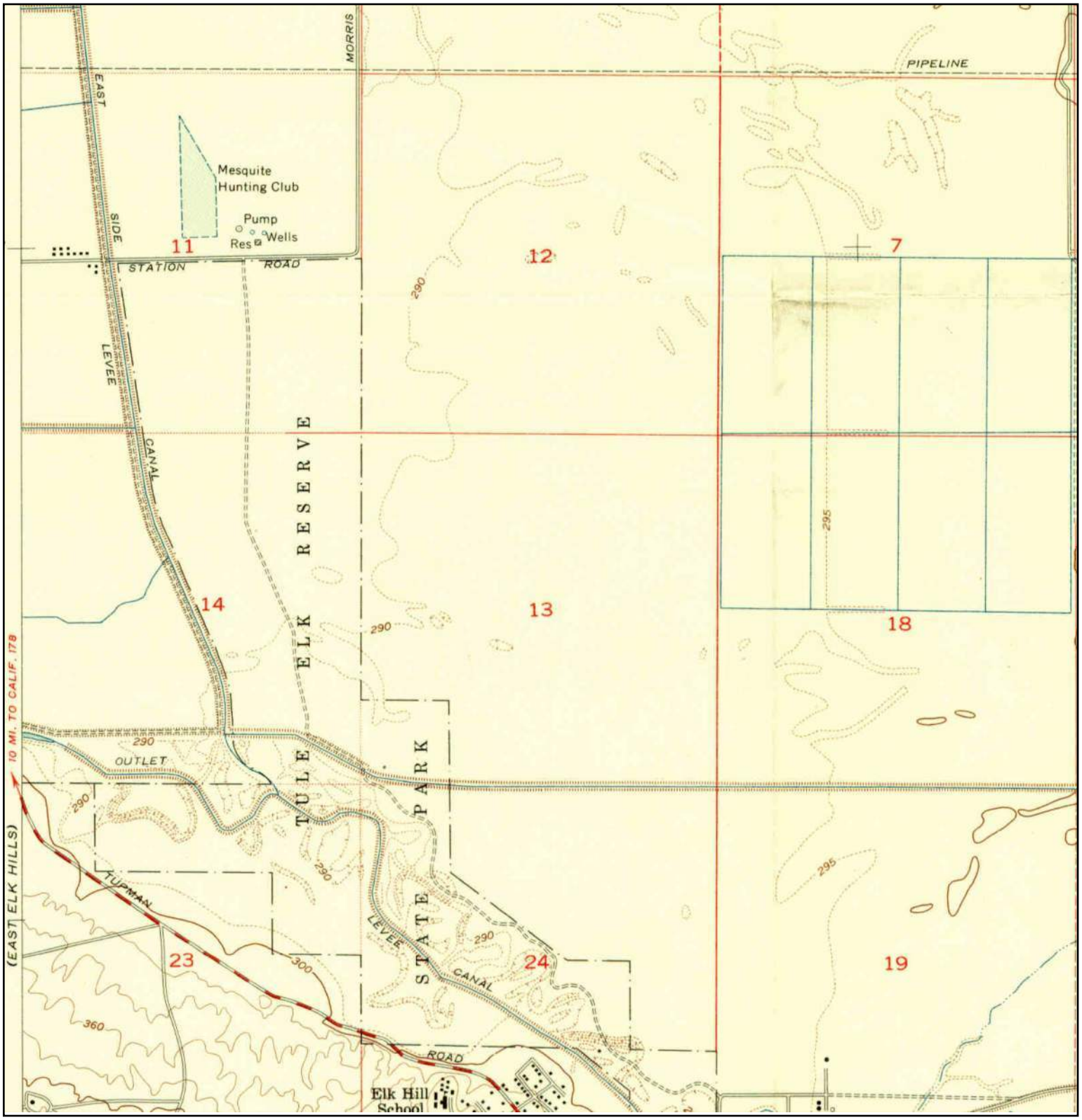
N	ADJOINING QUAD NAME: COLES LEVEE MAP YEAR: 1929 SERIES: 7.5 SCALE: 1:31680	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



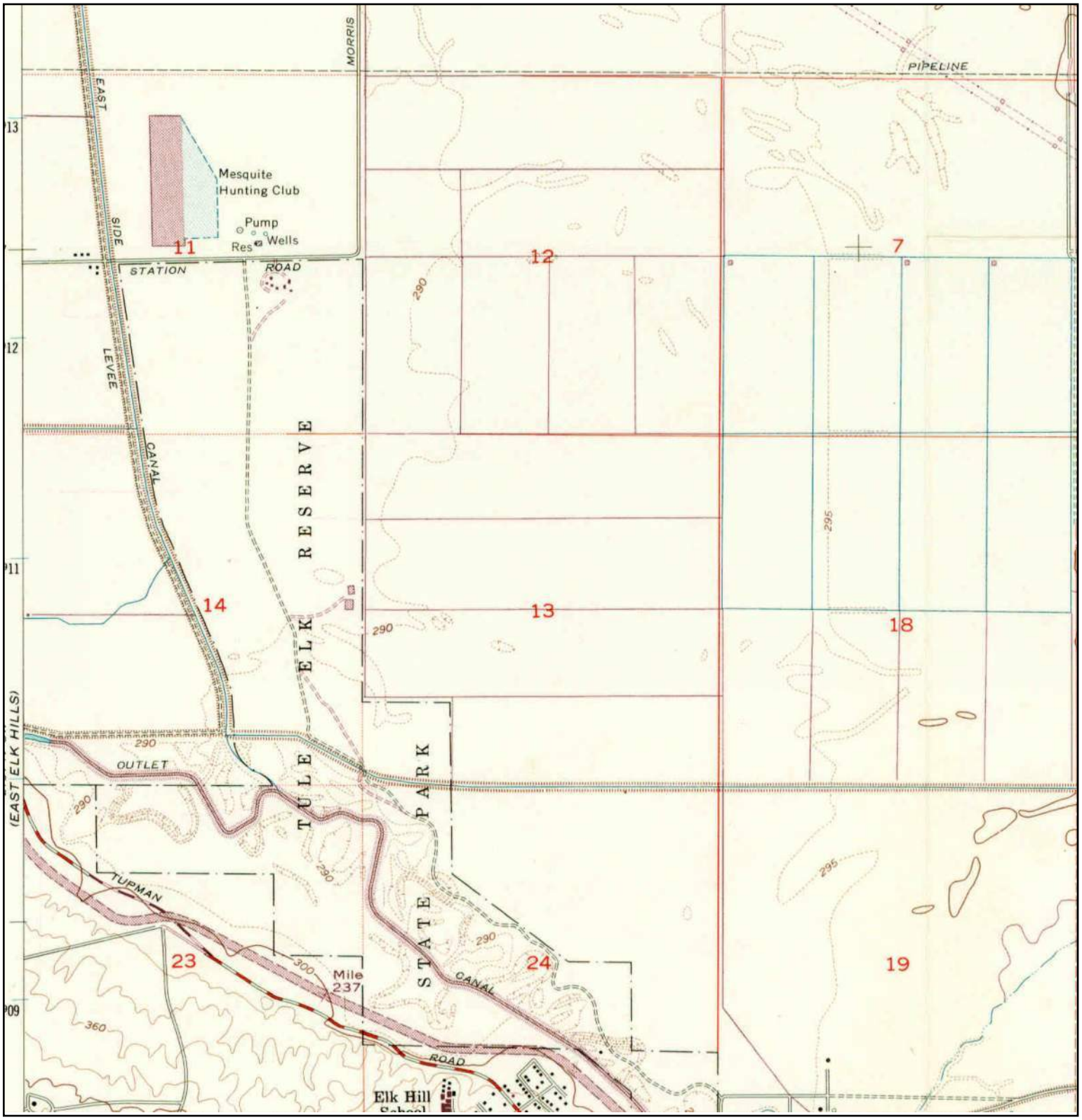
N	ADJOINING QUAD NAME: TUPMAN MAP YEAR: 1933 SERIES: 7.5 SCALE: 1:31680	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



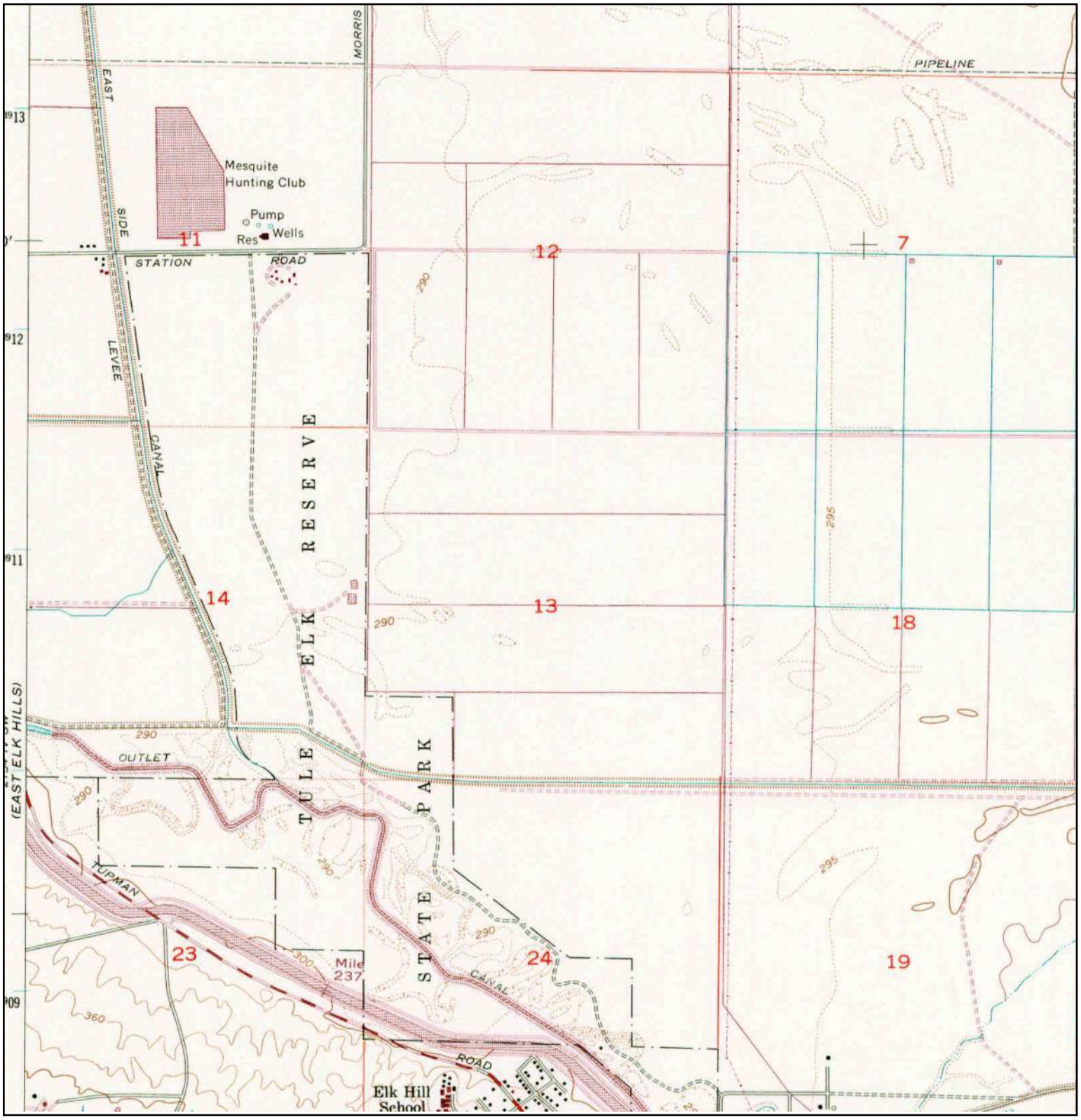
N	ADJOINING QUAD NAME: TUPMAN MAP YEAR: 1954 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



N	ADJOINING QUAD NAME: TUPMAN MAP YEAR: 1968 PHOTOREVISED FROM :1954 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Historical Topographic Map



N	ADJOINING QUAD NAME: TUPMAN MAP YEAR: 1973 PHOTOREVISED FROM :1954 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Buena Vista Palms ADDRESS: BVWSD Buttonwillow, CA 93206 LAT/LONG: 35.3204 / -119.3826	CLIENT: GEI Consultants CONTACT: Stephanie INQUIRY#: 4394757.4 RESEARCH DATE: 08/26/2015

Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Inquiry Number: 4394757.5
August 31, 2015

The EDR-City Directory Image Report

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

Environmental Data Resources Inc

TABLE OF CONTENTS

SECTION

Executive Summary

Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	*Target Street*	*Cross Street*	*Source*
2013	☐	☐	Cole Criss-Cross Directory
2008	☐	☐	Cole Criss-Cross Directory
2003	☐	☐	Cole Criss-Cross Directory
1999	☐	☐	Cole Criss-Cross Directory
1995	☐	☐	Cole Criss-Cross Directory
1992	☐	☐	Cole Criss-Cross Directory
1990	☐	☐	Haines Criss-Cross Directory
1985	☐	☐	Haines Criss-Cross Directory
1980	☐	☐	Haines Criss-Cross Directory
1975	☐	☐	Haines Criss-Cross Directory

RECORD SOURCES

EDR is licensed to reproduce certain City Directory works by the copyright holders of those works. The purchaser of this EDR City Directory Report may include it in report(s) delivered to a customer. Reproduction of City Directories without permission of the publisher or licensed vendor may be a violation of copyright.

FINDINGS

TARGET PROPERTY STREET

BVWSD
Buttonwillow, CA 93206

Year	*CD Image*	*Source*	
TUPMAN RD			
2013	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
2008	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
2003	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
1999	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
1995	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
1992	-	Cole Criss-Cross Directory	Target and Adjoining not listed in Source
1990	-	Haines Criss-Cross Directory	Street not listed in Source
1985	-	Haines Criss-Cross Directory	Street not listed in Source
1980	-	Haines Criss-Cross Directory	Street not listed in Source
1975	-	Haines Criss-Cross Directory	Street not listed in Source

FINDINGS

CROSS STREETS

No Cross Streets Identified

Buena Vista Palms
BVWSD
Buttonwillow, CA 93206

Inquiry Number: 4394757.9
August 31, 2015

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography August 31, 2015

Target Property:

BVWSD

Buttonwillow, CA 93206

Year	***Scale***	***Details***	***Source***
1937	Aerial Photograph. Scale: 1"=500'	Flight Year: 1937	USGS
1942	Aerial Photograph. Scale: 1"=500'	Flight Year: 1942	USGS
1952	Aerial Photograph. Scale: 1"=500'	Flight Year: 1952	USGS
1968	Aerial Photograph. Scale: 1"=500'	Flight Year: 1968	USGS
1975	Aerial Photograph. Scale: 1"=500'	Flight Year: 1975	USGS
1984	Aerial Photograph. Scale: 1"=500'	Flight Year: 1984	USGS
1994	Aerial Photograph. Scale: 1"=500'	/DOQQ - acquisition dates: 1994	USGS/DOQQ
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	USDA/NAIP
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2010	Aerial Photograph. Scale: 1"=500'	Flight Year: 2010	USDA/NAIP
2012	Aerial Photograph. Scale: 1"=500'	Flight Year: 2012	USDA/NAIP

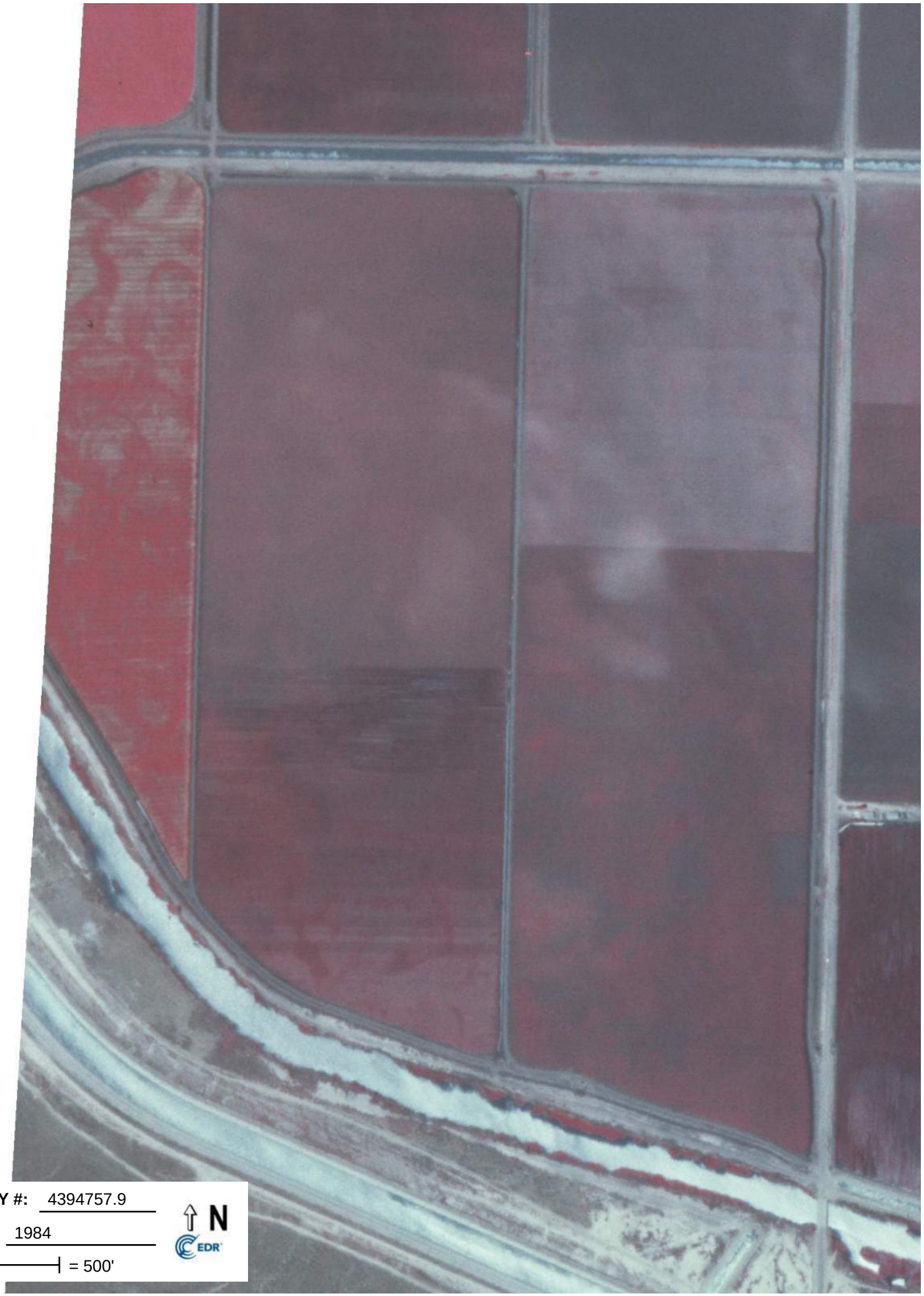

INQUIRY #: 4394757.9
YEAR: 1937
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 1942
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 1952
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 1968
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 1975
= 500'
N
EDR



INQUIRY #: 4394757.9

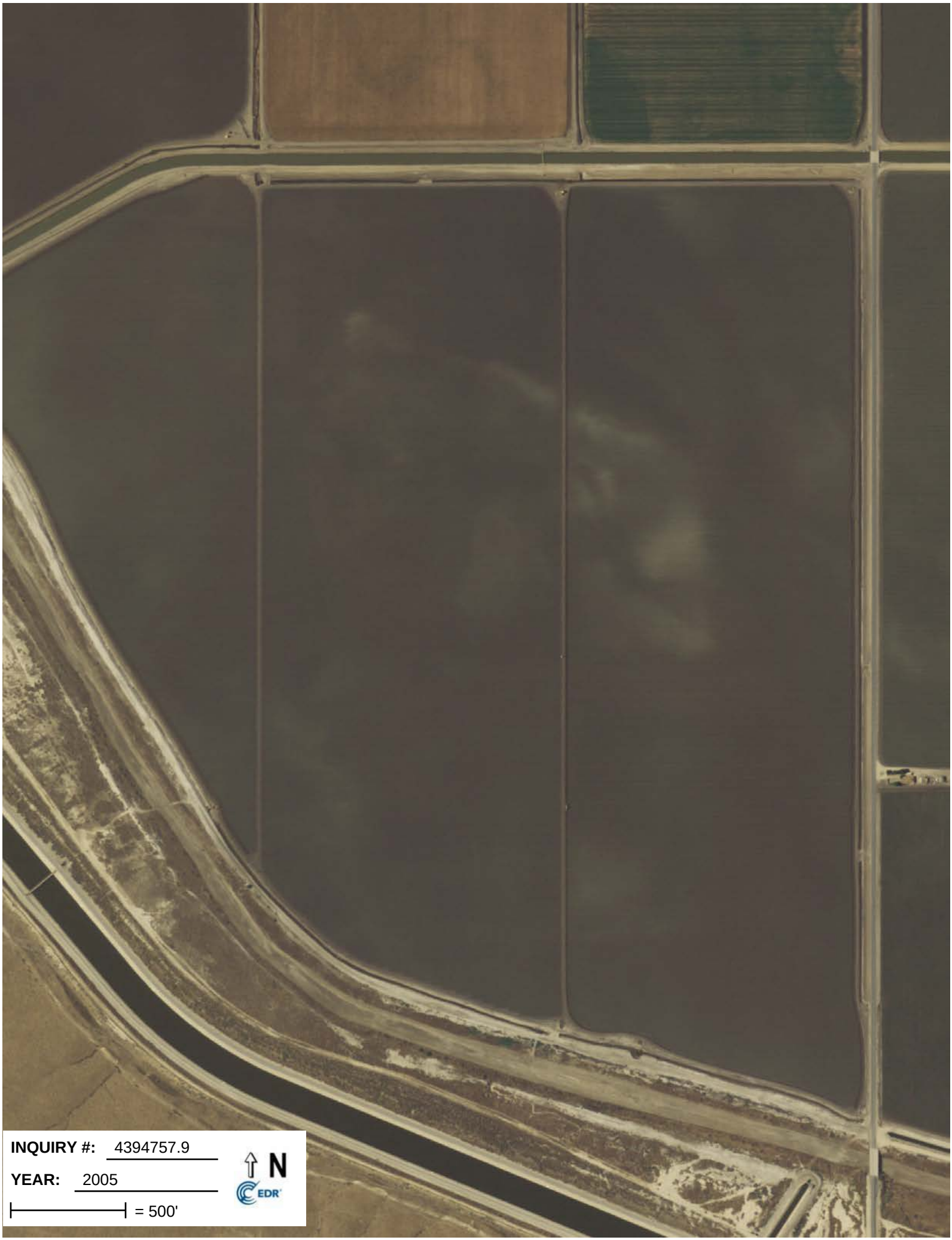
YEAR: 1984

= 500'

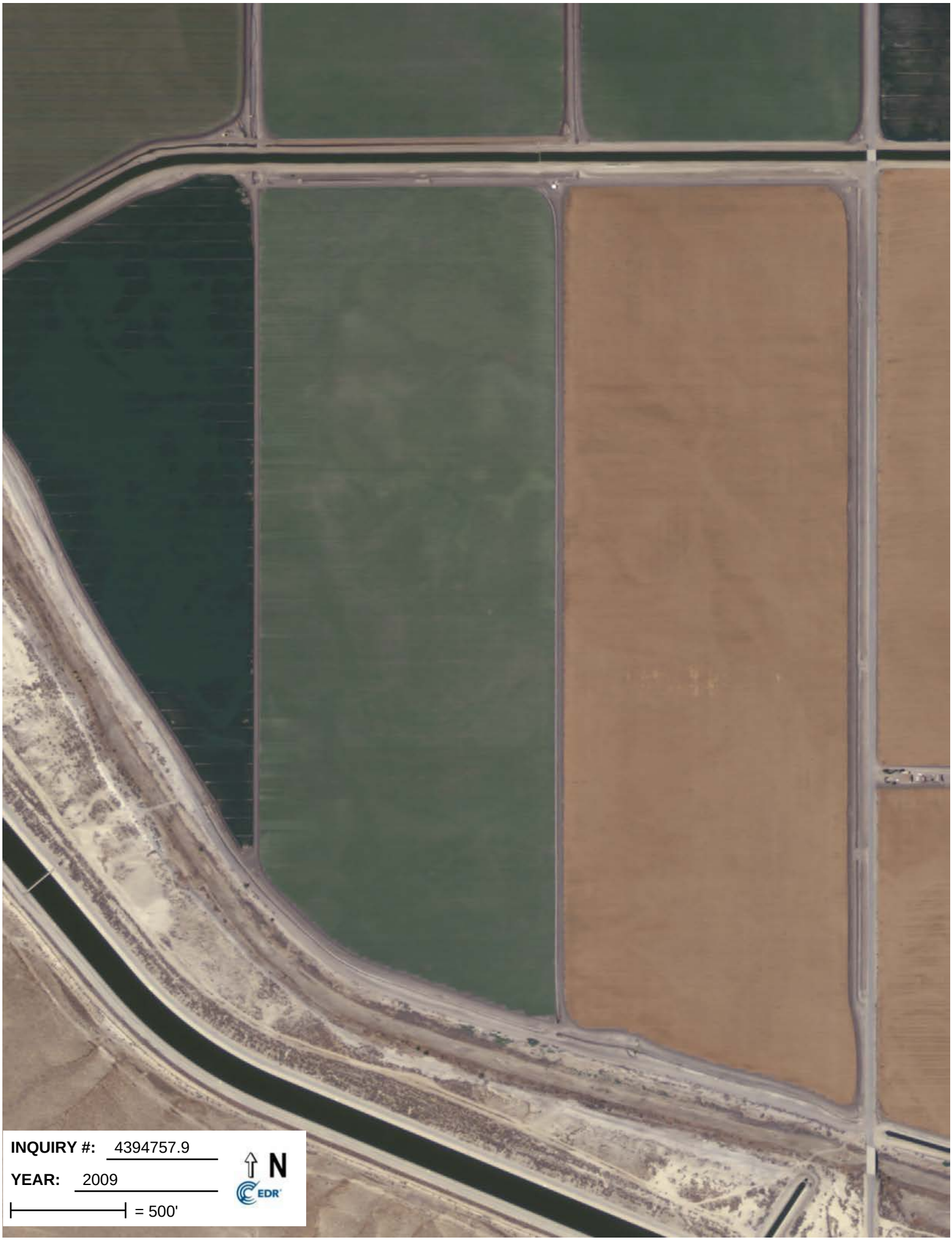
N

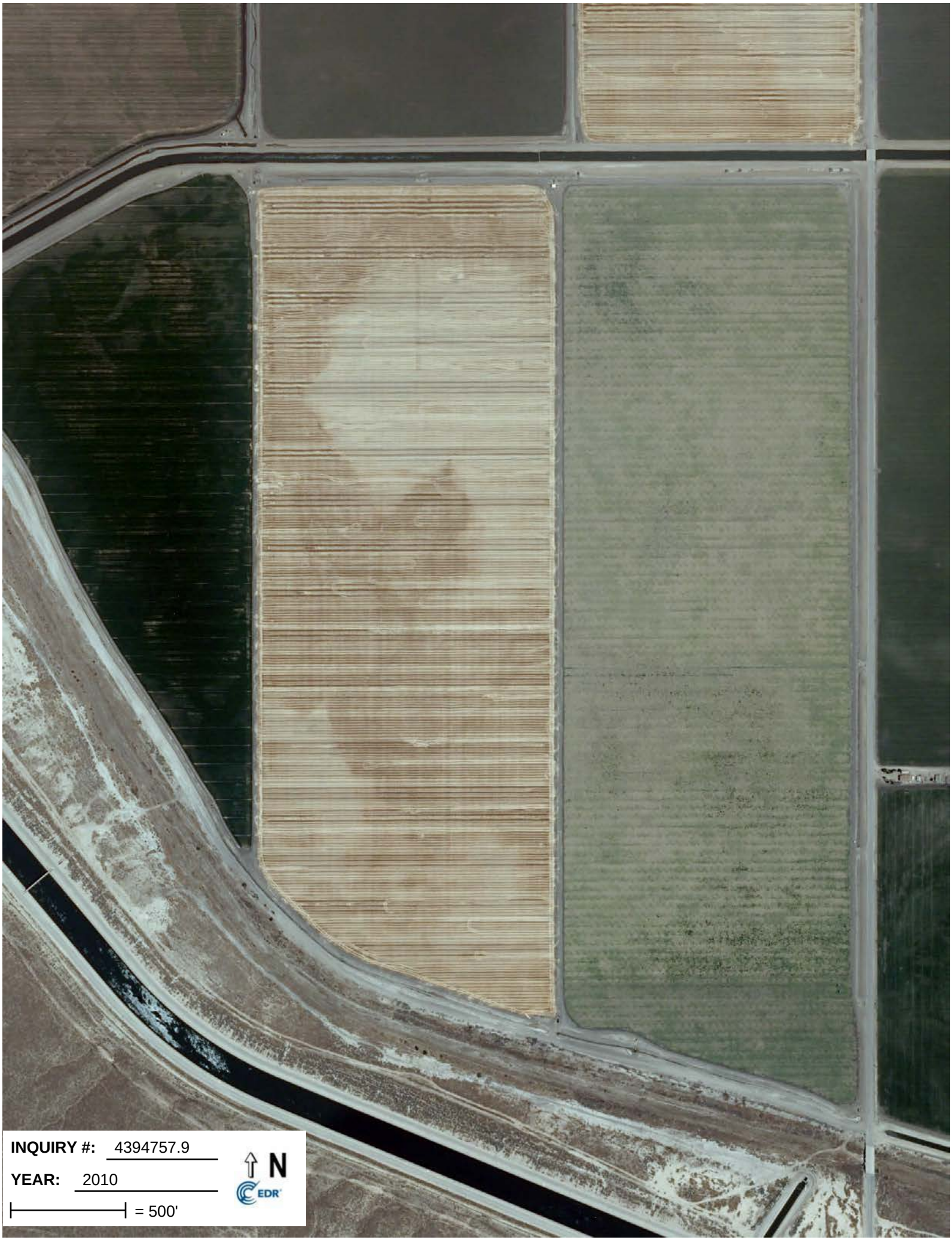
EDR

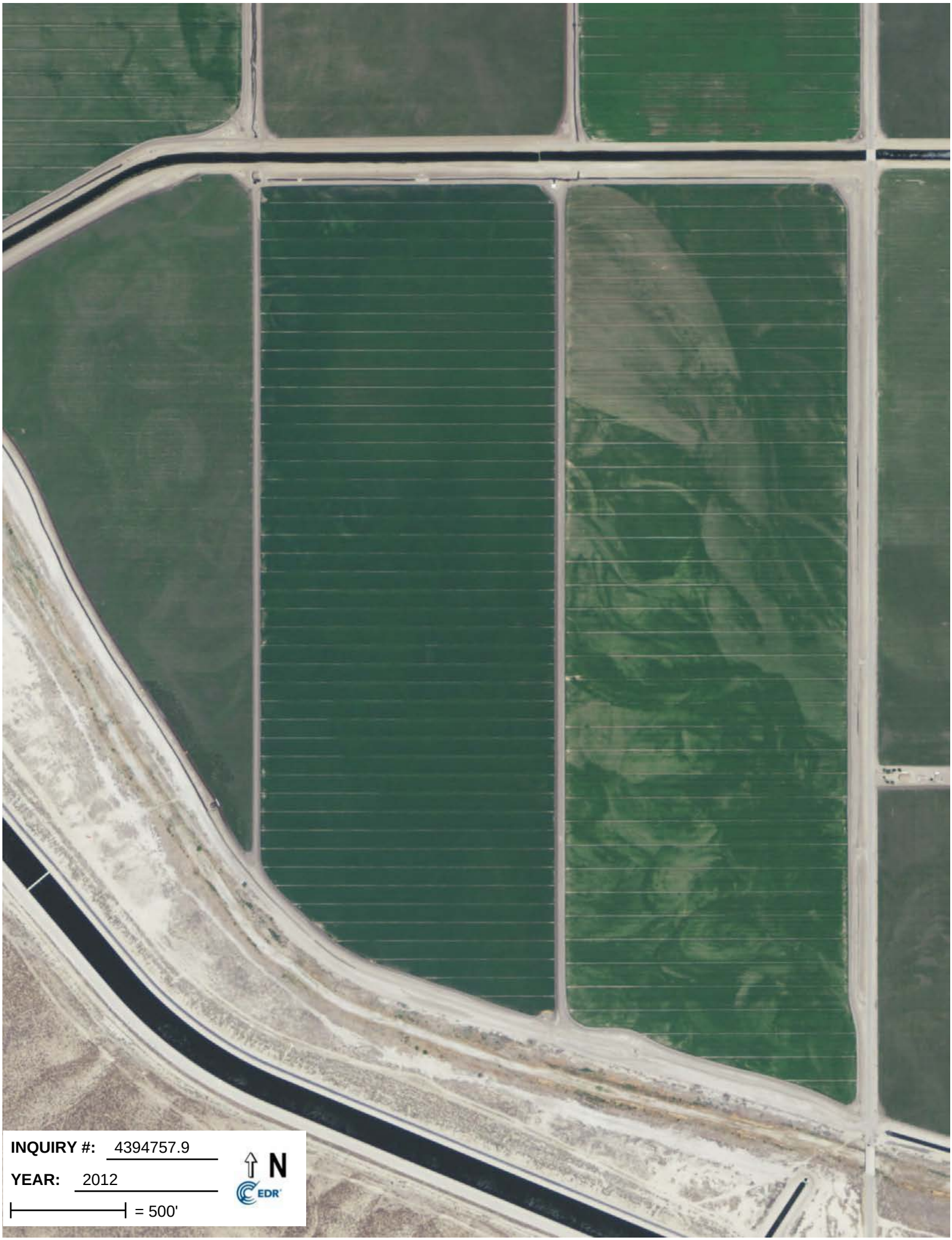

INQUIRY #: 4394757.9
YEAR: 1994
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 2005
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 2006
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 2010
= 500'
N
EDR


INQUIRY #: 4394757.9
YEAR: 2012
= 500'
N
EDR

Appendix E – HECA Phase I Environmental Site Assessment

Appendix L

Phase I Environmental Site Assessment

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Hydrogen Energy California (HECA) Project Site

Kern County, California

Prepared for

Hydrogen Energy California LLC

April 2012

1 Montgomery Street, Suite 900
San Francisco, California 94104

28068052

TABLE OF CONTENTS

1. Introduction 1-1

1.1 Purpose 1-1
1.2 Detailed Scope-of-Services 1-1
1.3 Limitations and Exceptions 1-2
1.4 User Reliance 1-3

2. Property Description and Subject Property Environment 2-1

2.1 Location and Property Description 2-1
2.2 Site Characteristics 2-2
2.3 Current and Historical Uses of the Site 2-2
2.4 Local Geology and Hydrogeology 2-2
2.4.1 Geology 2-3
2.4.2 Hydrology 2-4

3. Subject Property History/Historic Review 3-1

3.1 Site and Adjoining Property Historical Use Information 3-1
3.1.1 Aerial Photographs 3-1
3.1.2 Topographic Maps 3-1
3.1.3 City Directories 3-1
3.1.4 Sanborn™ Fire Insurance Maps 3-1
3.1.5 Environmental Lien and Activity Use Limitation Search 3-5
3.2 Previous Reports 3-5

4. Records Review 4-1

4.1 Regulatory Records 4-1
4.1.1 Regulatory Database Search Report 4-1
4.2 User-Provided Information 4-6

5. Agency Contacts 5-1

5.1 Local Government/Regulatory Agency Representatives 5-1
5.1.1 Kern County Environmental Health Services Department 5-1
5.1.2 Kern County Fire Department 5-2
5.1.3 Cal-EPA Department of Toxic Substances Control 5-2
5.1.4 Regional Water Quality Control Board 5-3
5.1.5 U.S. Environmental Protection Agency 5-3

6. Subject Property Reconnaissance 6-1

6.1 Methodology and Limiting Conditions 6-1
6.2 General Setting 6-1
6.3 Interior and Exterior Observations 6-2
6.3.1 Structures, Grounds, and Subject Property Access 6-2

TABLE OF CONTENTS

6.3.2 Water, Utilities, Pipelines 6-2
6.3.3 Wells 6-2
6.3.4 Wastewater Discharge 6-3
6.3.5 Stormwater Drainage/Discharge 6-3
6.3.6 Drains and Sumps 6-3
6.3.7 Solid Waste Disposal 6-3
6.3.8 Process Equipment 6-3
6.3.9 Underground Storage Tanks 6-3
6.3.10 Aboveground Storage Tanks 6-4
6.3.11 Other Hazardous Materials/Waste Storage 6-4
6.3.12 Pits, Ponds, and Lagoons 6-4
6.3.13 Stained/Discolored Soil or Pavement 6-4
6.3.14 Evidence of Fill or Illegal Dumping 6-5
6.3.15 Transformers/PCB Items 6-5
6.3.16 Air Emissions 6-5
6.3.17 Asbestos-Containing Materials 6-5
6.3.18 Lead-Based Paint 6-5
6.3.19 Radon 6-5

7. Findings and Opinions 7-1

8. Conclusions 8-1

9. References 9-1

10. Qualifications of Environmental Professionals 10-1

10.1 Corporate 10-1
10.2 Individual 10-1

List of Figures

Figure 1 Subject Property Location Map

Figure 2 Site Plan

List of Tables

Table 2-1 Subject Property Parcels

Table 3-1 Historic Site Information

Table 4-1 Databases Searched by Environmental Data Resources, Inc.

List of Appendices

Appendix A Curricula Vitae

Appendix B Subject Property Reconnaissance Photographs

TABLE OF CONTENTS

Appendix C	Historical Research Documentation
Appendix D	Regulatory Database Search Report
Appendix E	Port Organics Products, LTD Tailing Piles Soil Sample Analysis
Appendix F	AECOM 2010 Phase II Environmental Site Assessment
Appendix G	Kern County Environmental Health Services Department Inspection Documentation

ACRONYMS

AOCs	Areas of Concern
API	American Petroleum Institute
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	below ground surface
CalARP	California Accidental Release Prevention Program
Cal-EPA	California Environmental Protection Agency
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CHHSL	California Human Health Screening Level
CORRACTS	Corrective Action RCRA TSDFs
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DTSC	California Department of Toxic Substances Control
EDR	Environmental Data Resources, Inc.
ESA	Environmental Site Assessment
ESL	Environmental Screening Level
U.S. EPA	United States Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Subject Property Assessment
FEMA	Federal Emergency Management Agency
FINDS	Facility Index System
HECA	Hydrogen Energy California
HECA LLC	Hydrogen Energy California LLC
HEI LLC	Hydrogen Energy International, LLC
HIST	historical
HMBP	Hazardous Materials Business Plan
KCEHSD	Kern County Environmental Health Services Department
KCFD	Kern County Fire Department
LUST	leaking underground storage tank
mg/kg	milligrams per kilogram
NOVs	Notices of Violations
NPL	National Priority List

ACRONYMS

PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RSL	Regional Screening Level
RWQCB	Regional Water Quality Control Board
TPH	total petroleum hydrocarbons
TSDF	treatment, storage, and disposal facility
URS	URS Corporation
UST	underground storage tank
VOCs	volatile organic compounds

1.1 PURPOSE

The purpose of this Phase I Environmental Site Assessment (ESA) is to provide a professional opinion on the potential presence of current recognized environmental conditions (RECs) at the Subject Property, which is more fully defined in Section 2.1, Location and Property Description. The Subject Property is defined as the Hydrogen Energy California (HECA) Project Site, or Project Site, and consists of approximately 453 acres.

Figure 1, Subject Property Location Map, and Figure 2, Site Plan, illustrate the location and features of the Subject Property. The parcels comprising the Subject Property are listed in Table 2-1, Subject Property Parcels.

REC, as defined by American Society for Testing and Materials (ASTM) Designation E 1527-05, means "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions."

This ESA was performed according to the recommended guidelines established by ASTM Designation E 1527-05, "Standard Practice for Environmental Subject Property Assessments: Phase I Environmental Subject Property Assessment Process." Because there are multiple federal and state definitions of hazardous materials, for the purpose of this report, hazardous substances and petroleum products are jointly referred to as "hazardous materials."

1.2 DETAILED SCOPE-OF-SERVICES

URS Corporation (URS) was retained by Hydrogen Energy California LLC (HECA LLC) to conduct a Phase I ESA for the Subject Property. URS performed the following work:

1. Reviewed available geologic maps and literature for information on the physical and hydrogeologic settings of the Subject Property.
2. Contracted with Environmental Data Resources, Inc. (EDR), to conduct a regulatory database search of known aboveground storage tanks (ASTs); underground storage tanks (USTs); landfills; hazardous waste generation or treatment, storage, and disposal facilities (TSDFs); and subsurface contamination in the surrounding area up to within 1 mile of the Subject Property (see Appendix D). Based on ASTM Practice, the following search distances from the Subject Property boundaries were used to assess potential environmental impacts:
    - 0.75-mile radius for registered ASTs, underground storage tanks (USTs), Resource Conservation and Recovery Act (RCRA) waste generators, and mines.

- 1-mile radius for leaking underground storage tanks (LUSTs); landfills; Non-Corrective Action RCRA TSDFs; and Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites.
- 1.5-mile radius for Corrective Action RCRA TSDFs (CORRACTS), state sites with potential or confirmed hazardous substance releases, and United States Environmental Protection Agency (U.S. EPA) Superfund sites.

3. Researched the history of the Subject Property by reviewing a chronological series of historical aerial photographs and a chronological series of historic topographic maps for the Subject Property and surrounding properties. Copies of these documents are presented in Appendix B.
4. Performed a reconnaissance of the Subject Property and publicly accessible adjacent areas on February 8, 2012, for obvious evidence of potential contamination sources such as current hazardous materials storage or use; unusually stained soils, slabs, and pavements; drains, sumps, drums, tanks, and electrical transformers; stressed vegetation; and discarded hazardous materials containers. Photographs taken during Subject Property reconnaissance are included in Appendix B of this report.
5. Interviewed Mr. John Cauzza III and Mr. Sam Ackerman regarding their former respective properties.
6. Interviewed Mr. Dane Peacock of BP as representative of the current property owner (Hydrogen Energy International [HEI], LLC).
7. Reviewed records available from HEI LLC, HECA LLC, and Mr. John Cauzza III.
8. Requested supplemental records for information regarding the Subject Property from the Kern County Environmental Health Services Department (KCEHSD), the Kern County Fire Department (KCFD), the California Environmental Protection Agency (Cal-EPA), the Regional Water Quality Control Board (RWQCB), and the U.S. EPA.
9. Evaluated the information collected to prepare this report.
10. Prepared this report.

1.3 LIMITATIONS AND EXCEPTIONS

This report and the associated work have been provided in accordance with the principles and practices generally employed by the local environmental consulting profession. This is in lieu of all warranties, expressed or implied.

No evaluation for the presence of asbestos-containing building materials, urea-formaldehyde foam insulation, or other hazardous building materials; mold; methane; radon gas; lead in drinking water; wetlands; industrial hygiene and health and safety; ecological resources and endangered species; indoor air quality; or high-voltage power lines is included in this assessment.

These findings and opinions are based on information available from public sources on specific dates (historical photographs, maps, and regulatory agency files, lists, and databases), more

specifically set forth in Appendix A and Appendix B. Although this information is updated continually, it can be incomplete. Information obtained from interviews or provided to URS by Mr. John Cauzza III, Mr. Sam Ackerman, Mr. Dane Peacock, or HEI LLC is assumed to be correct and complete. URS does not assume any liability for information obtained that has been misrepresented, or for items not visible, accessible, or present on the Subject Property at the time of the field reconnaissance. All areas of the Subject Property were accessible during the February 8, 2012, site visit; however, respect for the crops precluded close-up inspection of the drainage ditches and selected agricultural fields which were observed from roads and other accessible areas.

There is no investigation that is thorough enough to preclude the presence of materials on the Subject Property that currently, or in the future, may be considered hazardous. URS cannot warrant or guarantee that not finding indicators of hazardous materials means that hazardous materials do not exist on the Subject Property.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

1.4 USER RELIANCE

This report has been prepared for the sole use of HECA LLC. This report shall not be relied upon by any other party without written authorization from HECA LLC and URS Corporation (URS).

2.1 LOCATION AND PROPERTY DESCRIPTION

The Subject Property is situated in the western-central portion of Kern County, in Section 10 of Township 30 South, Range 24 East, as shown on Figure 1. The Subject Property is west of Tupman Road and south of Adohr Road. The street address of the Project Site is 7361 Adohr Road.

The Subject Property is approximately 1.5 miles northwest of the unincorporated community of Tupman, California; approximately 1 mile south of Stockdale Highway; and approximately 2 miles southwest of Interstate 5 (which extends generally from the southeast to northwest, east of the Subject Property). The Tule Elk State Reserve is approximately 0.25 mile east of the Subject Property, east of Tupman Road.

The Subject Property consists of agricultural fields bisected by irrigation and drainage canals. Figures 1 and 2 show the Subject Property location and layout. The Subject Property is bounded by the following:

- North: Agricultural fields, a Farm Operations Area, two occupied residences, the Ackerman Property, with Adohr Road beyond (see Photos 1 and 2 in Appendix B).
- South: Agricultural fields and an irrigation canal.
- East: Tupman Road, with agricultural fields beyond.
- West: A dirt farm road (herein referred to as Dairy Road right-of-way) (see Photo 3).

For purposes of clarification, and because of recent changes to property ownership, the following parcels north of the Subject Property are referred to as follows:

- The 4.72-acre parcel containing a residence located northwest of the Subject Property is herein referred to as the Ackerman Property. For the purposes of the HECA Project, this is within the area referred to as the Controlled Area, which consists of property adjacent to the Project Site that will be owned and controlled by HECA LLC.

- The approximately 30-acre area containing storage barns, a maintenance shop, a disused rice elevator, and a residence is referred to as the Farm Operations Area. This area is also within the Controlled Area.

The Subject Property includes portions of three parcels listed in Table 2-1. The majority of the Subject Property is currently comprised of agricultural land as shown in Figure 2 and Photos 4 through 7 in Appendix B).

According to Mr. John Cauzza III and Mr. Sam Ackerman, the Subject Property parcels were purchased from Palm Farms, Inc., in 1995 and subsequently sold to HECA LLC in February 2011. According to Mr. Dane Peacock of BP, ownership of the parcels was transferred from HECA LLC to HEI LLC in September 2011.

Table 2-1
Subject Property Parcels

APN	Current Owner	Approximate Size (acres)
Part of 159-040-02	HEI LLC	75
Part of 159 040-16	HEI LLC	376.5
Part of 159-040-18	HEI LLC	1.5
Total		**453**

2.2 SITE CHARACTERISTICS

The Subject Property is approximately 453 acres, with the majority currently comprised of agricultural land, including cultivation of cotton, alfalfa, and onions. There are no buildings on the Subject Property.

The Subject Property includes portions of irrigation and drainage canals, which generally extend from north to south.

The West Side Canal (and the Outlet Canal), Kern River Flood Control Channel, and the California Aqueduct (State Water Project) are approximately 500, 700, and 1,900 feet south of the Project Site, respectively.

2.3 CURRENT AND HISTORICAL USES OF THE SITE

According to historical aerial photographs and topographic maps, the Subject Property has historically been and currently remains primarily in agricultural use. According to Mr. John Cauzza III, the Subject Property was purchased in 1995. Under the previous owners, Palm Farms, Inc., the Subject Property was used for agricultural production.

HEI LLC purchased the Subject Property in 2011 and leased it back to Cauzza Farms for agricultural use.

2.4 LOCAL GEOLOGY AND HYDROGEOLOGY

The elevation of the Subject Property is approximately 288 feet above mean sea level. The Subject Property is located in the San Joaquin Valley. The San Joaquin Valley is California's leading agricultural producing region, and five of its counties (Fresno, Kern, Tulare, Merced, and Stanislaus) rank among the state's top 10 counties in farm production value. Oil and gas is also an important industry in the San Joaquin region. The deepest wells and about half of the largest oil fields are found in Kern County, as is the Elk Hills Oil Field (formerly named the Elk Hills Naval Petroleum Reserve). The Subject Property is generally flat, and the topographic gradient generally slopes to the west.

2.4.1 Geology

The San Joaquin Valley is bordered to the east by the Sierra Nevada Mountain Range or batholith. The Sierra Nevada batholith is composed of granitic rocks variously described as granite, quartz-monzonite, granodiorite, and quartz diorite. The Coastal Ranges border the San Joaquin Valley to the west. The Coastal Ranges were formed in the Late Pliocene age, and major deformation of the ranges and adjacent parts of the San Joaquin Valley occurred. Surface anticlines such as Elk Hills, Kettleman Hills, and Wheeler Ridge quickly became major surface features rising from the valley floor. This deformation and uplift continues today and is measured at places such as Buena Vista Hills.

The valley that formed between the Sierras to the east and the Coastal Ranges to the west is an asymmetrical synclinal trough with an axis centered to the west. The elongate lowland known as the Great Valley is in size 400 miles long and 50 miles wide and rises from slightly below sea level in the delta area to 400 feet in elevation at the northern and southern ends. The southern portion is called the San Joaquin Valley. Bakersfield and Tupman, California, are located on the southeastern end. Over 30,000 feet of sediments ranging in age from Cretaceous to recent have accumulated within the San Joaquin Basin. The basin was formed from compressive forces between the North American and Pacific continental plates. As the basin sank, sediments from the rising mountains to the east (ancestral Sierra Nevada) and lesser amounts from the west accumulated in a thick wedge in the valley. The valley was once a great inland sea basin that was inundated or flooded periodically. The last large lake to occupy the Valley was Lake Corcoran about 600,000 years ago. The lake occupied approximately the western half of the Valley from the Stockton arch south to the bend in the San Joaquin River.

Kern County is located in the southern Central Valley and extends east beyond the southern slope of the Eastern Sierra Nevada range into the Mojave Desert and includes parts of the Indian Wells Valley and the Antelope Valley. From the Sierras, the county extends across the floor of the San Joaquin Valley to the eastern edge of the Temblor Range, part of the Coastal Ranges. To the south, the county extends over the ridge of the Tehachapi Mountains.

The EDR report included soil data for two locations in the vicinity of the Subject Property. Data for the first location indicated a soil component name of Lokern with surficial deposits generally less than 7 inches deep. These soils are moderately well drained and have slow infiltration rates. There are two subsurface layers in this soil. The upper layer exists at a depth from 7 to 48 inches, and the lower (deeper) layer exists at a depth between 48 to 66 inches. Although no soil texture classes were reported by EDR for these soils, bedrock occurs at a depth greater than 66 inches below ground surface (bgs). The second location indicated a soil component name of Buttonwillow with surficial deposits generally less than 27 inches deep. These soils are moderately well-drained and have slow infiltration rates. There are two subsurface layers in this soil. The upper layer exists at a depth from 27 to 55 inches, and the lower (deeper) layer exists at a depth between 55 to 64 inches. Although no soil texture classes were reported by EDR for these soils, bedrock occurs at a depth greater than 64 inches bgs.

2.4.2 Hydrology

Surface Water

Surface water exists south of the Subject Property in canals and on the Subject Property in a few drainage ditches and irrigation ditches. Water is not constantly present in the Outlet Canal on the southern boundary of the Subject Property or in the drainage ditches but would be present during periods of time when crops are being irrigated. At the approximate east–west center of the Subject Property, an irrigation canal briefly extends to the southwest before intersecting with the West Side and Outlet Canals. The drainage ditch extends from the northwest to the southeast. Several smaller irrigation ditches traverse the Subject Property from north to south and east to west around crop fields. The irrigation ditches are fed by the West Side Canal, lying southwest of the Subject Property, and the East Side Canal, which lies approximately 0.25 mile east of the northeastern corner of the Subject Property (at the intersection of Adohr and Tupman Roads).

The Subject Property generally slopes to the west, toward the West Side Canal. From observation of the Subject Property and input provided by Mr. John Cauzza III, it appears that any surface water runoff caused by storm precipitation events would flow to the west and drain into the West Side Canal.

The Kern River Flood Control Channel is located approximately 700 feet south of the Project Site. This channel conveys overflows from the Kern River during flood events. The floodplain associated with this channel does not extend onto the Project Site. The California Aqueduct, which supplies agricultural and municipal areas in Southern California, is located parallel to and west of the West Side and Outlet canals, approximately 500 feet south of the Project Site.

According to Federal Emergency Management Agency (FEMA) data provided by EDR, the Subject Property is not situated within a 100-year or 500-year flood zone.

Groundwater and Oil and Gas Wells

The EDR report (Appendix D) mapped two groundwater wells on the Subject Property (in the central portion of the Subject Property), and an additional nine wells located within 0.5 mile of the property boundary. The two wells mapped in agricultural fields on the Subject Property were not visible during the URS 2012 site visit.

The EDR report lists two California Division of Oil, Gas, and Geothermal Resources (DOGGR)-registered oil and gas wells within a 1-mile radius from the boundary of the Subject Property. It appears that one of these wells (American Petroleum Institute [API] well number 02952932) was located in the central portion of the Subject Property. API well number 02937474 was located approximately 0.5 mile south of the Subject Property. These former wells are shown in the EDR Report in Appendix D. The DOGGR database entry stated that these wells were plugged and abandoned (dry hole), as of November 18, 1950. URS visited the locations of the two DOGGR wells and saw no evidence of the wells in the cultivated fields.

Wetlands

There are no mapped wetlands located on the Subject Property. According to the National Wetland Inventory map included in the EDR report, the nearest national and state wetlands are a small area approximately 0.1 mile east of the Subject Property border near the intersection of Tupman Road and Station Road. In addition, more extensive wetlands are mapped generally extending from the southeast to the northwest, in the Kern River Flood Control Channel.

3.1 SITE AND ADJOINING PROPERTY HISTORICAL USE INFORMATION

URS reviewed aerial photographs, historical topographic maps, and city directories to compile the historical site information presented in Table 3-1 below. URS requested historical Sanborn™ fire insurance maps for the Subject Property; however, none were available.

3.1.1 Aerial Photographs

URS reviewed 29 aerial photographs for the Subject Property and the surrounding areas available through EDR. Photographs were dated from 1946 (two photos), 1956 (two photos), 1967, 1974, 1984, 1994, 2005, and 2006. Each of the aerial photographs depicts the Subject Property as undeveloped and in use for agricultural production; primarily, crop production. These aerial photographs are included in Appendix C, and the descriptions of the photos are presented in Table 3-1.

3.1.2 Topographic Maps

URS reviewed five historic topographic maps of the Subject Property and surrounding properties available through EDR representing the years 1912, 1933, 1954, 1968, and 1973. The topographic maps reviewed are included in Appendix C, and the descriptions of the maps are presented in Table 3-1.

3.1.3 City Directories

URS requested historic city directories for the Subject Property from EDR through their collection of Haines Criss-Cross Directories for the years 1971 through 2006. EDR found no properties listed at the Subject Property address of Dairy Road/Adohr Road; Buttonwillow, California 93206.

URS requested historic city directories for surrounding properties from EDR using their Haines Criss-Cross Directories for the years 1971 through 2006 (although these years are not necessarily inclusive). EDR reported that city directories were available for the following properties surrounding the source:

- 2001: Residence at 7345 Adohr Road, Buttonwillow, CA 93206
- 2001: Port Organic Products, Inc., at 7361 Adohr Road, Buttonwillow, CA 93206
- 2006: Residence at 7345 Adohr Road, Buttonwillow, CA 93206
- 2006: Port Organic Products, Inc., at 7361 Adohr Road, Buttonwillow, CA 93206

Although these properties are located in unincorporated Kern County, they have Buttonwillow addresses for mailing and directory purposes.

3.1.4 Sanborn™ Fire Insurance Maps

EDR reported that there were no Sanborn™ Fire Insurance Maps available for the Subject Property. Sanborn Fire Insurance Maps typically include information pertaining to fire risk and may provide details related to buildings and other structures located on a specified property. It is not uncommon for these maps to be unavailable for these reports, and it is not an indication of potential environmental risk if no maps are available for the Subject Property.

Table 3-1
Historic Site Information

Date	Location	Finding	Source
1912	Subject Property	The 1912 topographic map does not contain section numbers, which makes it difficult to accurately identify the Subject Property. The Subject Property appears to be undeveloped, and no features are shown on the site itself.	USGS Topo map, 1912 Buena Vista Lake, California
	Adjacent Properties	Surrounding area features include the Elk Hills, the town of Buttonwillow, the West Side Canal, Buena Vista and Lake sloughs, North and Coles levees, the Southern Pacific Railroad (approximately 4.5 miles to the north), and two oil pumping stations (approximately 5.5 miles to the northwest and 6 miles to the west).	
1933	Subject Property	The 1933 topographic map shows the eastern edge of the Subject Property. No features or buildings are visible on the site, and it appears undeveloped.	USGS Topo map, 1933 Tupman, California
	Adjacent Properties	The 1933 topographic map shows the Mesquite Hunting Club directly to the northeast of the Subject Property (northeast of what is now the intersection of Tupman Road and Station Road). The East Side Canal runs along the eastern edge of the Subject Property. The Buena Vista Slough is about 3 miles to the south, and the town of Tupman is about 6 miles to the south of the Subject Property.	
1946	Subject Property	The 1946 aerial photographs show the majority of the Subject Property in use as agricultural fields; however, several narrow, long buildings are present in the north-central portion of the Subject Property. A ditch or levee generally parallel to the west of the drainage ditch is also visible north-south across the Subject Property.	Aerial Photograph, 1946
	Adjacent Properties	There are several buildings north of the Subject Property (in the Farm Operations Area) that match the current storage barns and additional long narrow buildings that are no longer present. A ditch matching the current drainage ditch runs across the Farm Operations Area from the northwest to the southeast. The areas to the north, east, and west of the Subject Property appear to be undeveloped except for agricultural fields. The area to the south of the Subject Property, past the canals, appears to be undeveloped.	
1954	Subject Property	The Subject Property appears without any structures in the 1956 topographic map.	USGS Topo map, 1954 East Elk Hills, California
	Adjacent Properties	The 1954 topographic map shows Dairy and Adohr roads (the intersection north of the Subject Property) and Tupman Road. Dairy and Tupman roads run north/south, and Adohr Road runs east/west. The map shows small structures north of the Subject Property, and a landing field east of the structures. To the south of the Subject Property, two wells are near a levee that runs east/west. Based on their labels, these wells are presumed to be water wells.	

Table 3-1
Historic Site Information (Continued)

Date	Location	Finding	Source
		There are three wells in the surrounding area: one about 500 feet to the northeast, one 0.25 mile to the east, and one less than 0.5 mile to the northwest. Based on their labels, these wells are presumed to be water wells. The West Side and Outlet canals are south of the Subject Property, with a narrow reservoir running northwest to southeast along the edge of the Outlet Canal. A levee runs south of the Subject Property and connects to a main drain from the north. A pipeline appears north of the Subject Property, originating at the intersection of Tupman and Adohr roads, and extending to the east. The topographic map labels do not identify the nature or content of the pipeline. About 5 miles southwest of the Subject Property, there are numerous oil wells and oil tanks in the east Elk Hills. The area is labeled *Naval Petroleum.*	
1956	Subject Property	The 1956 aerial photos do not show any of the long narrow structures shown on the 1946 aerial photo. The irrigation ditch or canal seen in the 1946 aerial photograph along the eastern edge of the Subject Property does not appear in the 1956 aerial photograph.	Aerial Photograph, 1956
	Adjacent Properties	The 1956 aerial photos do not show any significant changes in the surrounding areas from the 1946 aerial photos. What appears to be the West Side and Outlet canals are shown south of the Subject Property. An irrigation ditch or canal east of the Subject Property does not appear to be as prominent as in the 1946 aerial photograph.	
1967	Subject Property	The 1967 aerial photos do not show any significant changes in the Subject Property (agricultural fields and undeveloped); however, the two ditches have been replaced by a single north-south ditch that matches the current configuration of the drainage ditch.	Aerial Photograph, 1967
	Adjacent Properties	The 1967 aerial photos do not show any significant changes in the surrounding areas, with the exception of the construction of a new, large canal (the California Aqueduct). Canals and ditches that were apparent in the 1946 and 1956 aerial photos no longer appear on the Subject Property.	
1968	Subject Property	The 1968 map shows only the eastern edge of the Subject Property, which shows no change from the 1933 or 1954 maps for that area.	USGS Topo map, 1968 Tupman, California
	Adjacent Properties	The 1968 map shows only the eastern edge of the Subject Property, which shows no change from the 1933 or 1954 maps for the surrounding areas.	
1973	Subject Property	The 1973 map does not show any significant changes in the Subject Property (agricultural fields and undeveloped land).	USGS Topo map, 1973 Tupman, California
	Adjacent Properties	The 1973 map shows new, large buildings in the Farm Operations Area near the landing field. The 1973 map shows no other significant changes from the 1933, 1954, or 1968 maps of the surrounding areas except for the California Aqueduct, located south of the Subject Property.	

Table 3-1
Historic Site Information (Continued)

Date	Location	Finding	Source
1974	Subject Property	The 1974 aerial photos do not show any significant changes in the Subject Property (agricultural fields and undeveloped land).	Aerial Photograph, 1974
	Adjacent Properties	The 1974 aerial photos do not show any significant changes in the surrounding areas (agricultural fields and relatively undeveloped), with the exception of the completed California Aqueduct.	
1984	Subject Property	The 1984 aerial photos do not show any significant changes in the Subject Property (agricultural fields and undeveloped) from the 1974 aerial photos.	Aerial Photograph, 1984
	Adjacent Properties	The 1984 aerial photos do not show any significant changes in the surrounding areas, with the exception of the completed California Aqueduct south of the site.	
1994	Subject Property	The 1994 aerial photos do not show any significant changes in the Subject Property (agricultural fields and undeveloped) from the 1984 aerial photos.	Aerial Photograph, 1994
	Adjacent Properties	The 1994 aerial photos do not show any significant changes in the surrounding areas (agricultural fields and relatively undeveloped land) from the 1984 aerial photos.	
2001	Subject Property	The 2001 City Directory lists 7361 Adohr Road, Buttonwillow, CA 93206 as Port Organic Products Ltd.	City Directory, 2001
	Adjacent Properties	The 2001 City Directory lists 7345 Adohr Road, Buttonwillow, CA 93206 as residential.	
2005	Subject Property	The 2005 aerial photos does not show any significant changes in the Subject Property (agricultural production and undeveloped land) from the 1994 aerial photos.	Aerial Photograph, 2005
	Adjacent Properties	The 2005 aerial photo does not show any significant changes in the surrounding area with the exception of the addition of equipment, containers, and/or debris on the adjacent parcel to the north (Farm Operations Area) southeast of the rice drying barn.	
2006	Subject Property	The 2006 aerial photo does not show any significant changes in the Subject Property.	Aerial Photograph, 2006
		The 2006 aerial photo does not show any significant changes in the surrounding area.	
	Adjacent Properties	The 2006 City Directory lists 7361 Adohr Road, Buttonwillow, CA 93206 as Port Organic Products, Ltd., and Cauzza Brothers.	
2006	Subject Property	The 2006 City Directory lists 7361 Adohr Road, Buttonwillow CA 93206 as Port Organic Products, Ltd., and Cauzza Brothers.	City Directory, 2006
	Adjacent Properties	The 2006 City Directory lists 7345 Adohr Road, Buttonwillow, CA 93206 as residential.	

Source: EDR Report, 2012.

3.1.5 Environmental Lien and Activity Use Limitation Search

URS requested an environmental lien search from EDR, and the results of this search are provided in Appendix C. No environmental liens or Activity Use Limitations were recorded for the Subject Property, according to EDR. According to the Lien Search report the Subject Property is currently owned by HEI LLC.

3.2 PREVIOUS REPORTS

URS reviewed the following previous reports in preparing this Phase I ESA. According to Mr. Dane Peacock with BP, the AECOM Phase II ESA of the Subject Property and adjacent areas is the most recent environmental report that was commissioned by HECA LLC.

- The URS Phase I ESA of the HECA Project Site, dated April 6, 2009 (URS, 2009), describes a portion of the current Subject Property; it was based on a 2009 site visit conducted when the Port Organics plant was in operation north of the current Subject Property. This report concluded that RECs were present. Some of the RECs presented in the 2009 Phase I ESA of the 2009 HECA Project Site are applicable to the current Subject Property and are presented in the conclusion section of this report.

- A sampling report prepared by AECOM in September 2009 for samples collected from the interior and exterior fertilizer tailings piles at the former Port Organics plant is provided in Appendix E (AECOM, 2009). Although the samples were labeled as soil, the report indicates that the samples were collected from the tailings piles themselves. During 2009, the Port Organics interior tailings pile was located north and west of the 2009 HECA Project Site boundary, and the exterior tailings pile was located within the 2009 HECA Project Site boundary. These areas are north of the current Subject Property boundaries. The AECOM report indicates that the fertilizer tailing piles are characterized as "Non-RCRA hazardous waste" based on the analytical results. The term "Non-RCRA hazardous waste" means the waste does not meet the federal (RCRA) definition of hazardous waste, but it meets the more-stringent California definition of hazardous waste, as presented in Title 22 of the California Code of Regulations.

- A URS Phase I ESA of the HECA Project Site, dated August 24, 2010 (URS, 2010), describes a portion of the current Subject Property and areas that are adjacent to the current Subject Property, including the Farm Operations Area and the Ackerman Residence. This Phase I ESA was based on a 2010 site visit conducted when Port Organics was no longer operating in the Farm Operations Area. The report concluded that RECs were present; however, only one was located on the Subject Property: the soil staining adjacent to the airstrip and the drainage ditch. In addition, the Phase I ESA report discussed the unknown USTs and the use of pesticides on agricultural fields. These issues are discussed below and in the 2010 Phase II ESA that followed the Phase I ESA report.

- A December 2010, Phase II ESA conducted by AECOM reported on the results of their September 2010 field investigation on and adjacent to the Subject Property. The field investigation included a geophysical investigation to identify potential buried tanks, and

surface and subsurface soil sampling to evaluate the potential extent of contamination from past activities. The areas investigated by AECOM were based on nine RECs identified in the URS Phase I ESA report, and four additional Areas of Concern (AOCs). No buried tanks were located by the geophysical survey in the areas investigated north of the Subject Property. The survey identified one area of backfilled excavation adjacent to the Barn east of the Ackerman Parcel and a few hundred feet north of the Subject Property boundary. This location was not further investigated by AECOM.

- Soil samples were collected from soil borings at 5-, 10-, and 15-feet bgs. The soil sampling conducted generally did not identify elevated levels of contaminants, with the following exceptions.

  - Borings GP-18 and GP-20 were advanced adjacent to the former wash pad area east of the Ackerman Parcel and west of the South farm storage building in the Farm Operations Area. This location is approximately 250 feet north of the Subject Property boundary (see Photos 8 and 9 in Appendix B). Soil at this location was found to have elevated levels of petroleum hydrocarbons up to 25,000 milligrams per kilogram (mg/kg) of total petroleum hydrocarbons (TPH) in the mineral oil range, exceeding the 1,000 mg/kg screening levels. It appears that the contamination may be in the top 5 feet at this location. In addition, the washwater was historically discharged to a ditch at this location and a sample collected from the sediment at this location had TPH as mineral oil levels up to 93,000 mg/kg.
  - Soil boring GP-10 and sediment sample SS-4 were collected near the stained area adjacent to the southeast end of the crop duster airstrip (see photos 10 to 12 in Appendix B). No petroleum hydrocarbons or volatile organic compounds (VOCs) were detected at this location with the exception of benzene detected in sediment sample SS-4 at a concentration of 2.1 micrograms per kilogram. Low concentrations of several pesticides were detected in sediment sample SS-4, but not in GP-10. Concentrations of potassium, nitrate, sulfate, and phosphate were detected above background in the soil samples collected from boring GP-10 and sediment sample SS-4. In addition, the 5-foot sample collected at GP-10 had a pH of 3.85.
  - In order to evaluate pesticide concentrations in surficial soil, AECOM collected nine sets of 5-point composite samples, including five sets on the Subject Property and four in adjacent parcels. These samples were analyzed for organochlorine pesticides by U.S. EPA Method 8081, and were not analyzed for organophosphorous pesticides or herbicides. Endrin, endosulfan, and dieldrin are present in composite samples SC-1, SC-4, and SC-8 at concentrations that exceed the RWQCB Environmental Screening Levels (ESLs), but did not exceed the California Human Health Screening Levels (CHHSL) or Regional Screening Levels (RSL). SC-1 and SC-4 were located on the Subject Property, and SC-8 on the agricultural fields to the south. These results are consistent with the historical agricultural use. No consistent spatial pattern of pesticides above ESLs was observed.

- AECOM identified and investigated an additional AOC along Adohr Road due to a historical spill from the oil pipeline adjacent to the north side of the road, which was verbally reported by Mr. Sam Ackerman. No evidence of significant contamination was noted, and the historical spill location is approximately 0.5 mile north of the Subject Property
- The AECOM Phase II ESA noted heavy metals concentrations in soil that generally appear to be consistent with naturally occurring heavy metal concentrations in soil.
- Groundwater was not encountered during the Phase II ESA; however, AECOM was not able to advance borings beyond approximately 40 feet bgs. In addition, groundwater was not encountered at depths of up to 101 feet bgs by URS in January 2009.
- The Phase II investigation collected at least one sample at 5 feet bgs from each of the 9 areas identified as RECs in the URS 2010 Phase I ESA. The results from the soil samples collected in the vicinity of the RECs indicate that soil impacts are generally confined to the upper 5 feet. Based on this information, AECOM's investigation concluded that no other significant contamination was detected, in addition to the issues described above. The majority of the investigation covered the Farm Operations Area north of the Subject Property.

4.1 REGULATORY RECORDS

4.1.1 Regulatory Database Search Report

An EDR Radius Map Report was prepared for the Subject Property on March 19, 2012, in accordance with ASTM recommended guidelines, and is included as Appendix D. The EDR report presents the results of a search of federal and state databases, along with a description of each database, that list addresses of sites with known USTs; landfills; hazardous waste generation or TSDFs; and subsurface contamination in the surrounding area.

The goal of reviewing the database report is to identify facilities that have known and documented environmental conditions that may negatively impact the Subject Property.

Table 4-1 summarizes the database information provided by EDR with respect to hazardous substances and wastes on or near the Subject Property. Appendix D includes the complete regulatory database search report, which presents larger search radii because additional coverage was requested from EDR to provide additional information about the Subject Property vicinity. Table 4-1 lists sites within the ASTM search radii from the boundary of the Subject Property identified in the respective databases searched by EDR.

Table 4-1
Federal Databases Searched by EDR

Type of Database	Description of Database/Effective Date	Search Radius	Number of Sites Identified
NPL	NPL of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the U.S. EPA Superfund program.	1.5 mile	0
CORRACTS	RCRA TSDF ordered to implement corrective actions.	1.5 mile	0
CERCLIS	The CERCLIS database identifies hazardous waste sites that require investigation and possible remedial action to mitigate potential negative impacts on human health or the environment.	1 mile	0
FINDS	The Facility Index System (FINDS) database contains both facility information and pointers to other sources that contain more detail.	0.5 mile	1
RCRA TSDFs	Identifies RCRA TSDFs.	1 mile	0
ERNS	U.S. EPA's ERNS list contains reported spill records of oil and hazardous substances.	Target Property	0
RCRA Generators	RCRA regulated hazardous waste generator list; both Large- and Small-Quantity Generators are included in this list.	0.75 mile	0
MINES	Federal database containing all mine identification numbers issued for mines opened since 1971.	0.75 mile	0
DOD	Federal database for Department of Defense sites consisting of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres.	1.5 mile	1
LUST	List of information pertaining to reported LUST investigations.	1 mile	0
UST	State database of active USTs.	0.75 mile	0
AST	State database of registered ASTs.	0.75 mile	1
CA BOND EXP. PLAN	Bond Expenditure Plan – Department of Health Services expenditure plan for appropriation of Hazardous Substance Cleanup Bond Act funds.	1.5 mile	0
HIST UST	Hazardous Substance Storage Container Database – historical listing of UST sites.	0.75 mile	2

Table 4-1
Federal Databases Searched by EDR (Continued)

Type of Database	Description of Database/Effective Date	Search Radius	Number of Sites Identified
SWEEPS UST	Statewide Environmental Evaluation and Planning System – underground storage tank listing updated and maintained by a State Water Resources Control Board contractor in the early 1990s.	0.75 mile	1
SCH	School Property Evaluation Program – proposed and existing school sites evaluated by California Department of Toxic Substances Control (DTSC) for possible hazardous materials contamination.	0.75 mile	0
TOXIC PITS	Toxic Pits Cleanup Act Sites – identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.	1.5 mile	0
SWF/LF	State inventory of solid waste disposal facilities or landfill sites, includes both active and inactive historical landfills.	1 mile	0
WMUDS/ SWAT	Waste Management Unit Database System – used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units.	1 mile	0
CA WDS	Waste Discharge System – addresses sites which have been issued waste discharge requirements.	Target Property	0
CORTESE	Hazardous Waste & Substances Sites List – listed sites are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).	1 mile	0
SWRCY	Recycler Database – listing of recycling facilities in California.	1 mile	0
CA FID UST	Facility Inventory Database – contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board.	0.75 mile	0
SLIC	Statewide SLIC Cases (Spills, Leaks, Investigations and Cleanup) – designed to protect and restore water quality from spills, leaks, and discharges.	1 mile	0
ENVIRO-STOR	EnviroStor Database DTSC's Subject Property Mitigation and Brownfields Reuse Program – database that identifies sites that have known contamination or sites for which there may be reasons to investigate further.	1.5 mile	0
LIENS	Environmental Liens Listing – listing of property locations with environmental liens for California.	Target Property	0
CHMIRS	California Hazardous Material Incident Report System – information on reported hazardous material incidents (accidental releases or spills).	Target Property	0
Notify 65	Proposition 65 Records – facility notifications about releases that could impact drinking water.	1.5 mile	0

Table 4-1
Federal Databases Searched by EDR (Continued)

Type of Database	Description of Database/Effective Date	Search Radius	Number of Sites Identified
DEED	Deed Restriction Listing Subject Property Mitigation and Brownfields Reuse Program – sites cleaned up under the program's oversight.	1 mile	0
VCP	Voluntary Cleanup Program Properties – low threat level properties with confirmed or unconfirmed releases and requested that DTSC oversee investigation and/or cleanup activities.	1 mile	0
DRY CLEANERS	Cleaner Facilities – drycleaner related facilities with U.S. EPA ID numbers.	0.75 mile	0
WIP	Well Investigation Program Case List – cases in the San Gabriel and San Fernando Valley area.	0.75 mile	0
CDL	Clandestine Drug Labs – drug lab locations.	Target Property	0
RESPONSE	State Response Sites – identifies confirmed release sites where DTSC is involved in remediation.	1.5 mile	0
HAZNET	Facility and Manifest Data – data extracted from hazardous waste manifests received by the DTSC.	0.5 mile	0
EMI	Emissions Inventory Data – toxics and criteria pollutant emissions data collected by the Air Review Board and local air pollution agencies.	0.5 mile	2
HAULERS	Registered Waste Tire Haulers Listing – listing of registered waste tire haulers.	0.5 mile	0

Source: EDR Report, 2012.

Each database searched by EDR is referenced in Appendix D. The results of the records review are presented in the EDR report and are summarized below.

Subject Property

No database listings were mapped for the Subject Property by EDR.

Subject Property

No database listings were mapped for the Subject Property by EDR.

Adjacent Property

The EDR report identified the following listings adjacent to the Subject Property; however, it should be noted that database listings may be incorrectly plotted due to the poor address accuracy in the area:

- Two historical (HIST) USTs are listed in the HIST UST database near (vicinity of Adohr Road and Tupman Road), with the listed owner as "Palm Farms." From information

provided in the HIST UST database by EDR, Palm Farms, Inc., was listed as having five tanks, storing diesel fuel in two of the tanks, and unleaded, regular, and premium (each in single tanks) for the purposes of farming. Due to limited address information in the HIST UST database, the location of these historical USTs could not be determined from the database, and the historical aerial photographs showed only crops and roadway in this area. The UST database identified Mr. Sam Ackerman as the contact name for the historical USTs at Palm Farms. Therefore, HECA LLC subsequently contacted Mr. Sam Ackerman on July 18, 2010, and HECA LLC provided the following information to URS: Mr. Ackerman recalled that three USTs were previously located on the portion of the Subject Property that is owned by Mr. John Cauzza III, east of the fenceline between the Ackerman and Cauzza properties. He recalled that in 1984, these three tanks were removed due to the federally mandated upgrade requirements for all USTs. Mr. Ackerman did not know of any records regarding the removal of the USTs. Mr. Ackerman also recalled two USTs near the airstrip, located partially on the northeastern corner of the Subject Property and partially on the adjacent property. Mr. Ackerman did not know if these two tanks had been removed. The suspected locations of these tanks were investigated during the 2010 AECOM Phase II ESA as described in Section 3.2.

- The SWEEPS UST database lists five 5,000-gallon diesel USTs registered to Palm Farms in 1985. This listing is likely to be a duplicate of the historical USTs described above.

- The AST database lists a 31,120-gallon unspecified AST registered to Cauzza John & Laura. No further details on the type, contents, or condition of this AST are provided in the database listing. This listing is likely to be for the diesel AST located in the Farm Operations Area.

Surrounding Properties

In addition to the above listings, the following nearby listings were identified during the database review:

- Three listings on the EMI and FINDS databases for Western Milling and Shanco Commodities at 7361 Adohr Road appear to refer to air permits for particulate matter. These listings were mapped approximately 371 feet south of the Subject Property; however, no permanent structures are apparent in the area. This air emissions listing is not considered to be an environmental concern to the Subject Property.

- The Department of Defense (DOD) list, as provided to EDR, revealed that there is one DOD site located at a higher elevation and within approximately 1 mile southwest of the Subject Property boundary. This site is the Elk Hills Oil Field, which was formerly known as the Naval Petroleum Reserve. No details of the potential nature of contamination are available from the database; however, the site is not cross-listed on contaminated site databases. Based on the lack of known releases, the distance, and the location across the Kern River flood control channel, this site is not likely to pose an environmental threat to the Subject Property.

- A HIST UST listing is identified as Martin Snow Farm (EDR address: "Station Rd, ¼ Mile east of"), located approximately 0.1 mile east of the northeastern corner of the Subject Property. This location is consistent with the location of a small farmhouse located near the intersection of Tupman Road and Station Road. The database lists Martin Snow Farm as having two tanks installed in 1970 that were used to store diesel fuel and unleaded gasoline for the purposes of farming. The site is not listed on UST release databases. Based on the lack of known releases, the distance, and the cross-gradient location, this site is not likely to pose a significant environmental threat to the Subject Property.

Orphan Sites

Due to poor or inadequate address information, EDR is not always able to map all sites that have environmental concerns. These listed, but unmapped, properties are referred to as orphan sites. Although the orphan sites are not mapped, EDR searches the same databases that they do for mapped sites, and provides relevant information if an orphan site is found on one of the databases. EDR identified 57 orphan sites in the database report. URS attempted to locate the orphan sites listed and measure their distance from the Subject Property. Based on partial address information, URS concluded that 51 orphan sites identified by EDR were located outside the ASTM recommended survey radius in reference to the Subject Property. Two addresses were located at unmapped locations on Tupman Road: a Chevron pipeline company listing for hazardous waste shipments, and Weatherford listing for a 3,000-gallon AST. Neither listing is indicative of a release, and no Chevron or Weatherford sites were noted along Tupman Road in the vicinity of the Subject Property during the site visit. The four remaining sites could not be located based on partial information.

4.2 USER-PROVIDED INFORMATION

As part of the ASTM 1527-05 standard, the following additional inquiries were made to HECA LLC representatives as the report "users":

1. Identification of environmental cleanup liens against the subject property;
2. Specialized knowledge or experience regarding the subject property;
3. Relationship of the purchase price to the fair market value if the subject property was not contaminated;
4. Commonly known or reasonably ascertainable information regarding the subject property; and
5. Degree of obviousness of the presence or likely presence of contamination at the subject property.

According to HECA LLC representatives, no environmental issues, environmental cleanup liens, or previous reports exist except for those discussed in this 2010 Phase I ESA of the HECA Controlled Area and Ackerman Property prepared by URS and the 2010 Phase II Investigation Report prepared by AECOM.

5.1 LOCAL GOVERNMENT/REGULATORY AGENCY REPRESENTATIVES

URS contacted the KCEHSD, Hazardous Materials Division, and the KCFD for information regarding the Subject Property. In addition, URS requested files from Cal-EPA and performed searches of the online site databases for the Cal-EPA and RWQCB to identify any files regarding the Subject Property. Information and files obtained during the URS 2009 Phase I ESA of the HECA Project Site are also presented in this section.

5.1.1 Kern County Environmental Health Services Department

URS conducted a file review at the KCEHSD, Hazardous Materials Division, on July 8, 2010. URS contacted the KCEHSD in March 2012 concerning any new information regarding hazardous materials and hazardous waste activity at the Subject Property. No response has been received to date regarding new information available from the KCEHSD. If material information is received by URS, it will be provided in an addendum to this report. The reviewed files confirmed the results of the file review performed as part of the URS 2009 Phase I ESA of the adjacent Farm Operations Area; however, no files or information were available regarding the hazardous materials or hazardous waste at the Subject Property.

The KCEHSD files for the adjacent site to the North (Port Organics) can generally be summarized as follows:

- The Port Organics fertilizer manufacturing operation included the use of hazardous materials, including acids, bases, heavy metals, and petroleum hydrocarbons. Based on an April 12, 2005 inspection, KCEHSD concluded that the operations were generally not in compliance with applicable hazardous materials and hazardous waste regulations. The inspection report included photographs of the facility taken during the inspection. The photographs illustrate the relatively poor chemicals management practices and the fragmented state of the concrete catch basin in the storage area. Subsequently, Notices of Violations (NOVs) were issued to Port Organics.

- Follow-up inspections by California Accidental Release Prevention Program (CalARP) and KCEHSD on January 25, 2007, and KCEHSD on November 12, 2008, resulted in a reduced list of compliance issues.

- February 2006 and February 2008 HMBPs for Port Organics detail the amounts of stored chemicals at the site, which included over 12,000 pounds of aqueous ammonia, over 90,000 pounds of sulfuric acid, over 32,000 pounds of phosphoric acid, over 300,000 pounds of various inorganic salts, 40,000 gallons of liquid fish base, and over 40,000 gallons of liquid organic fertilizer product ("Agrolizer" and "Fishilizer"). A list of 73 notes, prepared by Port Organics, was also on file, detailing the nature and uses of various on-site storage and transfer equipment.

- In March 2008, KCEHSD issued a Consent Order with a proposed settlement fee of $9,238.50 for the just-described compliance issues. The Consent Order was signed by KCEHSD and a Port Organics representative.

The KCEHSD files for "Palm Farms" and "Palm Ranch" appear to be for the Farm Operations Area north of the Subject Property. These files describe the 1989 and 2010 hazardous materials storage at the Farm Operations Area, including the following:

- An August 1989 survey drawing showing four tanks labeled diesel (2×), gasoline, and propane. No indication is given as to whether these tanks were aboveground or belowground. However, the largest diesel tank shown matches the current diesel AST south of the maintenance shop.

- A February 2010 HMBP for the Farm Operations Area, indicating maximum on-site storage of 2 × 500 gallons waste oil, 3 × 1,000 gallons and 1 × 10,000 gallons propane, 2 × 5,000 gallons and 4 × 1,000 gallons diesel, 500 gallons gasoline, 4,800 pounds fungicide Vitavax, and 3,100 pounds red seed dye.

- The KCEHSD also noted that a wastewater drain pipe in the southeastern area of the Farm Operations Area was discharging into a nearby drainage ditch used by other farmers (see Section 6.3.4, below).

Copies of files obtained from the KCEHSD during the URS 2009 and 2010 Phase I ESAs are provided in Appendix G.

5.1.2 Kern County Fire Department

URS contacted the KCFD on June 7, 2010, concerning potential hazardous materials and hazardous waste activity at the Subject Property. In a July 5, 2010, telephone call, KCFD Deputy Fire Marshall Mike Cody stated that KCEHSD was the appropriate place to investigate for the requested information, rather than his department. URS contacted the KCFD in March 2012, concerning any new information regarding hazardous materials and hazardous waste activity at the Subject Property. No response has been received to date regarding new information available from the KCFD. If material information is received by URS, it will be provided in an addendum to this report.

5.1.3 Cal-EPA Department of Toxic Substances Control

On January 29, 2009, URS contacted Mr. Alex Baillie, Hazardous Substance Scientist with the California Department of Toxic Substances Control (DTSC) Statewide Compliance and Oversight Enforcement Branch, who stated that the DTSC did not have information on the Subject Property and was not aware of any hazardous material incident or oil spill reported at the Subject Property. URS contacted the DTSC in March 2012, concerning any new information regarding hazardous materials and hazardous waste activity at the Subject Property. The DTSC responded that there was no new information on the Subject Property.

URS searched the Cal-EPA DTSC EnviroStor database for any records on the Subject Property. There were no records found for the Subject Property when searched by county (Kern), town (Buttonwillow), zip code (93206), or using the names/phrases "Cauzza," "Port Organics Products, LTD," or "Palm Farms, Inc."

5.1.4 Regional Water Quality Control Board

URS contacted the RWQCB concerning any files for the Subject Property. As of the date of this report, no response was received from the agency. URS will provide any information received by the agency in an addendum to this report.

URS searched the RWQCB GeoTracker database for any records on the Subject Property. There were no records found for the Subject Property when searched by county (Kern), town (Buttonwillow), zip code (93206), or using the names/phrases "Cauzza," "Port Organics Products, Ltd," or "Palm Farms, Inc."

5.1.5 U.S. Environmental Protection Agency

URS contacted the U.S. EPA concerning any files for the Subject Property. On March 19, 2012, the U.S. EPA responded that they had no file for the Subject Property.

6.1 METHODOLOGY AND LIMITING CONDITIONS

URS performed a site reconnaissance at the Subject Property on February 8, 2012 and interviewed Mr. John Cauzza III and Mr. Sam Ackerman during the site visit. URS staff were not accompanied during the majority of the site visit. The Subject Property was observed by walking the perimeter and internal areas on established roadways. URS staff did not walk through cultivated fields; however, all portions of the fields were visible from the roadways. Areas inaccessible during the site visit are listed in Section 1.3. Appendix B includes photographs taken during site reconnaissance.

6.2 GENERAL SETTING

The Subject Property is between the intersections of Dairy Road, Adohr Road, and Tupman Road in Kern County, California.

The elevation of the Subject Property is approximately 288 feet above mean sea level. The Subject Property occupies an area of approximately 453 acres. The Subject Property primarily consists of cultivated agricultural land with irrigation ditches. No buildings were noted on the Subject Property during the site reconnaissance.

The properties surrounding the Subject Property include a Farm Operations Area to the north, followed by Adohr Road; to the east Tupman Road; and to the west the Dairy Road right-of-way that forms the western border of the Subject Property. An operating ranch and ranch house are east of the Subject Property across Tupman Road. The West Side and Outlet canals are south of the Subject Property, generally extending from the southeast to northwest. Beyond these is the Kern River Flood Control Channel, which appeared as arid vegetation during the site visit. The California Aqueduct lies to the south of this flood channel. The Aqueduct extends generally from the southeast to northwest and is positioned parallel to and south of the West Side and Outlet canals. The Tule Elk State Reserve is located approximately 0.25 mile east of the Subject Property, east of Tupman Road. The reserve extends generally from the north to the south, with Station Road forming the northern boundary. The reserve's southern boundary is just east of the community of Tupman, California. The locations of several of these features are shown on Figure 2.

The Farm Operations Area north of the Subject Property extends over approximately 30 acres and houses the only structures adjacent to the Subject Property. The former Port Organics fertilizer manufacturing plant (comprising approximately 3.5 acres) is on the eastern side of the Farm Operations Area. The area used for the fertilizer manufacturing plant was leased to Port Organics in the past, and their operations ceased at the beginning of 2009. At the time of this Phase I ESA, no documentation of closure or decommissioning was found in the KCEHSD records; however, all containers and the majority of the tailings piles had been removed from the site prior to the URS 2012 site visit.

6.3 INTERIOR AND EXTERIOR OBSERVATIONS

6.3.1 Structures, Grounds, and Subject Property Access

Access to the Subject Property is via Dairy, Adohr, Station, and Tupman Roads. Numerous dirt roads are established on the Subject Property, traversing and bordering the cultivated fields and irrigation ditches.

There are no structures on the Subject Property.

6.3.2 Water, Utilities, Pipelines

Pacific Gas and Electric Company (PG&E) provides electricity to the areas adjacent to the Subject Property. Overhead electrical lines and pole-mounted transformers serve buildings in the Farm Operations Area, and stand-alone well pumps south of the Subject Property. No overhead lines and pole-mounted transformers were noted on the Subject Property itself; but the EDR report identifies on high-voltage transmission line over the Subject Property.

No public water or sewer service is provided to the Subject Property. According to Mr. John Cauzza III, irrigation water is provided by the Buena Vista Water Storage District. Several wells are located adjacent and in close proximity to the Subject Property and are used to replenish water in the irrigation canals. Three wells plugged with concrete were noted south of the Subject Property. Two domestic water supply wells are currently present on the Farm Operations Area north of the Subject Property, as described in Section 6.3.3, below. According to Mr. John Cauzza III a water line traverses the Subject Property to the east towards an offsite well in the Station Road area. In addition, an unknown 2-inch steel pipe was noted in the embankment for the drainage canal on the northernmost portion of the Subject Property.

An oil pipeline runs north of the Subject Property (originating at the intersection of Adohr and Tupman Roads, and extending to the east from the point of origination. A lone pipeline marker was noted during site visit on the northern side of Adohr Road, east of the landing strip and west of Tupman Road.

6.3.3 Wells

As noted in Section 6.3.2, several wells are located adjacent to the south of the Subject Property and are used for irrigation.

Domestic water wells serve the adjacent parcels to the north.

According to the EDR report, two groundwater wells are located on the Subject Property (in the central portion of the Subject Property), and an additional nine wells are located within 0.5 mile of the property boundary. The two wells mapped in agricultural fields on the Subject Property were not visible during the URS site visit.

The EDR report listed two DOGGR-registered oil and gas wells that are located within a 1-mile radius of the Subject Property. One of these wells is located on the Subject Property, to the south-southeast of the center point of the Subject Property, as shown in Appendix D. EDR reported that the wells on the Subject Property were plugged and abandoned (dry holes).

The former well locations were approached during the site reconnaissance and observed from the nearest roadway to avoid damaging crops. No evidence of these former wells was noted during the 2010 or 2012 site visits.

6.3.4 Wastewater Discharge

No public sewer is provided to the Subject Property. According to Mr. John Cauzza III, no septic tanks and associated leach fields are present on the Subject Property; however, four are present in the adjacent Farm Operations area to the north. In addition, Mr. Ackerman stated that his residence is served by a septic tank and leach field north of the Subject Property.

No wastewater discharges from the Subject Property were noted. Agricultural irrigation runoff is collected in the drainage canal that runs through the center of the Subject Property.

No surface water discharges from the Farm Operations Area adjacent to the north were noted during the URS 2012 site visit, with the exception of agricultural irrigation runoff.

6.3.5 Stormwater Drainage/Discharge

Generally, stormwater generated on site would sheet flow to the nearest irrigation or drainage ditch or to the West, East, or Outlet canals. No stormwater permits are held by Mr. John Cauzza III for the farm operations. Mr. John Cauzza III stated that the Buena Vista Storage Water District holds a discharge permit for the drainage canals, and conducts water testing.

The Subject Property is generally flat and gently slopes to the west, toward the West Side Canal. From observation of the Subject Property, it does not appear that stormwater is generated in concentrated flows.

6.3.6 Drains and Sumps

No drains or sumps were noted on the Subject Property during the site reconnaissance. Irrigation drainage canals are described in Section 6.3.5, and shown on Figure 2.

6.3.7 Solid Waste Disposal

There are no designated waste storage areas established in the Subject Property. Agricultural wastes generated by crop planting and harvesting activities are removed from the areas upon generation. Solid wastes are also generated and stored in the Farm Operations Area adjacent north of the Subject Property. In addition, broken concrete and debris were observed in the irrigation ditches used to prevent scouring and reinforce the ditches.

6.3.8 Process Equipment

No process equipment was present on the Subject Property.

6.3.9 Underground Storage Tanks

As described in the "Subject Property" subsection of Section 4.1.1, the EDR report did not identify any existing or historical USTs associated with the Subject Property; however, the EDR report noted 5 historical USTs reported as owned by Palm Farms on Adohr Road, with no

address specified. Based on conversations with Mr. Sam Ackerman, at least three of these five tanks were on the Farm Operations Area north of the Subject Property, and the other two tanks may have been near the airstrip north of the Subject Property. Mr. Sam Ackerman reported that three of the USTs were removed in the 1980s, and he is not aware if the remaining two tanks were removed or are still present. Mr. Sam Ackerman was not aware of any current or historical USTs on the Subject Property. Mr. John Cauzza III reported that he was not aware of any current or historical USTs on his former portion of the Subject Property. As discussed in Section 3.2 AECOM performed a geophysical survey in 2010 to attempt to locate the potential USTs and could not find them in the areas searched (AECOM, 2010).

During the site reconnaissance, URS did not note any fill or vent pipes suggesting the potential presence of USTs on the Subject Property.

Two unknown large concrete covers were noted west of the south storage building, and Mr. John Cauzza III could not provide any information regarding the nature or former use of these structures. There is a potential that these covers are associated with USTs or septic tanks. According to Mr. Sam Ackerman, they may have been used as part of the equipment maintenance and washing operations that were historically conducted in this area. As discussed in Section 3.2, AECOM advanced a single boring adjacent to these features in 2010 to assess potential impacts from them, and no petroleum hydrocarbons were detected in the soil samples collected (AECOM, 2010).

6.3.10 Aboveground Storage Tanks

No ASTs were noted on the Subject Property.

6.3.11 Other Hazardous Materials/Waste Storage

No hazardous materials or wastes were noted on the Subject Property during the URS 2012 site visit.

6.3.12 Pits, Ponds, and Lagoons

There are no pits, ponds, or lagoons on the Subject Property. Irrigation and drainage canals operated by the Buena Vista Storage Water District are present on and adjacent to the Subject Property.

6.3.13 Stained/Discolored Soil or Pavement

Stained soils were observed at the following location on the Subject Property during the February 2012 site visit:

- In the apparent pesticide loading or washing area on the southeastern end of the crop duster landing strip (Photo 11).

No other stained soils were observed on the Subject Property; however, soil staining was noted on adjacent properties to the south (associated with water pump oil and diesel) and north (associated with operations at the Farm Operations Area, the former crop duster hangar, and water pumps in this area).

6.3.14 Evidence of Fill or Illegal Dumping

No evidence of unauthorized or potentially illegal dumping was observed on the Subject Property during the 2012 site visit.

Mr. John Cauzza III was not aware of any fill that had been brought on site in the past. Mr. Ackerman noted that sandy fill was imported as a foundation for the Ackerman residence north of the Subject Property.

6.3.15 Transformers/PCB Items

Numerous pole-mounted transformers were observed on parcels adjacent to the Subject Property, but none were noted on the Subject Property. No other potential polychlorinated biphenyl (PCB)-containing items were observed on the Subject Property.

6.3.16 Air Emissions

Air emission sources include farm tractors and other mobile farm equipment, and diesel-powered irrigation pumps. No permits exist for this equipment. According to San Joaquin Valley Air Pollution Control District rules, farm tractors and other off-road mobile equipment do not require an air permit. Permits are not required for stationary diesel-powered irrigation pumps that are under 50 horsepower. The air permit status of these small emission sources is not considered a significant environmental issue for the purpose of this Phase I ESA. No significant issues were noted with respect to air emissions at the Subject Property.

6.3.17 Asbestos-Containing Materials

URS did not conduct an asbestos survey at the Subject Property, as explained in Section 1.3; however, during the 2012 site visit, URS did not note building materials on the Subject Property, with the exception of concrete rubble placed in the irrigation ditches.

6.3.18 Lead-Based Paint

No painted surfaces were noted on the Subject Property.

6.3.19 Radon

There are no federal or state standards regulating radon exposure; however, the U.S. EPA recommends a maximum exposure level of 4.0 picocuries per liter (pCi/L). Mr. John Cauzza III and Mr. Ackerman were not aware of any radon testing conducted at the Subject Property. URS did not conduct radon sampling during the Subject Property visit. The Subject Property is located in Kern County within U.S. EPA Radon Zone 2, according to the EDR. Properties located in U.S. EPA Radon Zone 2 have a moderate potential to have radon concentrations greater than 2 but less than 4 pCi/L.

The Subject Property consists of approximately 453 acres of land described in Section 2.1, located west of Tupman Road and south of Adohr Road in unincorporated Kern County near Buttonwillow, California.

In performing this ESA and based on the site reconnaissance, review of available documents, and interviews with Mr. John Cauzza III, Mr. Sam Ackerman, and Mr. Dane Peacock, URS identified the following environmental conditions in connection with this Subject Property:

- EDR reported a record of five USTs in the HIST UST database described as Palm Farms, Inc., including two diesel fuel tanks, an unleaded gasoline tank, a regular gasoline tank, and a premium gasoline tank. The address reported for Palm Farms, Inc., is Adohr Road, mapped by EDR as approximately 0.985 mile north-northeast of the Subject Property, according to the EDR HIST UST list from 1990. Based on a conversation with Mr. Sam Ackerman, at least three of these USTs were located on the Farm Operations Area north of the Subject Property, and were removed in 1984. Mr. Ackerman reported that two USTs may be on the adjacent crop duster hangar area, and might not have been removed. These potential UST areas were investigated in 2010, and the USTs could not be located, as discussed in Section 3.2.
- Although the former property owner, Mr. John Cauzza III, reported that he was not aware of any USTs being historically located at the Subject Property, a pipe that may be a UST fill or vent pipe was reported by URS in the 2009 and 2010 Phase I ESAs in the Farm Operations Area north of the Subject Property (as discussed in Section 6.3.9). In addition, two unknown large concrete covers were noted west of the south storage building. Mr. John Cauzza III was aware of these underground structures, but he does not know their nature or details on their former use. Both of these areas were investigated in 2010 and no evidence of releases was found as discussed in Section 3.2.
- Stained soils were observed adjacent to the crop duster landing strip during the Subject Property visit, as detailed in Section 6.3.13. The soil staining is likely to derive from handling of fuels, lubricating oils, and/or pesticides. This area was investigated in 2010 and no significant contamination was found; however, the extent of subsurface impacts does not appear to be defined vertically or horizontally.
- A portion of the Subject Property has been used for agriculture, and agricultural chemicals such as pesticides and herbicides were applied to crops over time. URS noted no specific evidence of stains or storage related to agricultural chemicals, with the exceptions noted in the stained soils above. Surface soils in five areas on the Subject Property were sampled in 2010 to evaluate concentrations of pesticides. The organochlorine pesticides dieldrin, endrin, and endosulfan were detected above industrial screening levels (RWQCB ESLs) in selected samples, but did not exceed other state or federal screening levels (CHHSLs or RSLs). The pesticide results are discussed in more detail in Section 3.2.
- The EDR database search identified one former oil and gas well on the Subject Property that was reported as abandoned in the 1950s. URS visited the reported location of the well during the June 2010 and February 2012 site visits and found no evidence of the well. The history and abandoned status of these wells is documented by DOGGR.

URS did not encounter significant data gaps in performing this ESA, with the exception of the following:

- Time intervals greater than 5 years between historical maps and resources; however, based on the nature of the site use as agricultural fields and the site history available from sources dating back to 1912, this data gap does not appear to be significant.

- Selected environmental agencies have not provided updates on their files regarding the Subject Property at the time this report was prepared. Since the agency files were last reviewed in 2010, it is unlikely that significant new information is available; however, an addendum to this report will be issued if significant information is received from these agencies.

URS has performed an ESA of the Subject Property described in Section 1, located on Adohr Road in unincorporated Kern County, California. Our work was conducted in conformance with the scope and limitations of ASTM Practice E 1527-05. Any exceptions to, or deletions from, this practice are described in Section 1.3, Limitations and Exceptions. This ESA identified the following RECs:

- The 2010 Phase II investigation identified elevated concentrations of petroleum hydrocarbons and other contaminants on the former equipment wash area immediately north of the Subject Property boundary. Because the vertical and horizontal extent of contamination were not defined by the Phase II ESA, and this wash area discharged into a ditch south of the Farm Operations Area boundary, the contamination is considered a potential offsite REC to the Subject Property.
- Stained soils were observed during the Subject Property visit, as detailed in Section 6.3.13. The soil staining is likely to derive from handling of fuels, lubricating oils, and/or pesticides. The AECOM 2010 Phase II ESA sampled in the vicinity of the stained soil and identified selected contaminants; however the extent of any subsurface impacts is not defined.

In addition to the above RECs the following potential environmental issues were noted: in the opinion of URS, they are not considered RECs:

- Surficial samples collected from the agricultural fields on the Subject Property identified levels of pesticides dieldrin, endrin, and endosulfan at concentrations that exceed the RWQCB ESLs, but did not exceed the state CHHSL or federal RSLs. These results are consistent with the historical agricultural use, and no consistent spatial pattern of pesticides above ESLs was observed
- An agency database lists five former USTs located at Palm Farms, Inc., on Adohr Road. Because the Subject Property is also located on Adohr Road, and the property was purchased from Palm Farms, Inc., the USTs may have historically been located on or adjacent to the Subject Property. The 2010 AECOM Phase II ESA investigated selected potential locations for these USTs and identified no USTs and no contamination associated with USTs.

AECOM, 2009. *Results of Soil Sampling Activities Proposed Subject Property near the Intersection of Dairy Road and Adohr Road, Buttonwillow, California*, September 9.

AECOM, 2010. *Phase II Environmental Site Assessment Report, Proposed Hydrogen Energy California Project Site, Adohr and Dairy Roads, Kern County, California*, December.

American Society for Testing Materials (ASTM). 2005. Standard Practice for Environmental Subject Property Assessments: Phase I Environmental Subject Property Assessment Process: Designation E 1527-05.

Cal-EPA GeoTracker database. http://www.geotracker.waterboards.ca.gov/. Searched on March 16, 2012.

Environmental Data Resources, Inc. (EDR), 2012. *Radius Map with GeoCheck®: Inquiry Number: 3251004.1s*, EDR, Inc., Milford, Connecticut. March 19.

Environmental Data Resources, Inc. (EDR), 2010. *Historic Topographic Map Report: Report Number 2755337.44.* EDR, Inc., Milford, Connecticut. May 6.

Environmental Data Resources, Inc. (EDR), 2010. *Sanborn Map Report: Report Number 2755383.3s.* EDR, Inc., Milford, Connecticut. April 27.

Environmental Data Resources, Inc. (EDR), 2012. *Aerial Photograph Decade Package: Report Number* 3293634.1. EDR, Inc., Milford, CT. April 4.

Environmental Data Resources, Inc. (EDR). 2010. *City Directory Abstract: Report Number 2785218.6.* EDR, Inc., Milford, Connecticut. June 4.

Environmental Data Resources, Inc. (EDR), 2012. *Lien Search: Inquiry Number: 3251004.2S.* EDR, Inc., Milford, Connecticut. February 24.

Cal/EPA Envirostor database. http://www.envirostor.dtsc.ca.gov/. Accessed on March 16, 2012.

URS, 2009. *Phase I Environmental Site Assessment, HECA Project Site, Kern County, California*, April 6.

URS, 2010. *Phase I Environmental Site Assessment, HECA Project Site, Kern County, California*, August 24.

10.1 CORPORATE

URS, a Nevada Corporation, provides professional services in engineering and sciences applied to the earth and its environment. One of the main areas of practice is Environmental Property Investigation and Remediation, which involves the application of science and engineering to contamination assessment and cleanup; the management, minimization, treatment, and disposal of hazardous, solid and industrial waste; and regulatory compliance. Phase I ESAs are a part of this practice area and have been conducted by URS globally for several decades.

10.2 INDIVIDUAL

The qualifications of the Project Manager and of the other Environmental Professionals involved in this ESA meet the URS corporate requirements for performing ESAs.

Mr. Giorgio Molinario and Mr. Zenis Walley of the URS San Francisco office performed the site reconnaissance, and Mr. Molinario authored the Phase I ESA report.

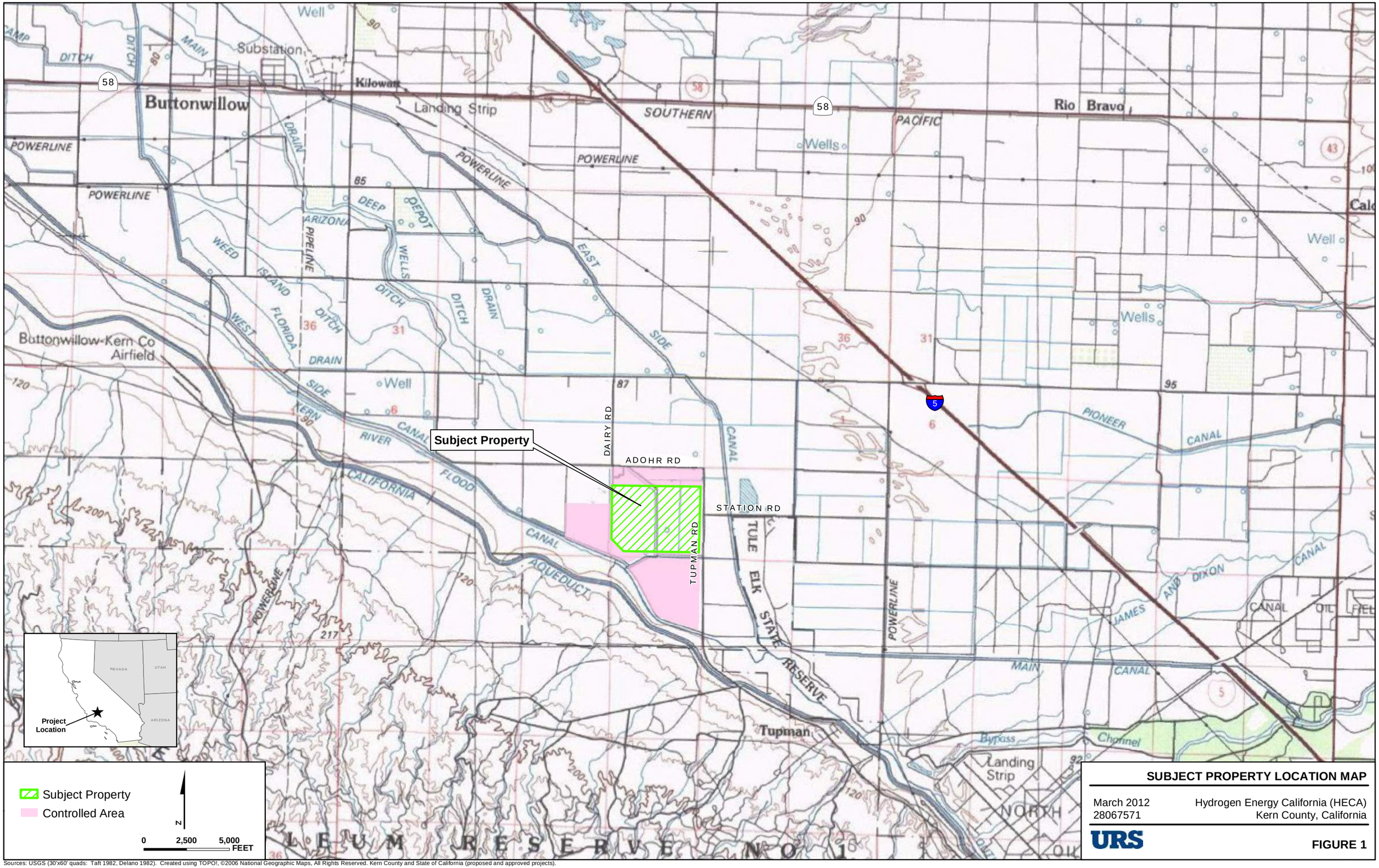
Mr. Molinario is an Environmental Chemist with more than 16 years of environmental compliance and due diligence experience. He has conducted a number of Phase I ESAs in California, the U.S., and internationally. His curriculum vitae is presented in Appendix A.

Mr. Walley is an experienced environmental compliance specialist with significant experience in Phase I ESAs at power generation facilities.

Ms. Cindy Fischer of the URS Denver office performed the internal technical review of this ESA. Ms. Fischer has over 20 years of relevant environmental professional experience.

April 27, 2012

Giorgio Molinario, REA 07436



SUBJECT PROPERTY LOCATION MAP

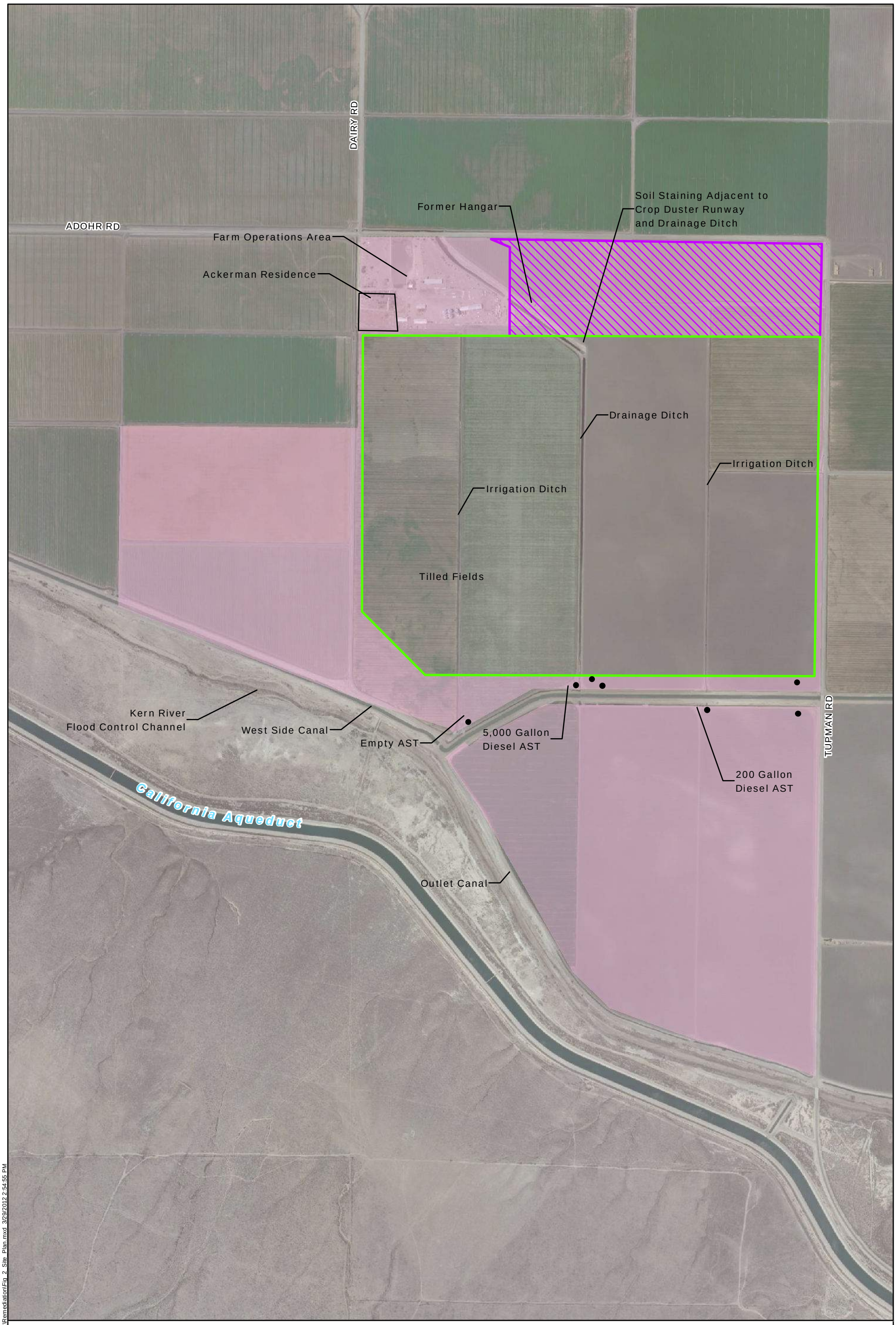
March 2012
28067571

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 1

Sources: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).



SITE PLAN

March 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 2

U:\GIS\HECA\Projects\HECA_2012\Remediation\Fig_2_Site_Plan.mxd 3/29/2012 2:54:55 PM

Source: Aerial Photo, Digital Globe, 2008.

Appendix F – HECA Phase II Environmental Site Assessment

AECOM Environment

Prepared for:
Hydrogen Energy California LLC
Long Beach, California

Prepared by:
AECOM
Camarillo, California
60163371
December 2010

Phase II Environmental Site Assessment Report

Proposed Hydrogen Energy California Project Site, Adohr and Dairy Roads, Kern County, California

Privileged & Confidential – Attorney Work Product/Attorney-Client Communication

AECOM Environment

Prepared for:
Hydrogen Energy California LLC
Long Beach, California

Prepared by:
AECOM
Camarillo, California
60163371
December 2010

Phase II Environmental Site Assessment Report

Proposed Hydrogen Energy California Project Site, Adohr and Dairy Roads, Kern County, California

Privileged & Confidential – Attorney Work Product/Attorney-Client Communication

This report was prepared consistent with currently and generally accepted environmental consulting principles and practices. The material and data in this report were prepared under the supervision and direction of the undersigned.

Jim Fickerson, REA
Program Manager

Sally Bilodeau, PG, 3580
Senior Program Manager

PROFESSIONAL GEOLOGIST
SALLY W. BILODEAU
No. 3580
Expires: 5/31/11
STATE OF CALIFORNIA

for Harry Van Den Berg, PE
Senior Program Manager

Contents

1.0 Introduction 1-1

2.0 Site Background 2-1

2.1 Site Description 2-1
2.2 Site History 2-1
2.3 Previous Environmental Site Assessments 2-1

3.0 Pre-Field Activities 3-1

3.1 Health and Safety Plan 3-1
3.2 Permits 3-1
3.3 Utility Clearance 3-1
3.4 Geophysical Survey 3-1

4.0 Field Assessment Methodology 4-1

4.1 Soil Borings 4-1
4.2 Surface Samples 4-1
4.3 Sediment Sampling 4-1
4.4 Composite Soil Sampling 4-2
4.5 Groundwater Sampling 4-2
4.6 Sample Location Survey 4-2
4.7 Equipment Decontamination 4-2
4.8 Boring Abandonment 4-2
4.9 Laboratory Analyses 4-2

5.0 Results of Assessment 5-1

5.1 Site Geology 5-1
5.2 Groundwater 5-1
5.3 Field Observations 5-1
5.4 Geophysical Survey 5-1
5.5 Analytical Results 5-1
5.5.1 REC 1 – Five Former USTs 5-2
5.5.2 REC 2 – Vent Pipe/Suspect UST 5-2
5.5.3 REC 3 - Two Large Concrete Covers 5-2

5.5.4 REC 4 – Port Organics 5-2
5.5.5 REC 5 – Port Organics East Sump 5-3
5.5.6 REC 6 – Farm Equipment Wash Pad 5-3
5.5.7 REC 7 – Outdoor Tailings Pile 5-3
5.5.8 REC 8 – Indoor Tailings Pile 5-3
5.5.9 REC 9 – Stained Surface Soils 5-4
5.5.10 AOC 1 – Historical Pipeline Release 5-4
5.5.11 AOC 2 – Airport Hangar Soil Staining 5-4
5.5.12 AOC 3 – Suspect UST, Chemical Storage Pad, and Surface Staining 5-5
5.5.13 AOC 4 – Historical Pesticide and Herbicide Use 5-5
5.6 Quality Assurance/Quality Control 5-5

6.0 Conclusions 6-1

7.0 Recommendations 7-1

8.0 Limitations 8-1

9.0 References 9-1

Appendices

Appendix A Geophysical Survey Report

Appendix B Borings Logs GP-1 through GP-21

Appendix C Certified Laboratory Reports & Chain-of-Custody Documentation

List of Figures

Figure 1 Site Location Map
Figure 2 Site Plan
Figure 3 Geophysical Survey Map
Figure 4 Sampling Map A
Figure 5 Sampling Map B

List of Tables

Table 1 Sampling Plan
Table 2 Summary of Analytical Results – Exceedances Only
Table 3 Summary of Detected Analytes – VOCs & TPH in Soil
Table 4 Summary of Detected Analytes – pH, Potassium, Anions, OPPS and OCPs in Soil
Table 5 Summary of Detected Analytes – Metals in Soil

List of Abbreviations

°C	degrees Celsius
AOC	Area of Concern
bgs	below ground surface
BLI	BC Laboratories, Inc.
CHHSL	California Human Health Screening Level
CO_2	carbon dioxide
COC	chain-of-custody
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	Environmental Screening Level
GPS	Global Positioning System
HASP	Health and Safety Plan
HECA	Hydrogen Energy California LLC
JSA	Job Safety Analyses
mg/kg	milligrams per kilogram
MW	megawatt
OCP	organo-chlorine pesticide
OPP	organophosphorus pesticides
petcoke	petroleum coke
PID	photoionization detector
ppm	parts per million
RCRA	Resource Conservation & Recovery Act
REC	recognized environmental condition
RPD	relative percent difference
RSL	Regional Screening Level
TPH	total petroleum hydrocarbons
USA	Underground Service Alert
UST	underground storage tank
VOC	volatile organic compound

1.0 Introduction

This report documents the results of a Phase II Environmental Site Assessment (ESA) that was recently conducted by AECOM, on behalf of Hydrogen Energy California LLC (HECA), at the proposed project site located southwest of Buttonwillow, Kern County, California. The proposed project will gasify petroleum coke (petcoke) (or blends of petcoke and coal, as needed) to produce hydrogen to fuel a combustion turbine operating in combined cycle mode. The Gasification Block feeds a 390-gross-megawatt (MW) combined cycle plant. The net electrical generation output from the Project will provide California with approximately 250 MW of low carbon baseload power to the grid. The Gasification Block will also capture approximately 90 percent of the carbon from the raw syngas at steady-state operation, which will be transported to the Elk Hills Field for carbon dioxide (CO_2) Enhanced Oil Recovery, resulting in sequestration of the injected CO_2. In addition, approximately 100 MW of natural gas generated peaking power will be available from the proposed project.

This Phase II ESA was conducted to evaluate recognized environmental conditions (RECs) that were identified in April 2009 and August 2010 by URS during their Phase I ESAs of the proposed project site. RECs that were identified by URS included potential former underground storage tanks (USTs), unknown concrete structures, a farm equipment wash pad, a former fertilizing manufacturing facility (Port Organics Products Ltd.), outdoor and indoor tailings piles of raw materials used by Port Organics in the fertilizer manufacturing process, and a number of locations with stained surface soil.

The following sections summarize the site background, pre-field activities, field assessment methodology, laboratory analytical program, results of the assessment, conclusions, and recommendations of this Phase II ESA.

2.0 Site Background

2.1 Site Description

The proposed project site consists of approximately 1,100 acres of agricultural land that is generally located west of Tupman Road and Station Road, southwest of the intersection of Adohr and Tupman Roads, Kern County, California. Tule Elk State Park is located approximately ¼ mile east of the proposed project site and Interstate 5 is located approximately 2.5 miles east of the proposed project site. The approximate location of the proposed project site is illustrated on Figure 1.

The proposed project site currently consists of a residence, an active farming operations area (equipment storage and maintenance), a former fertilizer manufacturing plant, a crop duster airstrip, agricultural fields, and other nominal site features. The residence, farming operations area, and former fertilizer manufacturing plant occupy approximate 45 acres that are located in the northwest corner of the proposed project site. The remaining portions of the proposed project site are occupied by alfalfa and/or cotton fields, access roads, and irrigation ditches/canals. The general locations of the main site features are illustrated on Figure 2.

2.2 Site History

Historical research conducted by URS indicates that the proposed project site was developed for residential and agricultural uses in the 1940s. Farming operations appear to have been concentrated around the northern portion of the proposed project site which was developed with several equipment storage and maintenance buildings. In the 1950s a crop duster landing strip was constructed to the east of the farming operations area. By the early 1970s the proposed project site was developed into its current configuration.

Occupants of the proposed project site have included a residence located at 7345 Adohr Road, Palm Farms, Inc. (also identified as Palm Ranch) and Port Organic located at 7361 Adohr Road. From at least the late 1980s, Palm Farms manufactured fertilizer on site. Sometime in the 2000s Port Organics took over operation of the fertilizer manufacturing operations. According to URS, hazardous materials utilized by Port Organics included acids, bases, heavy metals, petroleum hydrocarbons, and organic fertilizer product including “Agrolizer” and “Fishilizer.” The materials were stored at various locations throughout the farming operations area, including in a former tank farm and associated concrete sumps that were located to the east of the Port Organics storage building.

2.3 Previous Environmental Site Assessments

In April 2009 and August 2010 URS conducted Phase I ESAs of the proposed project site. The Phase I ESAs identified six RECs. Several of these RECs consist of multiple environmental concerns that are located in different locations of the proposed project site. For purposes of clarity, AECOM has subdivided three of these RECs into their own individual RECs. A summary of the revised RECs as identified by URS is provided on the following page.

1. A review of a site-specific environmental database report indicates that five USTs were formerly located at the proposed project site. These USTs include two diesel fuel tanks, an unleaded gasoline tank, a regular gasoline tank, and a premium gasoline tank. At least three of these USTs were removed in 1984. The Phase I ESAs indicated that it is uncertain whether the other two USTs were actually located on the site and whether they may or may not have been removed.

2. A pipe that may be a UST fill or vent pipe was observed south of the large grain bins.

3. Two unknown large concrete covers were observed to the west of the south storage building. The site contact was aware of these structures, but does not know their nature or details on their former use.

4. Port Organics, a former fertilizer manufacturing plant, is located in the northwest portion of the farm operations area (see Figure 2). Manufacturing at this site included the use of hazardous materials and operation of a tank farm and associated concrete sumps. Unknown liquids are currently stored outdoors in drums and containers, and soil staining is present in the former Port Organics manufacturing area.

5. According to URS (as documented in the Phase I ESA) the east sump of the Port Organics facility previously discharged approximately 500 to 750 gallons per day of liquids to the drainage ditch located east of the Port Organics facility through an underground 2-inch flex line in 2009.

6. A farm equipment wash pad abuts the southeast side of the former horse stables building. The concrete, soil, and sediment in the adjacent irrigation ditch were observed to be visually stained.

7. One outdoor uncontained tailings pile, consisting of remnants of fishmeal and bird guano (raw materials used in the fertilizer manufacturing process), was found to the east of the former Port Organics aboveground tank farm. This pile was sampled in 2009 and was characterized as non-Resource Conservation & Recovery Act (RCRA) hazardous waste.

8. One indoor tailings pile, consisting of remnants of fishmeal and bird guano was observed inside the former Port Organics storage building. Like the outdoor tailings pile, this pile was also sampled in 2009 and was characterized as non-RCRA hazardous waste.

9. Stained soils were observed during the site visit in the farming operations area and agricultural production areas. The extent of any subsurface impacts from the staining was unknown.

In addition to addressing the RECs identified by URS, this Phase II ESA evaluated the following additional potential environmental concerns based on AECOM's conversation with Mr. Paul Ackerman on September 22, 2010, and AECOM's experience evaluating similar agricultural sites:

- According to Mr. Ackerman, a Chevron (former Unocal) pipeline runs along the north side of Adohr Road directly across the street from the proposed project site. Mr. Ackerman reported that in the past (exact date unknown) a section of pipeline near the intersection of Adohr and Dairy Roads ruptured, releasing crude oil onto Adohr Road and the immediate surrounding property including the northern edge of the proposed project site. Mr. Ackerman stated that

Unocal quickly repaired the pipeline and removed the impacted soil. This potential environmental concern is referred herein within this report as Area of Concern (AOC)-1.

- According to Mr. Ackerman, a UST was located adjacent to the former airplane hangar that abuts the crop duster air strip. Mr. Ackerman was not aware if the UST was still present on site. This potential environmental concern is referred herein within this report as AOC-2.
- According to Mr. Ackerman, a UST may have been located at the northeast end of the on-site crop duster airstrip, near the former chemical storage pad. Mr. Ackerman was not aware if the UST was still present on site. This potential environmental concern is referred herein within this report as AOC-3.
- It is has been AECOM's experience that residual concentrations of organo-chlorine pesticides (OCPs) are commonly present in the shallow soil of commercial agricultural sites throughout California. This potential environmental concern is referred herein within this report as AOC-4.

3.0 Pre-Field Activities

3.1 Health and Safety Plan

AECOM prepared a site-specific Health and Safety Plan (HASP) prior to the onset of field activities to address potential physical and chemical hazards associated with the work at the proposed project site and evaluate other health and safety considerations. Additionally, Job Safety Analyses (JSAs) were prepared to mitigate specifically identified hazards encountered within the scope of work. The HASP and JSAs were reviewed and approved by AECOM Health and Safety Management prior to commencement of field activities, and on a daily basis. Site assessment activities conducted by AECOM and subcontractors were performed in accordance and in compliance with the HASP and JSAs.

3.2 Permits

According to Kern County Environmental Health Department guidance, permits are not required for installation of soil borings.

3.3 Utility Clearance

On September 16, 2010, AECOM contacted Underground Service Alert (USA) of Northern California to notify them of the planned subsurface assessment as required by State law. USA issued ticket numbers 0279029, 0279041, and 0279044 for the planned Phase II ESA of the proposed project site.

3.4 Geophysical Survey

On September 23, 2010, AECOM oversaw a geophysical and utility clearance survey conducted by Subsurface Surveys of Carlsbad, California. Subsurface Surveys used ground-penetrating radar and a roller-mounted magnetometer to minimize the likelihood that utilities or other subsurface obstructions were present in the vicinity of the proposed boring locations. In addition, Subsurface Surveys evaluated the five suspect UST areas as well as the two unknown concrete structures.

No subsurface utilities or other subsurface obstructions were identified in the vicinity of the proposed borings. No USTs or other underground anomaly were identified in the vicinity of the presumed UST locations. In addition, no underground structures or potential anomalies were identified in the vicinity of the two unknown concrete structures. The approximate locations of the areas surveyed for suspect USTs and the two unknown concrete structures are illustrated on Figure 3. A copy of the geophysical survey report is included as Appendix A.

4.0 Field Assessment Methodology

The field assessment consisted of collection of 70 soil samples from 21 borings, 4 sediment samples, 3 surface soil sample, and 9 soil composite samples for laboratory analyses. The following sections describe the methods that were used to collect the samples.

4.1 Soil Borings

From September 21 through 23, 2010, AECOM advanced 21 soil borings (GP-1 through GP-21) at the proposed project site using a truck-mounted, hydraulically operated Geoprobe® sampling system operated by BC2 of Orange, California. The AOC that each boring was designed to evaluate, the targeted sampling depth of each boring, and analytical methodology used to analyze the soil samples is summarized in Table 1. The approximate locations of the borings are illustrated on Figure 4 and Figure 5.

Borings GP-1 through GP-21 were advanced to depths ranging between 4 and 25 feet below ground surface (bgs) depending on the area of concern being evaluated. The soil samples that were planned for volatile organic compound (VOC) analysis were preserved in the field in accordance with U.S. Environmental Protection Agency (EPA) Method 5035. This sample preservation method involves placing approximately 5 grams of soil in laboratory-supplied VOA vials containing sodium bi-sulfate or methanol as preservatives. In addition, soil samples were also placed in unpreserved laboratory-supplied jars for additional laboratory analysis.

The collected soil samples were then sealed, labeled, recorded on a chain-of-custody (COC) form, and placed in an ice chest chilled to approximately 4 degrees Celsius (ºC) pending delivery to BC Laboratories, Inc. (BLI) in Bakersfield, California. BLI is a certified hazardous waste testing laboratory under California certification number 1186.

Additional soil from each sample was collected and subsequently screened with a photoionization detector (PID) and observed for visual and olfactory evidence of contamination.

4.2 Surface Samples

AECOM used a manually operated hand auger to collect surface samples SS-1, SS-6, and SS-7 from areas of visually stained surface soil located within the former Port Organics tank farm. Each surface soil sample was collected using a stainless steel trowel. The collected surface samples were preserved in accordance with EPA Method 5035 (as described in Section 4.1), placed in laboratory-supplied VOAs and glass jars, sealed, labeled, recorded on a COC form, and placed in an ice chest chilled to approximately 4ºC pending delivery to BLI. The approximate locations of the surface samples are illustrated on Figure 4.

4.3 Sediment Sampling

AECOM utilized a pole-mounted sampling device to collect sediment samples SS-2 through SS-5 from several irrigation ditches that are located throughout the proposed project site. The collected surface samples were placed in laboratory supplied VOAs and glass jars, sealed, labeled, recorded

on a COC form, and placed in an ice chest chilled to approximately 4ºC pending delivery to BLI. The approximate locations of the sediment samples are illustrated on Figures 4 and 5.

4.4 Composite Soil Sampling

AECOM utilized a stainless steel hand trowel to collect 45 soil samples from nine representative areas (SC-1 through SC-9) located throughout the agricultural fields that comprise the proposed project site. Each square-shaped area measured approximately one acre. Five soil samples (A through E) were collected from each square-shaped area (four samples were collected near the corners and one sample from the middle) and placed in laboratory-supplied glass jars. The collected soil samples were then sealed, labeled, recorded on a COC form, and placed in an ice chest chilled to approximately 4ºC pending delivery to BLI for preparing the area composite samples and subsequent analysis. The approximate locations of the composite samples are illustrated on Figure 4.

4.5 Groundwater Sampling

AECOM planned to advance borings GP-1, GP-3, and GP-7 to a depth of 40 feet bgs in an attempt to collect groundwater hydropunch samples. However, drilling refusal was encountered in borings GP-1 and GP-3 at a depth of approximately 25 feet bgs. The success of advancing boring GP-7 to 40 feet bgs was considered low. Therefore, an attempt to advance boring GP-7 to a depth of 40 feet bgs was not made.

4.6 Sample Location Survey

With the exception of the soil samples collected from boring GP-14 which was advanced inside a building, each soil sample location was recorded using a Trimble GeoXT sub meter-level Global Positioning System (GPS) unit. Field GPS data was post processed in the office to differentially correct for common satellite and atmospheric errors. The predicted horizontal precision of the post-processed data ranged between 0.4 and 0.7 meters (between 1.3 and 2.3 feet). The sample locations are plotted in Figures 4 and 5.

4.7 Equipment Decontamination

Equipment that came into contact with, or that was used to collect the soil samples, was cleaned with distilled water and Alconox™ detergent, followed by two rinses of tap and distilled water to prevent cross contamination.

4.8 Boring Abandonment

Following the completion of the soil sampling activities, the soil borings were backfilled with hydrated bentonite chips and capped with native soil or concrete to match the surrounding surface.

4.9 Laboratory Analyses

A total of 70 soil samples including 3 surface, 9 composite, and 4 sediment samples were selected for laboratory analysis. Depending on the environmental concern being evaluated the samples were analyzed for one or more of the following parameters:

- VOCs by EPA Method 8260;
- Organophosphorus pesticides (OPPs) by EPA Method 8141;
- OCPs by EPA Method 8081;

- The full carbon range of total petroleum hydrocarbons (TPH) by EPA Method 8015 modified;
- One or more of the Title 22 metals by EPA Method 6010/7000 series;
- pH;
- Phosphorus by EPA Method 365.4;
- Sulfate and Nitrogen by EPA Method 300; and
- Potassium by EPA Method 200.7.

The samples were analyzed on an expedited 48-hour laboratory turnaround-time basis.

5.0 Results of Assessment

5.1 Site Geology

In general, soils encountered from depths of between 0 and 5 feet bgs during the subsurface assessment consisted primarily of fine-grained material (i.e. clay, silt, sandy silt, and occasional silty sand). Soils encountered from 5 feet bgs to a total depth explored of 25 feet bgs consisted primarily of light gray to reddish brown, fine to medium-grained sand with occasional silt and silt/clay mixtures. Soil from ground surface to 25 feet bgs was primarily dry with the exception of soil borings GP-8 and GP-9 advanced in the former Port Organics concrete-lined sumps, which were moist to wet at a depth of approximately 4 feet bgs. Logs of borings GP-1 through GP-21 are included as Appendix B.

5.2 Groundwater

AECOM attempted to advance to borings (GP-1 and GP-3) to a depth of 40 feet bgs to collect a hydropunch groundwater sample. As described in Section 4.5, drilling refusal was encountered at a depth of 25 feet bgs in both borings. In January 2009 URS conducted a geotechnical field exploration of the proposed project site. This drilling program involved the advancement of 13 borings throughout the proposed project site at depths ranging from between 60 and 101.5 feet bgs. Groundwater was not encountered in the 13 borings advanced by URS in January 2009.

5.3 Field Observations

An ammonia-like odor was observed in the soil samples collected from the outdoor tailings pile and the concrete-lined sumps located within the former aboveground tank farm. A petroleum hydrocarbon odor and dark stained soil were observed in the soil samples collected from beneath the equipment washing area. With the exception of the soil sample collected from boring GP-8 at a depth of 4 feet bgs (138 parts per million (ppm) by volume), no significant PID readings were measured (above 50 pm) during this assessment.

5.4 Geophysical Survey

No subsurface utilities or other subsurface obstructions were identified in the vicinity of the proposed borings. No USTs or other underground anomalies were identified in the vicinity of the presumed UST locations. In addition, no underground structures or anomalies were identified in the vicinity of the two unknown concrete structures.

5.5 Analytical Results

The analytical result of the soil and sediment samples collected during the Phase II ESA are summarized in Tables 2 through 5. Table 2 summarizes the analytical results that exceed one or more of the following regulatory guidance values:

- California Human Health Screening Levels (CHHSLs) for industrial properties dated January 2005;
- EPA Region 9 Regional Screening Levels (RSLs) for industrial soil dated May 2010; and

- San Francisco Regional Water Quality Control Board Environmental Screening Levels (ESLs) for commercial/industrial property dated May 2008.

Table 3, 4, and 5 also compares the analytical results against regulatory guidance values, but provides a more comprehensive summary of the results that exceeded a laboratory detection limit. Table 3 provides a summary of the VOC and TPH analytical results; Table 4 provides a summary of the pH, potassium, anion, OPP, and OCP analytical results; and Table 5 presents a summary of metal analytical results. The following sections provide a discussion of the analytical results by the area of concern being evaluated. Copies of the certified laboratory analytical reports and COC documentation are included in Appendix C.

5.5.1 REC 1 – Five Former USTs

Borings GP-1 through GP-4 were advanced to evaluate the presumed locations of the three former USTs that were removed and the two USTs that may or may not have been removed. VOCs or TPH were not detected above the laboratory detection limit in the 12 soil samples collected from these two areas. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from borings GP-3 and GP-4. With the exception of total arsenic, none of the metals detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.2 REC 2 – Vent Pipe/Suspect UST

Boring GP-6 was advanced adjacent to the suspect vent pipe located to the south of the former grain storage silo. No VOCs, TPH, OCPs, or OPPs were detected in the three soil samples collected from boring GP-6. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-6. With the exception of total arsenic, none of the total metals detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.3 REC 3 – Two Large Concrete Covers

Boring GP-5 was advanced adjacent to the two large concrete covers that were observed to the west of the south farm storage building. No VOCs, TPH, OCPs, or OPPS were detected in the three soil samples collected from boring GP-5. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-5. With the exception of total arsenic, none of the total metals detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.4 REC 4 – Port Organics

Soil samples from borings GP-8, GP-9, GP-10, and GP-19 and surface samples SS-1, SS-5, and SS-6 were collected in the former Port Organics tank farm to evaluate the historical tank farm operations. No OPPs were detected in the 11 soil samples collected from the former tank farm. Low concentrations of VOCs, OCPs, and TPH were detected in one or more of the soil samples collected from the former tank farm. Low to moderate concentrations of potassium, nitrate, sulfate, and phosphate were detected in the soil samples collected from the former tank farm. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from the former tank farm. pH in the soil samples collected ranged from 3.85 (GP-10-5) to 7.87 to (GP-8-4). With the exception of total

arsenic and the OCP endosulfane (detected in the duplicate soil samples), none of the compounds detected in the historical tank farm area exceeded the CHHSLs, RSLs, or ESLs.

5.5.5 REC 5 – Port Organics East Sump

Sediment sample SS-3 was collected adjacent to an underground 2-inch flex line that was observed to be protruding from a drainage ditch located to the east of the Port Organics tank farm. TPH, OCPs, and OPPs were not detected in the sediment sample SS-3. Low to moderate concentrations of VOCs, potassium, nitrate, sulfate, and phosphate were detected in the sediment sample SS-3. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, vanadium, and zinc were detected sediment sample SS-3. With the exception of total arsenic, none of the compounds detected in the former tank farm exceeded the CHHSLs, RSLs, or ESLs.

5.5.6 REC 6 – Farm Equipment Wash Pad

Borings GP-18 and GP-20 and sediment sample SS-2 were collected adjacent to the farm equipment wash pad. Low concentrations of VOCs and low to elevated concentrations of TPH in the mineral oil range were detected in the six soil samples collected from borings GP-18 and GP-20 as well as sediment sample SS-2. In addition, low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, vanadium, and zinc were detected in sediment sample SS-2. However, no OCPs or OPPs were detected in the six soil samples collected from borings GP-18 and GP-20 as well as sediment sample SS-2. With the exception of TPH in the mineral range and total arsenic, none of the compounds detected in the soil and sediment samples collected near the farm equipment wash pad exceeded the CHHSLs, RSLs, or ESLs.

5.5.7 REC 7 – Outdoor Tailings Pile

Borings GP-11, GP-12, and GP-13 were advanced adjacent to the outdoor tailings pile to evaluate the lateral extent of the pile. Low concentrations of VOCs were detected in the seven soil samples collected from borings GP-11, GP-12, and GP-13. No TPH, OCPs, or OPPS were detected in the soil samples collected from borings GP-11, GP-12, and GP-13. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from borings GP-11, GP-12, and GP-13. With the exception of total arsenic, none of the compounds detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.8 REC 8 – Indoor Tailings Pile

Boring GP-14 was advanced inside the former Port Organics storage building to evaluate if the tailings pile has impacted the underlying subsurface. Low concentrations of VOCs were detected in the two soil samples collected from boring GP-14. No TPH, OCPs, or OPPs were detected in the soil samples collected from boring GP-14. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-14. With the exception of total arsenic, none of the total metals detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.9 REC 9 – Stained Surface Soils

Borings GP-15 and GP-16 and sediment sample SS-7 were collected to evaluate visually stained soil that was observed in several areas of the proposed project site. Boring GP-15 was advanced near the northwest end of the crop duster airstrip to evaluate visually stained soil that was observed in this location as well as to evaluate potential pesticides/herbicides releases associated with the crop dusters. Boring GP-16 and sediment sample SS-7 were advanced in the southeast corner of the proposed project site to evaluate an area of stained yellowish soil and to assess if the stained soil had impacted the adjacent irrigation canal.

No VOCs or TPH were detected in the two soil samples collected from boring GP-15. Low concentrations of several OCPs and total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-15. With the exception of total arsenic, none of the compounds detected exceeded the CHHSLs, RSLs, or ESLs.

No VOCs were detected in the soil samples collected from boring GP-16 and sediment sample SS-7 TPH was not detected in the two soil samples collected from boring GP-16; however low concentrations of TPH in the mineral oil range were detected in sediment sample SS-7. Several OCPs were detected in one or more of the soil samples collected from boring GP-16 and sediment sample SS-7. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-16 and sediment sample SS-7. Low to moderate concentrations of potassium, nitrate, sulfate, and phosphate were detected in the sediment sample SS-7. With the exception of total arsenic, none of the compounds detected in boring GP-16 and sediment sample SS-7 exceeded the CHHSLs, RSLs, or ESLs.

5.5.10 AOC 1 – Historical Pipeline Release

Boring GP-21 was advanced on the south side of Adohr Road to evaluate a historical petroleum pipeline release as reported by Mr. Ackerman. No VOCs or TPH were detected in the two soil samples collected from boring GP-21. A low concentration of the OCP Dichlorodiphenyltrichloroethane was detected in one of the soil samples collected from boring GP-21. This concentration was well below the CHHSLs, RSLs, and ESLs.

5.5.11 AOC 2 – Airport Hangar Soil Staining

Boring GP-17 was advanced adjacent to the former airplane hangar that abuts the crop duster air strip to evaluate stained soil that was present in this location. Low concentrations of VOCs and elevated concentrations of TPH in the mineral oil range were detected in the two soil samples collected from boring GP-17. The OPP tokuthion and the OCPs endrin, Dichlorodiphenyldichloroethane, Dichlorodiphenyldichloroethylene, and Dichlorodiphenyltrichloroethane were detected in one or more of the soil samples collected from boring GP-17. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-17. With the exception of total arsenic, the OCP endrin, and TPH in the mineral oil range, none of the compounds detected exceeded the CHHSLs, RSLs, or ESLs.

5.5.12 AOC 3 – Suspect UST, Chemical Storage Pad, and Surface Staining

Boring GP-10 and sediment sample SS-4 were collected at the south end the crop duster airstrip adjacent to the former chemical storage pad. This boring and sediment sample location was selected to evaluate stained soil and the potential presence of a suspect UST as reported by Mr. Ackerman. No VOCs were detected in the three soil samples collected from boring GP-10. However, the VOC benzene was detected in sediment sample SS-4 at a concentration of 0.0021 milligrams per kilogram (mg/kg). TPH and OPPs were not detected in the soil samples collected from boring GP-10 and sediment sample SS-4. Low concentrations of several OCPs were detected in sediment sample SS-4, but no OCPs were detected in the soil samples collected from boring GP-10. Low to moderate concentrations of potassium, nitrate, sulfate, and phosphate were detected in the soil samples collected from boring GP-10 and sediment sample SS-4. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-10 and sediment sample SS-4. With the exception of total arsenic, none of the compounds detected exceeded the CHHSLs, RSLs, and ESLs.

5.5.13 AOC 4 – Historical Pesticide and Herbicide Use

OPPs were not detected in the composite samples SC-1 through SC-9. However, low concentrations of OCPs were detected in the composite samples SC-1 through SC-9. Of the compounds detected, the concentration of dieldrin in SC-1, SC-5, and SC-9 and the concentrations of endrin in SC-2, SC-5, SC-7, and SC-9 exceeded the ESLs, but not the RSL or CHHSLs. Low concentrations of total arsenic, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, selenium, vanadium, and zinc were detected in one or more of the soil samples collected from boring GP-16 and sediment sample SS-7. With the exception of total arsenic, none of the metals detected exceeded the CHHSLs, RSLs, or ESLs.

5.6 Quality Assurance/Quality Control

To demonstrate that quality data has been collected during the field program, field and laboratory quality control samples were analyzed and their data used in support of the primary data. Field quality control samples that were collected for this project consisted of the following:

1. Six field duplicate samples were used to determine relative percent difference (RPD) between duplicates,

2. Sample equipment was decontaminated and equipment blanks were collected to demonstrate its effectiveness, and

3. Trip blank controls were sent with each shipment to evaluate potential cross contamination of VOCs.

Laboratory quality controls included:

1. Method blank samples,

2. Lab control spikes and duplicates, and

3. Matrix spikes and duplicates.

Data for all quality control samples was included with laboratory data packages. Field duplicate RPDs were within criteria for 80 out of 104 analytes for which a valid comparison (measured value in both samples that is greater than 2 times the practical quantitation limit) could be determined. The 24 samples which exceeded criteria are attributed to detections that are close to practical quantitation limits and the variability of the soil at this location. No analytes were detected in trip blank samples. Chloroform was detected in an equipment blank sample, but was not detected in any primary sample. All laboratory quality controls were within laboratory and method-specified criteria.

Overall, based on the analysis of quality control samples collected at the proposed project site, the data are of sufficient quality to be used in the due diligence evaluation of this site.

6.0 Conclusions

Based on the results of this Phase II ESA, AECOM provides the following conclusions:

- REC-1 – The geophysical survey did not reveal the presence of USTs in the areas where they had presumably been located based on anecdotal information. This indicates that the USTs have either been removed or were located elsewhere. The analytical results of the soil samples collected from borings GP-1 and GP-2 appear to indicate that the three former USTs have not impacted the proposed project site. In addition, the analytical results of the soil samples collected from borings GP-3 and GP-4 appear to indicate the UST suspected to be present to the west of the horse stable has not impacted the proposed project site.
- REC 2 – A reconnaissance by AECOM of the area around the suspect vent pipe appears to indicate that this suspect vent pipe is more likely a water-related pipe rather than a fuel-related vent pipe. Equipment in the immediate vicinity of the water pipe is labeled as a "vaporizer" and appears to be related to a former propane above ground storage tank that appears to have been located in this area. Based on this information, AECOM concludes that this suspect vent pipe is not related to a potential UST or other environmental concern. However, to be conservative and rule out this potential environmental concern, AECOM advanced boring GP-6 and collected three soil samples from this location for laboratory analysis. The analytical results from these soil samples further demonstrate that REC-2 no longer presents a significant environmental concern to the proposed project site.
- REC 3 –The analytical results of the soil samples collected from borings GP-5 indicate that the soil in the vicinity of the two unknown large concrete covers is not impacted. This information combined with the geophysical survey which did not identify a subsurface anomaly, allow AECOM to conclude that REC-3 no longer presents a significant environmental concern to the proposed project site.
- REC 4 – The analytical results of soil samples collected from the former Port Organics tank farm appears to indicate that soil in this area has not been significantly impacted by the historical fertilizer plant operations. Based on this information, AECOM concludes that REC-4 no longer presents a significant environmental concern to the proposed project site.
- REC 5 – The analytical results of sediment sample SS-4 indicate that the former discharge to the 2-inch flex line that is protruding from a drainage ditch located to the east of the Port Organics tank farm has not significantly impacted the sediment in this location. Based on this information, AECOM concludes that REC-5 no longer presents a significant environmental concern to the proposed project site.
- REC 6 – The analytical results from the soil samples collected from borings GP-18 and GP-20 and sediment sample SS-2 indicate current and historical washing of farm equipment in this location has impacted the shallow soil and sediment with petroleum hydrocarbons at concentrations that exceed the ESLs. The vertical extent of this impact appears to be limited to the upper 5 feet; however the lateral extent of this contamination has not been defined. Based on this information, AECOM concludes that the former farm equipment wash pad continues to present a potentially significant environmental concern to the proposed project site.

- REC 7 – The analytical results from the soil samples collected from borings GP-11 through GP-13 appear to indicate that the potential contaminants associated with the outdoor tailing pile are confined to the immediate area of the pile. No additional lateral characterization of the soil beneath the tailing pile appears to be required.
- REC 8 – The analytical results from the soil samples collected from boring GP-14 appear to indicate that the potential contaminants associated with the indoor tailing pile are largely confined to the immediate area of the pile and have not impacted the shallow soil beneath the concrete floor. No additional characterization of the soil beneath the tailing pile appears to be required.
- REC 9 – The analytical results from the soil samples collected from boring GP-15 and GP-16 and sediment sample SS-7 appear to indicate that the stained soil that is present near the northwest end of the crop duster runway, the potential historical pesticides/herbicides releases (if any) that may have occurred at the end of the airstrip, and the yellow stained soil that is present in the southeast corner of the site do not present a significant environmental concern to the proposed project site.
- AOC 1 – The analytical results from the soil samples collected from boring GP-21 appear to indicate that the historic petroleum pipeline rupture was successfully remediated and has not significantly impacted the proposed project site. Based on this information, AECOM concludes that AOC-1 no longer presents a significant environmental concern to the proposed project site.
- AOC 2 – A UST was not identified during the geophysical survey of the area surrounding the former airplane hangar. However, elevated concentrations of endrin and TPH in the mineral oil range were detected in the 0.5 foot soil samples collected from boring GP-17 at concentrations that exceed regulatory guidance values. The soil in this area was visually stained. Additional lateral and vertical subsurface soil sampling will likely be required to characterize the TPH and endrin impacts in this area.
- AOC 3 – The results of the geophysical survey and analytical results of the soil samples collected from boring GP-10 indicate that the soil in this area has not been significantly impacted by a suspect UST (if any) or former chemical storage. In addition, the analytical results of sediment sample SS-4 collected from the adjacent irrigation cannel indicate that the surface staining that is visible in this area has not significantly impacted the nearby sediment. Based on these results, the surface staining in this location appears to be localized and does not appear to present a significant environmental concern to the proposed project site.
- AOC-4 – The OCPs endrin, endosulfan, and dieldrin are present in composite samples SC-1, SC-4, and SC-8 at concentrations that exceed the ESLs, but did not exceed the CHHSL or RSL. These results are consistent with the historical use of the proposed project site as an active agricultural operation. No consistent spatial pattern of OCPs above ESLs was observed and therefore no areas of the proposed project site are anticipated to have any greater risk associated with exposure to these constituents. The low frequency (less than 10 percent) and relatively low concentrations at which these three OCPs were detected in site soils indicate that they do not represent a significant environmental risk and a more rigorous risk analysis is not warranted.

- Total arsenic was detected throughout the proposed project site at concentrations ranging from 1.6 to 35 mg/kg. These concentrations exceed the CHHSLs for arsenic of 0.24 mg/kg, and exceed and/or equal the RSLs of 1.6 mg/kg. However, a mean concentration and variability (9.2 ± 6.9 mg/kg) was observed throughout the proposed project site which are consistent with regional background arsenic levels (Bradford et al. 1996), rather than the result of historical on-site agricultural operations. It is therefore AECOM's opinion that the concentrations of arsenic detected at the proposed project site are representative of regional background concentrations, and therefore do not present a significant environmental concern to the proposed project site.
- Data collected during this assessment indicate that pesticides in surface soil and sediment are at sufficiently low concentrations that they are unlikely to pose a risk to aquatic biota from surface runoff.
- Groundwater was not encountered during this assessment. In addition, groundwater was not encountered at depths of up to 101 feet bgs by URS in January 2009. The analytical results of soil samples collected in the vicinity of the RECs and AOCs indicate that soil impacts are generally confined to the upper 5 feet. Based on this information, AECOM's concludes that groundwater beneath the proposed project site is unlikely to have been impacted by historical agricultural operations.

7.0 Recommendations

Based on the results of this Phase II ESA, AECOM provides the following conclusions:

- No additional assessment is recommended to address RECs 1, 2, 3, 4, 5, 7, 8, and 9 as well as AOCs 1, 3, and 4.
- The lateral and vertical extent of the TPH-impacted soil and sediment associated with REC-6 (farm equipment wash pad) should be defined.
- The lateral and vertical extent of the TPH-impacted soil associated with AOC-2 (airplane hangar) should be defined.
- The indoor and outdoor tailing piles (RECs 7 and 8) should be removed and transported to a permitted disposal facility prior to site redevelopment.
- The stained surface soil that is present in the vicinity of RECs 9 (two areas), REC-10, AOC-2, and AOC-3 should be removed and transported to a permitted facility for disposal prior to site redevelopment.
- The tailing pile removal and impacted soil removal should be conducted under environmental oversight to ensure that these activities are properly documented.

8.0 Limitations

This Phase II ESA report has been prepared for the proposed HECA project site located near the intersection of Dairy and Adohr Roads, Kern County, California. In performing our professional services, we have applied present engineering and scientific judgment and used a level of effort consistent with the standard of practice measured on the date the work was performed in the locale of the project site for similar type studies. AECOM makes no warranty, express or implied. AECOM is not responsible for potential inaccuracies in data reported by others.

The analyses and interpretations in this report have been developed solely based on the field observations and the results from laboratory analyses in the soil and material samples collected at the proposed project site. It should be recognized that on any limited subsurface or material assessment, site conditions can vary laterally and with depth below a given site and that potential contaminant sources can go undetected.

9.0 References

The following references were consulted in the preparation of this report:

Ackerman, Paul. Personal communication between Paul Ackerman, property owner, and Jim Fickerson, AECOM, on September 22, 2010.

Background Concentrations of Trace and Major Elements in California Soils, Kearney Foundation of Soil Sciences, Division of Agriculture and Natural Resources University of California, Bradford, March 1996.

California Human Health Screening Levels for industrial properties dated January 2005.

EPA Region 9 Regional Screening Levels for industrial soil dated May 2010/; and

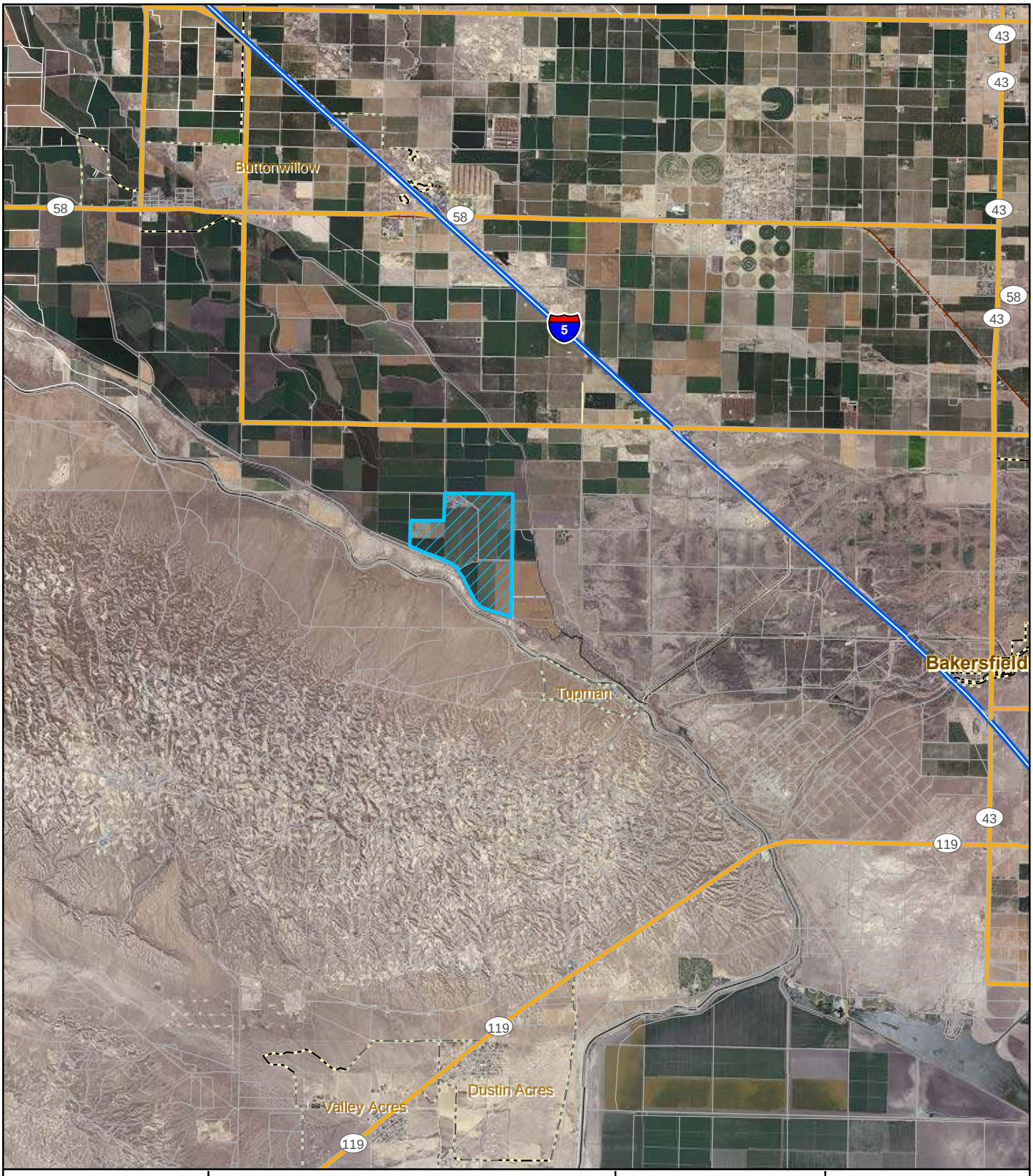
Phase I Environmental Site Assessment, HECA Project Site, Kern County, California, April 6, 2009.

Phase I Environmental Site Assessment, HECA Project Site, Kern County, California, August 24, 2010.

Report Preliminary Geotechnical Investigation Proposed Hydrogen Energy California Project Kern County, California, prepared by URS, dated April 14, 2009.

San Francisco Regional Water Quality Control Board (RWQCB) Environmental Screening Levels for commercial/industrial property dated May 2008.

Figures



Map Location

Legend

Proposed HECA Project Site

1 in = 2 miles

0 2 4 Miles

N W E S

Hydrogen Energy California

Figure 1
Site Location Map

AECOM

Project: 60163371
Date: October 2010

J:\Client-Projects\HECA\Button_Willow_CA\Graphics\GIS\Site_Location_Map-smlayout.mxd

FIGURE NUMBER:	SHEET NUMBER:
2	X

SITE PLAN

Hydrogen Energy California
Adohr Road and Dairy Road
Kern County, California

SCALE:	DATE:	PROJECT NUMBER:
X	10/1/2010	60163371

AECOM

AECOM ENVIRONMENT
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.AECOM.COM

DESIGNED BY:	REVISIONS:			
S. Bilodeau	NO:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
M. Scop				
CHECKED BY:				
J. Fickerson				
APPROVED BY:				
H. Vandenberg				

Dairy Ro

Adohr Road

HECA Entrance - Adohr Road

Cellular tower & equipment building

Debris pile

Farm Operations Area

Domestic well - pressure tank, former storage tank

Dilapidated house

Dilapidated house

Trailer home

Farm maintenance & storage

30,000 gallon diesel AST

Hazmat storage trailer

Residence

Domestic well

Fertilizer pile - inside building

Former Port Organics storage building

North farm storage - seed barn equipment

Chicken coop

Former hangar

Former Port Organics tank farm

Concrete covers

Stable

Diesel AST

South farm storage

Drums & 275-gallon totes

Tailings pile

Equipment washing area

Waste bin

Scrap pile

Soil staining

CROP DUSTER AIRSTRIP

N

1:2,400

200 100 0 200 Feet

Legend

Approximate Location of Areas Surveyed for Suspect USTs and Unknown Concrete Structures on September 21, 2010

REVISIONS:			
NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	S. Bilodeau
DRAWN BY:	M. Scop
CHECKED BY:	J. Fickerson
APPROVED BY:	H. Vandenberg

AECOM

AECOM ENVIRONMENT
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.AECOM.COM

GEOPHYSICAL SURVEY MAP

Hydrogen Energy California
Adohr Road and Dairy Road
Kern County, California

SCALE:	DATE:	PROJECT NUMBER:
X	10/1/2010	60163371

FIGURE NUMBER:

3

SHEET NUMBER:

X

Dairy Road

Adohr Road

IIECA Entrance - Adohr Road

Cellular tower & equipment building

Debris pile

Farm Operations Area

CROP DUSTER AIRSTRIP

Domestic well, pressure tank, former storage tank

Dilapidated house

Dilapidated house

Dilapidated house

Trailer home

Farm maintenance & storage

30,000 gallon diesel AST

Hazmat storage trailer

Residence

Domestic well

Fertilizer pile - inside building

Former Port Organics storage building

North farm storage - seed barn equipment

Chicken coop

Former Port Organics tank farm

Former hangar

Concrete covers

Stable

South farm storage

Diesel AST

Tailings pile

Drums & 275-gallon totes

Equipment washing area

Waste bin

Scrap pile

Soil staining

GP-1 GP-2 GP-3 GP-4 GP-5 GP-6 GP-7 GP-8 GP-9 GP-10 GP-11 GP-12 GP-13 GP-14 GP-15 GP-17 GP-18 GP-19 GP-20 GP-21

SS-1 SS-2 SS-3 SS-4 SS-5 SS-6

N

1:3,000

250 125 0 250 Feet

Legend

Geoprobe boring locations advanced by AECOM September 2010

Soil or sediment sample location collected by AECOM September 2010

REVISIONS:			
NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	S. Bilodeau
DRAWN BY:	M. Scop
CHECKED BY:	J. Fickerson
APPROVED BY:	H. Vandenberg

AECOM

AECOM ENVIRONMENT
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.AECOM.COM

SAMPLING MAP A

Hydrogen Energy California
Adohr Road and Dairy Road
Kern County, California

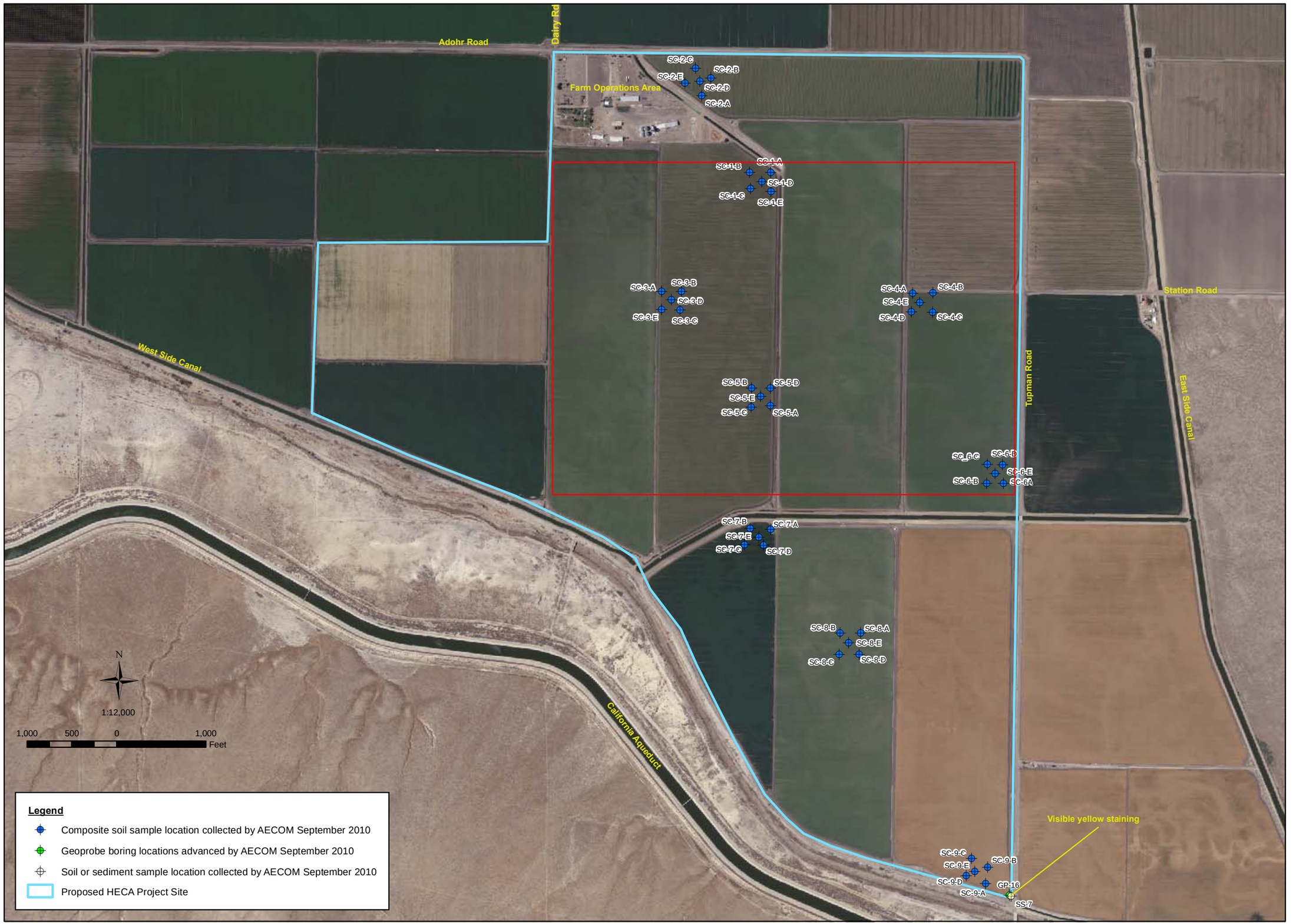
SCALE:	DATE:	PROJECT NUMBER:
X	10/1/2010	60163371

FIGURE NUMBER:

4

SHEET NUMBER:

X



REVISIONS:			
NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
S. Bilodeau	M. Scop	J. Fickerson	H. Vandenberg

AECOM

AECOM ENVIRONMENT
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.AECOM.COM

SAMPLING MAP B

Hydrogen Energy California
Adohr Road and Dairy Road
Kern County, California

SCALE:	DATE:	PROJECT NUMBER:
X	10/1/2010	60163371

FIGURE NUMBER:

5

SHEET NUMBER:

X

Tables

Table 1
Sampling Plan
Proposed Hydrogen Energy California Site
Kern County, California

REC	Area of Focus	Sample Location	Boring Number	Media	Sample Number	Sample Depth (feet bgs)	Analytical Methodology									
							VOC (8260B)	OPPs 8141	OCPs 8081	TPH-FF (8015M)	Lead (6010)	Title 22 Metals (6010)	pH	Phosphorous (365.4)	Sulfate and Nitrogen (300)	Potassium (200.7)
1	Three former USTs	West of the North Farm Storage Building	GP-1	Soil	GP-1-5	5	NA	Analyze	Analyze	NA	NA	NA	NA	NA	NA	NA
					GP-1-10	10	Analyze	NA	NA	Analyze	Analyze	NA	NA	NA	NA	NA
					GP-1-15	15	Analyze	NA	NA	Analyze	Analyze	NA	NA	NA	NA	NA
1	Three former USTs	West of the North Farm Storage Building	GP-2	Soil	GP-2-5	5	NA	Analyze	Analyze	NA	NA	NA	NA	NA	NA	NA
					GP-2-10	10	Analyze	NA	NA	Analyze	Analyze	NA	NA	NA	NA	NA
					GP-2-15	15	Analyze	NA	NA	Analyze	Analyze	NA	NA	NA	NA	NA
1	Suspect UST	West of the Horse Stable	GP-3	Soil	GP-3-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-3-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-3-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
1	Suspect UST	West of the Horse Stable	GP-4	Soil	GP-4-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-4-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-4-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
3	Suspect underground structure with concrete cover	West of Farm Storage Building	GP-5	Soil	GP-5-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-5-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-5-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
2	Fill Pipe by Grain Bin Suspect UST	South of Grain Storage Bins	GP-6	Soil	GP-6-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-6-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-6-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
4	Port Organics	Tank Farm	GP-7	Soil	GP-7-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					Dup-1	5	Analyze	Analyze	Analyze	Analyze		Analyze	NA	NA	NA	NA
					GP-7-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-7-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
4	Port Organics	Tank Farm	GP-8	Soil	GP-8-4	4	Analyze	Analyze	Analyze	Analyze	NA	Analyze	Analyze	Analyze	Analyze	Analyze
4	Port Organics	Tank Farm	GP-9	Soil	GP-9-4	4	Analyze	Analyze	Analyze	Analyze	NA	Analyze	Analyze	Analyze	Analyze	Analyze
4	Port Organics stained soil	Tank Farm	Surface	Soil	SS-1	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
				Soil	Dup-2	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
3	Farm Equipment Wash Pad	Drainage ditch that abuts the southern portion of the wash pad	Sediment	Sediment	SS-2	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
5	Port Organics Tank Farm	Irrigation Ditch located to the Northeast of the Tank Farm	Sediment	Sediment	SS-3	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
8	Chemical Storage Area, Suspect UST, and stained surface soil	Southeast end of Airstrip	GP-10	Soil	GP-10-5	5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	Analyze	Analyze	Analyze	Analyze
					GP-10-10	10	Analyze	Analyze	Analyze	Analyze	NA	Analyze	Analyze	Analyze	Analyze	Analyze
					GP-10-15	15	Analyze	Analyze	Analyze	Analyze	NA	Analyze	Analyze	Analyze	Analyze	Analyze
8	Stained surface soil near irrigation ditch	Southeast end of Airstrip	NA	Sediment	SS-4	NA	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
7	Outdoor Tailing Pile	East of Tank Farm	GP-11	Soil	GP-11-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					Dup-3	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-11-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
7	Outdoor Tailing Pile	East of Tank Farm	GP-12	Soil	GP-12-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-12-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
7	Outdoor Tailing Pile	East of Tank Farm	GP-13	Soil	GP-13-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-13-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
8	Indoor Tailing Pile	Inside Port Organics Storage Building	GP-14	Soil	GP-14-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-14-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
5	Tank Farm	Tank Farm	Surface	Soil	SS-5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
5	Tank Farm	Tank Farm	Surface	Soil	SS-6	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
9	Stained Surface Soil - Suspect Pesticide Release Area	North end of Airstrip	GP-15	Soil	GP-15-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-15-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
9	Stained Surface Soil	Southeast corner of the proposed project site	GP-16	Soil	GP-16-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-16-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
9	Former Airplane Hanger Stained Surface Soil - Suspect UST	South side of former airplane hanger	GP-17	Soil	GP-17-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-17-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA

Table 1
Sampling Plan
Proposed Hydrogen Energy California Site
Kern County, California

REC	Area of Focus	Sample Location	Boring Number	Media	Sample Number	Sample Depth (feet bgs)	Analytical Methodology									
							VOC (8260B)	OPPs 8141	OCPs 8081	TPH-FF (8015M)	Lead (6010)	Title 22 Metals (6010)	pH	Phosphorous (365.4)	Sulfate and Nitrogen (300)	Potassium (200.7)
6	Farm Equipment Wash Area	Southeast Horse Stables	GP-18	Soil	GP-18-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-18-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					Dup-4	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
4	Former Tank Farm	Tank Farm	GP-19	Soil	GP-18-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					Dup-5		Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
6	Farm Equipment Wash Area	Southeast of Horse Stables	GP-20	Soil	GP-18-0.5	0.5	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
					GP-18-2	2	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	NA	NA	NA
AOC-1	Historic Pipeline Release	~ 200 feet E of intersection of Adohr and Dairy Rds	GP-21	Soil	GP-21-0.5	0.5	Analyze	NA	NA	Analyze	NA	NA	NA	NA	NA	NA
					GP-21-2	2	Analyze	NA	NA	Analyze	NA	NA	NA	NA	NA	NA
					GP-21-5	5	Analyze	NA	NA	Analyze	NA	NA	NA	NA	NA	NA
9	Stained surface soil	SE corner of the proposed project site.	Sediment	Sediment	SS-7	NA	Analyze	Analyze	Analyze	Analyze	NA	Analyze	NA	Analyze	Analyze	Analyze
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-1A	0.5	NA	NA	Composite A-E & Analyze	NA	NA	Composite A-E & Analyze	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-2A	0.5	NA		Composite B-E & Analyze	NA	NA	Analyze A & Composite for Arsenic	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	Dup-6	0.5	NA	NA	Composite A-E & Analyze	NA	NA	Composite A-E & Analyze	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-3A	0.5	NA	NA	Composite A-E & Analyze	NA	NA	Composite A-E & Analyze	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-4A	0.5	NA	NA	Composite B-E & Analyze	NA	NA	Analyze A for Arsenic	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-5A	0.5	NA	NA	Composite A-E & Analyze	NA	NA	Composite A-E & Analyze	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-6A	0.5	NA	NA	Composite B-E & Analyze	NA	NA	Analyze A for Arsenic	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-7A	0.5	NA		Composite B-E & Analyze	NA	NA	Analyze A for Arsenic	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-8A	0.5	NA	NA	Composite B-E & Analyze	NA	NA	Analyze A for Arsenic	NA	NA	NA	NA
AOC-4	Historical Pesticide Applications	Agricultural Fields	NA	Soil composite	SC-9A	0.5	NA	NA	Composite B-E & Analyze	NA	NA	Analyze A for Arsenic	NA	NA	NA	NA

Notes:

REC: Recognized environmental condition.

AOC - Area of concern.

NA - Not applicable/not analyzed.

bgs - Below ground surface.

VOCs - Volatile organic compounds.

OPPs - Organophosphorus pesticides

OCPs - Organo-chlorine pesticides.

TPH-FF: The full carbon range of total petroleum hydrocarbons.

Table 2
Summary of Analytical Results - Exceedences Only
Proposed Hydrogen Energy California Site
Kern County, California

Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	TPH 8015 FF			Organochlorine Pesticides 8081			Metals 6010
				TPH-Diesel	TPH-Motor Oil	TPH-Mineral Oil	Dieldrin	Endo-sulfan II	Endrin	As
GP-3	GP-3-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	**5.1**
	GP-3-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	**4**
	GP-3-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	**2.9**
GP-4	GP-4-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	**12**
	GP-4-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	**2.3**
	GP-4-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	**5.1**
GP-5	GP-5-5	5	9/23/2010	ND	ND	ND	ND	ND	ND	**29**
	GP-5-10	10	9/23/2010	ND	ND	ND	ND	ND	ND	**7**
	GP-5-15	15	9/23/2010	ND	ND	ND	ND	ND	ND	**1.6**
GP-6	GP-6-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	**3**
	GP-6-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	**9.6**
	GP-6-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	**4.4**
GP-7	GP-7-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	**8.6**
	Dup-1	5	9/22/2010	ND	ND	ND	ND	ND	ND	**22**
	GP-7-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	**13**
	GP-7-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	**25**
GP-8	GP-8-4	4	9/22/2010	ND	ND	**22**	ND	ND	ND	**6.5**
GP-9	GP-9-4	4	9/22/2010	ND	ND	**68**	ND	ND	ND	**4.9**
GP-10	GP-10-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	**4.3**
	GP-10-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	**15**
	GP-10-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	**8.2**
GP-11	GP-11-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	**16**
	Dup-3	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	**8**
	GP-11-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	**19**
GP-12	GP-12-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	**6.7**
	GP-12-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	**6.4**
GP-13	GP-13-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	**11**
	GP-13-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	**6.30**
GP-14	GP-14-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	**7.3**
	GP-14-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	**5.4**
GP-15	GP-15-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	**35**
	GP-15-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	**21**
GP-16	GP-16-0.5	0.5	9/23/2010	ND	ND	ND	**0.0014**	ND	**0.00031**	**7.7**
	GP-16-2	2	9/23/2010	ND	ND	ND	**0.00034**	ND	ND	**7.9**
GP-17	GP-17-0.5	0.5	9/22/2010	ND	ND	**4300**	ND	ND	**0.014**	**27**
	GP-17-2	2	9/22/2010	ND	ND	**320**	ND	ND	**0.0070**	**8.2**
	GP-17-5	5	9/22/2010	**23**	ND	ND	NA	NA	NA	NA
GP-18	GP-18-0.5	0.5	9/23/2010	ND	ND	**25000**	ND	ND	ND	**7.5**
	GP-18-2	2	9/23/2010	ND	ND	**2000**	ND	ND	ND	**5.5**

Table 2
Summary of Analytical Results - Exceedences Only
Proposed Hydrogen Energy California Site
Kern County, California

Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	TPH 8015 FF			Organochlorine Pesticides 8081			Metals 6010
				TPH-Diesel	TPH-Motor Oil	TPH-Mineral Oil	Dieldrin	Endo-sulfan II	Endrin	As
	Dup-4	2	9/23/2010	ND	ND	**2700**	ND	ND	ND	**4.9**
	GP-18-5	5	9/23/2010	ND	ND	**290**	ND	ND	ND	**4.5**
GP-19	GP-19-0.5	0.5	9/21/2010	ND	ND	**45**	**0.0028**	ND	**0.0019**	**4.8**
	Dup-5		9/21/2010	ND	ND	**120**	ND	**0.0048**	**0.0032**	**4.8**
	GP-19-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	**7.2**
GP-20	GP-20-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	**16**
	GP-20-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	**6.7**
GP-21	GP-21-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	**21**
	GP-21-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	**19**
NA	SS-1	0.5	9/23/2010	ND	ND	**140**	ND	ND	ND	**6.1**
NA	Dup-2	0.5	9/23/2010	ND	**20000**	ND	ND	ND	ND	**5.1**
NA	SS-2	0.5	9/23/2010	ND	ND	**93000**	ND	ND	ND	**5.5**
NA	SS-3	0.5	9/22/2010	ND	ND	ND	ND	ND	ND	**5**
NA	SS-4	0.5	9/22/2010	ND	ND	ND	**0.00071**	ND	ND	**5.9**
NA	SS-5	0.5	9/23/2010	ND	ND	**1200**	ND	ND	ND	**5.4**
NA	SS-6	0.5	9/23/2010	ND	ND	**26**	ND	ND	ND	**3.3**
NA	SS-7	0.5	9/23/2010	ND	ND	**49**	ND	ND	ND	**5.5**
NA	SC-1-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	**0.0033**	ND	ND	**7.9**
NA	SC-2A	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	**5.4**
NA	SC-2-B,C,D,E	0.5	9/21/2010	NA	NA	NA	ND	ND	**0.00051**	**5.6**
NA	Dup-6-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	**0.00065**	ND	**0.0015**	**4.9**
NA	SC-3-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	**0.00085**	ND	ND	**8.2**
NA	SC-4A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	**8.3**
NA	SC-5-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	**0.0027**	ND	**0.0014**	**7.7**
NA	SC-6A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	**6.5**
NA	SC-7A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	**14**
NA	SC-7-B,C,D,E	0.5	9/22/2010	NA	NA	NA	**0.0013**	ND	**0.0027**	NA
NA	SC-8A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	**6.4**
NA	SC-9A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	**7.8**
NA	SC-9-B,C,D,E	0.5	9/22/2010	NA	NA	NA	**0.0036**	ND	**0.0022**	NA
Regulatory/Guidance Values										
California Human Heath Screening Levels				NS	NS	NS	0.13	NS	230	0.24
US EPA Region 9 Regional Screening Levels				NS	NS	310,000	0.11	26,000	180	1.6
SFBRWQCB ESLs				83	1,000	1,000	0.0023	0.0046	0.00065	5.5

Notes

Detected analytes are displayed in **bold**
ND = Not detected above the laboratory detection limit.
NA = Not analyzed/not applicable.
NS = No standard established.
Highlight = Analyte detected in exceedence of screening level

Table 3
Summary of Detected Analytes
VOCs & TPH in Soil
Proposed Hydrogen Energy California Site
Kern County, California

				VOCs 8260														TPH FF 8015		
Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	Benzene	sec-Butyl-benzene	Ethyl-benzene	p-Isopropyl-toluene	Methyl t-butyl ether	n-Propyl-benzene	Toluene	Trichloro-ethene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Total Xylenes	p- & m-Xylenes	o-Xylene	Diesel	TPH-Motor Oil	TPH-Mineral Oil
GP-1	GP-1-5	5	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-1-10	10	9/23/2010	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-1-15	15	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-2	GP-2-5	5	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-2-10	10	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**95**
	GP-2-15	15	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-3	GP-3-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-3-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-3-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-4	GP-4-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-4-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-4-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-5	GP-5-5	5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-5-10	10	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-5-15	15	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-6	GP-6-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-6-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-6-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-7	GP-7-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Dup-1	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-7-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-7-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-8	GP-8-4	4	9/22/2010	**0.0019**	ND	**0.0035**	ND	ND	ND	**0.01**	ND	ND	ND	ND	ND	ND	**51**	ND	**22**
GP-9	GP-9-4	4	9/22/2010	**0.0026**	ND	ND	ND	ND	ND	**0.0025**	ND	ND	ND	ND	ND	ND	**50**	ND	**68**
GP-10	GP-10-5	5	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-10-10	10	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-10-15	15	9/22/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-11	GP-11-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Dup-3	0.5	9/21/2010	**0.0013**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-11-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-12	GP-12-0.5	0.5	9/21/2010	**0.0012**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-12-2	2	9/21/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-13	GP-13-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-13-2	2	9/21/2010	**0.0015**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-14	GP-14-0.5	0.5	9/23/2010	**0.0048**	ND	ND	ND	ND	ND	**0.0027**	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 3
Summary of Detected Analytes
VOCs & TPH in Soil
Proposed Hydrogen Energy California Site
Kern County, California

				VOCs 8260														TPH FF 8015		
Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	Benzene	sec-Butyl-benzene	Ethyl-benzene	p-Isopropyl-toluene	Methyl t-butyl ether	n-Propyl-benzene	Toluene	Trichloro-ethene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Total Xylenes	p- & m-Xylenes	o-Xylene	Diesel	TPH-Motor Oil	TPH-Mineral Oil
	GP-14-2	2	9/23/2010	0.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-15	GP-15-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-15-2	2	9/23/2010	0.0027	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-16	GP-16-0.5	0.5	9/23/2010	0.0028	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-16-2	2	9/23/2010	0.0038	ND	ND	ND	ND	ND	0.0018	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-17	GP-17-0.5	0.5	9/22/2010	0.0031	ND	ND	ND	ND	ND	0.0012	ND	ND	ND	ND	ND	ND	ND	ND	4300
	GP-17-2	2	9/22/2010	0.0019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	320
GP-18	GP-18-0.5	0.5	9/23/2010	ND	0.086	0.054	0.13	ND	0.1	0.25	ND	1.2	0.46	0.55	0.3	0.25	ND	ND	25000
	GP-18-2	2	9/23/2010	ND	0.033	0.039	0.058	ND	0.043	0.058	ND	0.36	0.15	0.18	0.083	0.093	ND	ND	2000
	Dup-4	2	9/23/2010	ND	0.056	0.04	0.092	ND	0.069	0.066	ND	0.72	0.25	0.24	0.12	0.13	ND	ND	2700
	GP-18-5	5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	290
GP-19	GP-19-0.5	0.5	9/21/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	45
	Dup-5	2	9/21/2010	0.0031	ND	ND	ND	ND	ND	0.0011	ND	ND	ND	ND	ND	ND	ND	ND	120
	GP-19-2	2	9/21/2010	0.0034	ND	ND	ND	ND	ND	0.0014	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-20	GP-20-0.5	0.5	9/23/2010	0.0019	ND	ND	ND	0.00053	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-20-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-21	GP-21-0.5	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-21-2	2	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SS-1	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140
NA	Dup-2	0.5	9/23/2010	0.0014	ND	0.0018	0.017	ND	ND	0.046	ND	0.013	0.0054	0.0088	0.0057	0.0031	ND	20000	ND
NA	SS-2	0.5	9/23/2010	0.0018	ND	0.0018	0.025	ND	ND	0.048	0.0019	0.021	0.0077	0.015	0.01	0.0047	ND	ND	93000
NA	SS-3	0.5	9/22/2010	ND	ND	0.0020	0.0060	ND	ND	0.0061	ND	0.0014	ND	ND	ND	0.0014	ND	ND	ND
NA	SS-4	0.5	9/22/2010	0.0021	ND	ND	ND	ND	ND	0.0027	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SS-5	0.5	9/23/2010	0.0017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1200
NA	SS-6	0.5	9/23/2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26
NA	SS-7	0.5	9/23/2010	0.0021	ND	ND	ND	ND	ND	0.0013	ND	ND	ND	ND	ND	ND	ND	ND	49
NA	SC-1-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-2A	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-2-B,C,D,E	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	Dup-6-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-3-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-4A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-4-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-5-A,B,C,D,E	0.5	9/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-6A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 3
Summary of Detected Analytes
VOCs & TPH in Soil
Proposed Hydrogen Energy California Site
Kern County, California

Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	VOCs 8260													TPH FF 8015		
				Benzene	sec-Butyl-benzene	Ethyl-benzene	p-Isopropyl-toluene	Methyl t-butyl ether	n-Propyl-benzene	Toluene	Trichloro-ethene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Total Xylenes	p- & m-Xylenes	o-Xylene	Diesel	TPH-Motor Oil	TPH-Mineral Oil
NA	SC-6-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-7A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-7-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-8A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-8-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-9A	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-9-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Regulatory/Guidance Values																			
California Human Heath Screening Levels				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
US EPA Region 9 Regional Screening Levels				5.4	NS	27	NS	220	21,000	4,500	14	260	10,000	2,700	17,000	17,000	NS	NS	310,000
SFBRWQCB ESLs				0.044	NS	3.3	NS	0.023	NS	2.9	0.46	NS	NS	2.3	NS	NS	100	1,000	1,000

Notes

Detected analytes are displayed in **bold**
ND = Not detected above the laboratory detection limit.
NA = Not analyzed.
NM - Not measured.
NS = No standard established.
Highlight = Analyte detected in exceedence of screening level.

Table 4
Summary of Detected Analytes
pH, Potassium, Anions, OPPs, and OCPs in Soil
Hydrogen Energy California Site
Kern County, California

						Anions			OPPs 8141		OCPs 8081											
Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	pH	Potassium	Nitrate	Sulfate	Phosphate	Tokuthion	Chlorpyrifos	Beta BHC	Delta BHC	Gamma BHC (Lindane)	Dieldrin	Endo-sulfan I	Endo-sulfan II	Endrin	4,4'-DDD	4,4'-DDE	4,4'-DDT	Meth-oxychlor	Hepta-chlor
GP-1	GP-1-5	5	9/23/2010	NM	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-1-10	10	9/23/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-1-15	15	9/23/2010	NM	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-2	GP-2-5	5	9/23/2010	NM	NA	NA	NA	NA	NA	NA	ND	**0.00035**	ND	ND	ND	ND	**0.00055**	**0.001**	**0.0039**	**0.005**	ND	ND
	GP-2-10	10	9/23/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-2-15	15	9/23/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GP-3	GP-3-5	5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-3-10	10	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.0039**	ND	ND
	GP-3-15	15	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-4	GP-4-5	5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-4-10	10	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-4-15	15	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-5	GP-5-5	5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-5-10	10	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-5-15	15	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-6	GP-6-5	5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-6-10	10	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-6-15	15	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-7	GP-7-5	5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Dup-1	5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-7-10	10	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-7-15	15	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-8	GP-8-4	4	9/22/2010	**7.87**	**6600**	**210**	**9100**	**7000**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-9	GP-9-4	4	9/22/2010	**6.33**	**6300**	**4**	**32000**	**6800**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.037**	ND	ND
GP-10	GP-10-5	5	9/22/2010	**3.85**	**2300**	**99**	**210**	**290**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-10-10	10	9/22/2010	**6.34**	**1600**	**2**	**71**	**200**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-10-15	15	9/22/2010	**6.83**	**630**	**0.59**	**37**	**150**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-11	GP-11-0.5	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.0029**	ND	ND
	Dup-3	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	**0.00034**	ND	**0.0005**	ND	ND	ND	ND	ND	ND	ND
	GP-11-2	2	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	**0.00055**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-12	GP-12-0.5	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	**0.014**	ND	ND	ND	ND	ND	ND	**0.14**	**0.023**	ND	ND
	GP-12-2	2	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	**0.068**	ND	ND	ND	ND	ND	**0.016**	ND	ND	ND	ND
GP-13	GP-13-0.5	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-13-2	2	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	**0.00062**	ND	ND	ND	ND	ND	**0.00062**	**0.0016**	**0.00049**	ND	ND
GP-14	GP-14-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-14-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 4
Summary of Detected Analytes
pH, Potassium, Anions, OPPs, and OCPs in Soil
Hydrogen Energy California Site
Kern County, California

						Anions			OPPs 8141		OCPs 8081											
Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	pH	Potassium	Nitrate	Sulfate	Phosphate	Tokuthion	Chlorpyrifos	Beta BHC	Delta BHC	Gamma BHC (Lindane)	Dieldrin	Endo-sulfan I	Endo-sulfan II	Endrin	4,4'-DDD	4,4'-DDE	4,4'-DDT	Meth-oxychlor	Hepta-chlor
GP-15	GP-15-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	0.00033	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-15-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-16	GP-16-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.00069	ND	0.0014	ND	ND	0.00031	0.001	0.016	0.00096	ND	ND
	GP-16-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	0.00034	ND	ND	ND	ND	0.0044	ND	ND	ND
GP-17	GP-17-0.5	0.5	9/22/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	0.014	0.014	0.046	0.038	ND	ND
	GP-17-2	2	9/22/2010	NM	NA	NA	NA	NA	0.064	ND	ND	ND	ND	ND	ND	ND	0.0070	0.0092	0.0270	0.0360	ND	ND
GP-18	GP-18-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.014	ND	ND	ND	ND
	GP-18-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.0019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Dup-4	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-18-5	5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.00022	ND	ND	ND	ND	ND	ND	0.00065	ND	ND	ND
GP-19	GP-19-0.5	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	0.00091	0.0093	0.00099	0.0028	ND	ND	0.0019	0.0057	0.07	0.0081	ND	0.0003
	Dup-5		9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.016	ND	ND	ND	0.0048	0.0032	0.0093	0.16	0.013	ND	ND
	GP-19-2	2	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-20	GP-20-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	GP-20-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GP-21	GP-21-0.5	0.5	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND
	GP-21-2	2	9/23/2010	NM	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SS-1	0.5	9/23/2010	NM	8500	3600	26000	9200	ND	ND	ND	0.0078	ND	ND	ND	ND	ND	0.0062	0.02	0.0011	ND	ND
NA	Dup-2	0.5	9/23/2010	NM	3400	0.41	96	1400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SS-2	0.5	9/23/2010	NM	3500	0.44	140	1600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SS-3	0.5	9/22/2010	NM	1600	0.4	390	2200	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0019	0.0030	ND	ND	ND
NA	SS-4	0.5	9/22/2010	NM	2200	0.38	200	800	ND	ND	ND	ND	ND	0.00071	ND	ND	ND	0.0071	0.0077	0.0027	ND	ND
NA	SS-5	0.5	9/23/2010	NM	3200	4500	6200	4600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0083	ND	ND
NA	SS-6	0.5	9/23/2010	NM	3000	5400	9700	2300	ND	ND	ND	0.002	ND	ND	ND	ND	ND	0.00082	ND	ND	ND	ND
NA	SS-7	0.5	9/23/2010	NM	3000	0.79	210	510	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NA	SC-1-A,B,C,D,E	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.0039	ND	0.0033	ND	ND	ND	0.0026	0.039	0.011	ND	ND
NA	SC-2A	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-2-B,C,D,E	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.0054	ND	ND	ND	ND	0.00051	0.00083	0.022	0.0046	ND	ND
NA	Dup-6-A,B,C,D,E	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	0.0037	ND	0.0056	ND	0.00065	ND	ND	0.0015	0.0015	0.028	0.0061	ND	ND
NA	SC-3-A,B,C,D,E	0.5	9/21/2010	NM	NA	NA	NA	NA	ND	ND	ND	0.0026	ND	0.00085	ND	ND	ND	ND	0.0086	0.00098	ND	ND
NA	SC-4A	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-4-B,C,D,E	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	ND	0.0045	ND	ND	ND	ND	0.00055	ND	0.017	0.0025	ND	ND
NA	SC-5-A,B,C,D,E	0.5	9/21/2010	NM	NA	NA	NA	NA	NA	NA	ND	0.004	ND	0.0027	ND	ND	0.0014	0.0017	0.024	0.0078	ND	ND
NA	SC-6A	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-6-B,C,D,E	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	ND	0.0029	ND	ND	ND	ND	ND	ND	0.0088	0.0016	ND	ND
NA	SC-7A	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-7-B,C,D,E	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	ND	0.0048	ND	0.0013	ND	ND	0.0027	0.002	0.05	0.012	ND	ND

Table 4
Summary of Detected Analytes
pH, Potassium, Anions, OPPs, and OCPs in Soil
Hydrogen Energy California Site
Kern County, California

						Anions			OPPs 8141		OCPs 8081											
Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	pH	Potassium	Nitrate	Sulfate	Phosphate	Tokuthion	Chlorpyrifos	Beta BHC	Delta BHC	Gamma BHC (Lindane)	Dieldrin	Endo-sulfan I	Endo-sulfan II	Endrin	4,4'-DDD	4,4'-DDE	4,4'-DDT	Meth-oxychlor	Hepta-chlor
NA	SC-8A	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-8-B,C,D,E	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	ND	**0.0037**	ND	ND	ND	ND	ND	ND	**0.01**	**0.0014**	ND	ND
NA	SC-9A	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-9-B,C,D,E	0.5	9/22/2010	NM	NA	NA	NA	NA	NA	NA	ND	**0.0049**	ND	**0.0036**	ND	ND	**0.0022**	**0.001**	**0.044**	**0.0071**	ND	ND
Regulatory/Guidance Values																						
California Human Heath Screening Levels				NS	NS	NS	NS	NS	NS	NS	NS	NS	2	0.13	NS	NS	230	9	6.3	6.3	3800	0.52
US EPA Region 9 Regional Screening Levels				NS	NS	1,600,000	NS	NS	NS	1,800	NS	NS	NS	0.11	26000	26000	180	7.2	5.1	7	3100	0.38
SFBRWQCB ESLs				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023	0.0046	0.0046	0.00065	9	4	4	19	0.014

Notes

Detected analytes are displayed in **bold**
ND = Not detected above the laboratory detection limit.
NA = Not analyzed.
NM - Not measured.
NS = No standard established.
Highlight = Analyte detected in exceedence of sceening level.

Table 5
Summary of Detected Analytes
Metals in Soil
Proposed Hydrogen Energy California Site
Kern County, California

Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	Metals 6010																
				Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Th	V	Zn
GP-1	GP-1-5	5	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-1-10	10	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	0.88	NA	NA	NA	NA	NA	NA	NA	NA
	GP-1-15	15	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	0.69	NA	NA	NA	NA	NA	NA	NA	NA
GP-2	GP-2-5	5	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	GP-2-10	10	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	2.9	NA	NA	NA	NA	NA	NA	NA	NA
	GP-2-15	15	9/23/2010	NA	NA	NA	NA	NA	NA	NA	NA	1.3	NA	NA	NA	NA	NA	NA	NA	NA
GP-3	GP-3-5	5	9/22/2010	ND	5.1	170	0.56	0.097	12	6.7	16	15	ND	1.2	10	ND	0.13	ND	42	45
	GP-3-10	10	9/22/2010	ND	4	79	0.57	0.094	12	6.1	12	3.8	ND	2.2	7.1	ND	ND	ND	49	46
	GP-3-15	15	9/22/2010	ND	2.9	33	0.3	ND	4.3	2.3	2.9	0.77	ND	1	1.8	ND	ND	ND	45	23
GP-4	GP-4-5	5	9/22/2010	ND	12	120	0.64	0.098	35	7.8	21	32	0.014	5.2	16	0.85	ND	ND	49	51
	GP-4-10	10	9/22/2010	ND	2.3	48	0.22	ND	5.4	3.4	5.3	1.8	ND	1.1	3	ND	ND	ND	26	35
	GP-4-15	15	9/22/2010	ND	5.1	28	0.29	ND	4.8	1.9	2.8	1.1	ND	1.7	1.5	ND	ND	ND	35	21
GP-5	GP-5-5	5	9/23/2010	ND	29	140	0.58	ND	11	6.6	10	3.1	0.021	3	7.7	ND	ND	ND	45	41
	GP-5-10	10	9/23/2010	ND	7	140	0.55	0.077	13	5.8	13	4.2	0.013	0.87	9.3	0.55	ND	ND	40	43
	GP-5-15	15	9/23/2010	ND	1.6	21	0.19	ND	4.5	2	2.8	1.3	ND	0.32	1.6	ND	ND	ND	22	17
GP-6	GP-6-5	5	9/22/2010	ND	3	89	0.74	0.13	19	6.6	15	5.3	ND	3.5	12	ND	ND	ND	40	62
	GP-6-10	10	9/22/2010	ND	9.6	270	0.38	0.05	8.3	5.1	8.7	2.5	0.012	3.1	4.7	0.71	ND	ND	30	35
	GP-6-15	15	9/22/2010	0.85	4.4	57	0.15	0.051	4.8	2.7	3.4	1	ND	1.2	2.6	0.71	ND	ND	15	24
GP-7	GP-7-5	5	9/22/2010	ND	8.6	150	1	0.47	23	7.6	25	7.4	0.02	1.4	18	ND	0.1	ND	76	67
	Dup-1	5	9/22/2010	ND	22	100	0.52	0.31	10	5.3	12	3.2	ND	1.6	7.2	ND	0.16	ND	50	49
	GP-7-10	10	9/22/2010	ND	13	120	0.67	0.11	15	7.2	16	4	ND	0.86	9.5	ND	ND	ND	47	59
	GP-7-15	15	9/22/2010	ND	25	230	0.64	0.14	16	7.8	15	5	0.012	2.9	9.1	0.55	ND	ND	40	51
GP-8	GP-8-4	4	9/22/2010	ND	6.5	100	0.55	2.6	24	4.8	27	7.9	0.013	2.5	15	ND	ND	ND	50	250
GP-9	GP-9-4	4	9/22/2010	ND	4.9	58	0.38	3	49	2.9	22	5.3	0.032	3.6	21	0.58	0.17	ND	45	150
GP-10	GP-10-5	5	9/22/2010	ND	4.3	110	0.44	0.16	12	5.5	11	3.1	ND	4.1	7.8	0.57	ND	ND	33	44
	GP-10-10	10	9/22/2010	ND	15	53	0.19	0.092	7.1	3.1	5.5	1.4	0.016	16	4.6	ND	ND	ND	18	28
	GP-10-15	15	9/22/2010	ND	8.2	25	0.06	ND	2.4	0.84	2.1	0.75	ND	4.6	1.3	ND	ND	ND	7.7	9.1
GP-11	GP-11-0.5	0.5	9/21/2010	ND	16	130	0.75	0.69	19	6	26	14	0.064	13	14	1.1	ND	ND	54	97
	Dup-3	0.5	9/21/2010	ND	8	140	0.66	1.1	18	5.9	32	26	0.058	2.5	13	0.65	ND	ND	44	330
	GP-11-2	2	9/21/2010	ND	19	140	0.83	0.38	18	6	22	6.5	0.094	31	16	ND	ND	ND	65	59
GP-12	GP-12-0.5	0.5	9/21/2010	ND	6.7	140	0.64	1.5	18	5.6	39	23	0.056	2.5	14	0.53	ND	ND	45	480
	GP-12-2	2	9/21/2010	ND	6.4	130	0.62	0.25	15	5.2	13	4.8	0.037	2.5	10	0.72	ND	ND	38	65
GP-13	GP-13-0.5	0.5	9/21/2010	0.82	11	150	0.77	0.57	18	6.4	20	7.6	0.031	11	17	0.79	ND	ND	49	61
	GP-13-2	2	9/21/2010	ND	6.30	150	0.77	0.42	18	6.8	19	6.60	0.02	6.10	16	1.30	ND	ND	42	62
GP-14	GP-14-0.5	0.5	9/23/2010	ND	7.3	170	0.92	0.33	19	7.5	20	8.1	0.03	4.4	14	ND	ND	ND	47	67
	GP-14-2	2	9/23/2010	ND	5.4	210	0.99	0.39	23	8.7	25	8.7	0.028	2	18	0.69	ND	0.73	60	73
GP-15	GP-15-0.5	0.5	9/23/2010	ND	35	190	0.92	0.25	22	8	26	11	0.28	9.8	13	ND	ND	ND	71	78
	GP-15-2	2	9/23/2010	ND	21	69	0.45	0.19	14	3.9	14	3.6	0.028	18	8	ND	ND	ND	44	46
GP-16	GP-16-0.5	0.5	9/23/2010	ND	7.7	150	0.77	0.55	21	7.2	19	9.1	0.032	1.5	18	ND	ND	ND	45	76
	GP-16-2	2	9/23/2010	ND	7.9	140	0.88	0.55	25	7.9	22	10	0.037	1.6	21	0.86	ND	ND	50	71
GP-17	GP-17-0.5	0.5	9/22/2010	ND	27	140	0.72	1.10	18	6.3	26	27	0.038	3.7	14.0	0.7	ND	ND	50	160
	GP-17-2	2	9/22/2010	ND	8.2	140	0.74	0.29	16	6.5	20	7.1	ND	2.7	14	0.64	ND	ND	51	67
GP-18	GP-18-0.5	0.5	9/23/2010	1.30	7.5	120	0.4	1.3	18	5.3	63	17	0.028	12	15	ND	0.079	ND	36	290
	GP-18-2	2	9/23/2010	ND	5.5	110	0.51	0.63	21	5.3	27	12	0.018	1.7	12	ND	ND	ND	34	110
	Dup-4	2	9/23/2010	ND	4.9	150	0.53	0.64	14	5.1	20	13	0.021	1.3	9.9	ND	ND	ND	35	110
	GP-18-5	5	9/23/2010	ND	4.5	150	0.62	0.14	14	6.5	16	4.5	0.022	0.91	12	ND	0.073	ND	42	50
GP-19	GP-19-0.5	0.5	9/21/2010	ND	4.8	95	0.52	1.7	19	4.5	33	8.9	0.039	2.1	13	0.6	ND	ND	41	180
	Dup-5		9/21/2010	ND	4.8	120	0.58	0.58	17	5.5	26	12	0.048	2.2	14	ND	ND	ND	39	140
	GP-19-2	2	9/21/2010	ND	7.2	160	0.91	0.39	19	7.5	24	7.9	0.031	1.5	15	ND	ND	ND	60	77
GP-20	GP-20-0.5	0.5	9/23/2010	ND	16	190	1.1	0.28	23	8.3	25	10	0.022	1.7	18	1	ND	ND	66	70
	GP-20-2	2	9/23/2010	ND	6.7	150	0.94	0.18	22	8	16	6.9	0.023	1.4	15	ND	ND	ND	49	56
GP-21	GP-21-0.5	0.5	9/23/2010	ND	21	160	0.82	0.4	20	7.1	20	9.6	0.056	5.7	15	ND	ND	ND	58	78

Table 5
Summary of Detected Analytes
Metals in Soil
Proposed Hydrogen Energy California Site
Kern County, California

Boring Number	Sample Number	Sample Depth (feet bgs)	Sample Date	Metals 6010																
				Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Th	V	Zn
	GP-21-2	2	9/23/2010	ND	**19**	**140**	**0.71**	**0.42**	**20**	**6.2**	**20**	**15**	**0.059**	**11**	**14**	ND	ND	ND	**60**	**66**
NA	SS-1	0.5	9/23/2010	ND	**6.1**	**63**	**0.55**	**7.4**	**31**	**3.2**	**46**	**9**	**0.027**	**2.7**	**19**	ND	ND	ND	**56**	**230**
NA	Dup-2	0.5	9/23/2010	1.90	**5.1**	**150**	**0.45**	**1.6**	**17**	**4.6**	**51**	**17**	**0.049**	**14**	**13**	ND	ND	ND	**33**	**290**
NA	SS-2	0.5	9/23/2010	1.60	**5.5**	**140**	**0.45**	**1.7**	**17**	**4.9**	**63**	**22**	**0.053**	**12**	**14**	ND	ND	ND	**33**	**290**
NA	SS-3	0.5	9/22/2010	ND	**5**	**120**	**0.54**	**9.3**	**39**	**3.7**	**76**	**5.8**	**0.018**	**4.2**	**21**	ND	ND	ND	**60**	**310**
NA	SS-4	0.5	9/22/2010	ND	**5.9**	**87**	**0.5**	**4.5**	**22**	**3.4**	**37**	**4.7**	**0.024**	**3.2**	**8.5**	ND	ND	ND	**43**	**200**
NA	SS-5	0.5	9/23/2010	ND	**5.4**	**76**	**0.41**	**1.1**	**19**	**3.8**	**17**	**5.5**	**0.024**	**1.9**	**13**	ND	ND	ND	**34**	**83**
NA	SS-6	0.5	9/23/2010	ND	**3.3**	**44**	**0.27**	**0.96**	**11**	**2.5**	**8.6**	**3.6**	**0.012**	**1.1**	**11**	ND	ND	ND	**22**	**84**
NA	SS-7	0.5	9/23/2010	ND	**5.5**	**86**	**0.5**	**0.35**	**15**	**4.9**	**14**	**5.1**	**0.019**	**0.88**	**13**	ND	0.05	ND	**30**	**62**
NA	SC-1-A,B,C,D,E	0.5	9/21/2010	NA	**7.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-2A	0.5	9/21/2010	NA	**5.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-2-B,C,D,E	0.5	9/21/2010	NA	**5.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	Dup-6-A,B,C,D,E	0.5	9/21/2010	NA	**4.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-3-A,B,C,D,E	0.5	9/21/2010	NA	**8.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-4A	0.5	9/22/2010	NA	**8.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-4-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-5-A,B,C,D,E	0.5	9/21/2010	NA	**7.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-6A	0.5	9/22/2010	NA	**6.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-6-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-7A	0.5	9/22/2010	NA	**14**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-7-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-8A	0.5	9/22/2010	NA	**6.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-8-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-9A	0.5	9/22/2010	NA	**7.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	SC-9-B,C,D,E	0.5	9/22/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Regulatory/Guidance Values																				
California Human Heath Screening Levels				380	0.24	63,000	1,700	7.5	100,000	3,200	38,000	3,500	180	4,800	16,000	4,800	4,800	63	6,700	10,000
US EPA Region 9 Regional Screening Levels				410	1.6	190,000	2,000	800	1,500,000	300	41,000	800	34	5,100	20,000	390	5,100	NS	5,200	310,000
SFBRWQCB ESLs				40	1.6	1,500	8	7.4	58	10	230	750	10	40	150	10	40	16	200	600

Notes

Detected analytes are displayed in **bold**
ND = Not detected above the laboratory detection limit.
NA = Not analyzed.
NM - Not measured.
NS = No standard established.
Highlight = Analyte detected in exceedence of screen level.

Section E. Mitigation Measures

In order to reduce potential impacts to a less than significant level, the following mitigation measures will be implemented:

Air Quality

AQ - 1: The BVWSD will develop a Dust Control Plan as prescribed and approved by the San Joaquin Valley Air Pollution Control Board to minimize and control fugitive dust during construction.

Biological

BIO 1 - An Environmental Awareness Program will be presented to all personnel working in the field on the proposed project site. The program will consist of a brief presentation in which biologists knowledgeable of endangered species biology and legislative protection explain endangered species concerns. The program will include a discussion of special-status plants and sensitive wildlife species. Species biology, habitat needs, status under the Endangered Species Act(s), and measures being incorporated for the protection of these species and their habitats will also be addressed.

BIO 2 - As close to the beginning of project activities as possible, but not more than 14 days prior, a qualified biologist will conduct a final pre-construction biological survey of proposed construction areas to verify that no special-status species have become established in the project site.

BIO 3 - Project site boundaries will be clearly delineated by stakes and/or flagging. Project activities are restricted to the project site to minimize inadvertent degradation or loss of adjacent habitat or agricultural lands during project operations.

BIO 4 - All areas of habitat and small mammal burrows that may serve as potential for special-status species will be avoided during project activities.

BIO 5 - To prevent entry of special-status small mammals and other wildlife into construction areas, an exclusion barrier (i.e., silt fencing) should be installed along the southern edge of the project boundary.

BIO 6 - A biological monitor is recommended when project activities are being conducted in areas adjacent to potential habitat for special-status species (on the south end of the project site). The biologist will be available to direct exclusion barrier installation, and on an on-call basis thereafter for the duration of the project, to direct project activities and ensure that take of listed and other special-status species is avoided.

BIO 7 - Off-road traffic outside of the designated project site should be prohibited.

BIO 8 - Project-related traffic will observe a 20 mph speed limit in the project site, except on County roads and State and federal highways, to avoid impacts to special-status and common wildlife species.

BIO 9 - When possible, project activities will be scheduled to avoid evening hours to minimize potential impacts to special-status wildlife species that are active during the night.

BIO 10 - Hazardous materials, fuels, lubricants, and solvents that spill accidentally during project-related activities will be cleaned up and removed from the project sites as soon as possible according to applicable federal, State and local regulations.

BIO 11 - To prevent entrapment of animals during construction, all excavated steep-walled holes or trenches in excess of two (2) feet in depth should be covered at the close of each working day by plywood or similar material. For trenches that cannot be closed daily, one or more escape ramps constructed of earth fill or wooden planks should be installed. Ramps should be located at no greater than 1,000-foot intervals (for pipelines) and at no less than 45-degree angles.

BIO 12 - Before such holes or trenches are filled they should be thoroughly inspected for trapped animals. Any animals discovered will be allowed to escape voluntarily, or will be removed from the trench or hole by a qualified biologist and allowed to escape unimpeded.

BIO 13 - All pipes, culverts, or similar structures stored at the proposed project sites overnight having a diameter of four (4) inches or greater will be inspected thoroughly for wildlife species before being buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight will be capped. If during project implementation a wildlife species is discovered inside a pipe, that section of pipe will not be moved or, if necessary, moved only once to remove it from the path of project activity, until the wildlife species has escaped.

BIO 14 - All food-related trash items such as wrappers, cans, bottles or food scraps generated during project activities will be disposed of only in closed containers and regularly removed from the proposed project sites. Food items may attract wildlife species onto the proposed project sites, consequently exposing such animals to increased risk of injury or mortality. No deliberate feeding of wildlife will be allowed.

BIO 15 - To prevent harassment or mortality of wildlife species via predation, or destruction of their dens or nests, no domestic pets will be permitted on the project sites.

BIO 16 - The following measures (a-e) will be implemented by BVWSD to ensure protection and no take of blunt-nosed leopard lizards during project implementation:

a. A final clearance survey will be conducted to ensure that no blunt-nosed leopard lizards are present in the project site.

b. If no individual blunt-nosed leopard lizards are observed and no burrows are identified within the project sites and a 50-foot avoidance buffer during the final clearance survey, then project activities may proceed.

c. Alternatively, if suitable burrows that may serve as potential refugia for blunt-nosed leopard lizard are identified that cannot be avoided, and a minimum 50-foot avoidance buffer cannot be maintained, then additional surveys to detect the species will be completed in accordance with CDFW's Approved Survey Methodology For The Blunt-Nosed Leopard Lizard (CDFG 2004).

d. If a blunt-nosed leopard lizard is observed during project pre-construction or clearance surveys, the USFWS and CDFW will be notified for further guidance.

e. All vehicle operators will check under vehicles and equipment prior to operation, or if left idle.

BIO 17 - BVWSD will implement the following measures to protect San Joaquin kit fox. These measures have been adapted from the USFWS Standardized Recommendations For Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS 2011):

a. Pre-construction surveys should be conducted by a qualified biologist no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities.

b. BIO 18- Construction and other project related activities should avoid den(s) that could be used by San Joaquin kit fox.

c. If a natal/pupping den is discovered within the project site or within 200 feet of the project boundaries, the USFWS and CDFW should be notified. Natal/pupping dens may not be destroyed while occupied, and a take authorization/permit is required to destroy these dens even after they are vacated.

d. If dens are identified during pre-construction surveys that may be used by San Joaquin kit fox, protective exclusion zones will be established prior to project activities.

e. To ensure protection of known dens, exclusion zones should be established 100 feet from the den entrance(s) with fencing that does not prevent access to the den by kit foxes. Acceptable fencing includes untreated wood particle-board, silt fencing, or orange construction fencing, as long as it has opening for kit fox ingress/egress and keeps humans and equipment out.

f. For potential and/or atypical dens, placement of 4-5 flagged stakes 50 feet from the den entrance(s) will suffice to identify the den location; fencing will not be required, but the exclusion zone must be observed.

g. Exclusion zones around kit fox dens will be maintained until all construction related

disturbances have been completed. At that time all fencing will be removed to avoid attracting subsequent attention to the dens.

h. Only essential vehicle operation on existing roads and foot traffic should be permitted in exclusion zones. Otherwise, all construction, vehicle operation, material storage, or any type of surface-disturbing activity should be prohibited or greatly restricted within the exclusion zones.

i. If den avoidance is not feasible or if buffer zones cannot be maintained, known dens and potential dens should be monitored prior to construction activities.

j. Known dens and potential dens occurring within the footprint of the project must be monitored for three (3) consecutive days with tracking medium or an infra-red camera beam to determine the current use. If no kit fox activity is observed during this period, the den(s) should be destroyed immediately to preclude subsequent use.

k. If kit fox activity is observed at the den(s) during this period, the den(s) should be monitored for at least five (5) consecutive nights from the time of the observation to allow any resident animal to move to another den during its normal activity. Only when the den(s) are determined unoccupied may the den(s) be excavated.

l. Destruction of the den(s) should be accomplished by careful excavation until it is certain that no kit foxes are inside. The den(s) should be fully excavated, filled with dirt and compacted to ensure that kit foxes cannot reenter to use the den during the construction period. If at any point during excavation, a kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring the den as described above should resume. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped without further disturbance, from the partially destroyed den.

m. If any kit fox den is considered to be a potential den, but is later determined during monitoring or destruction to be currently, or previously used by kit fox (e.g., if kit fox sign is found inside), then all construction activities will cease and the USFWS and CDFW will be notified immediately.

n. Destruction of any known or natal/pupping kit fox den requires take authorization/permit from the USFWS and CDFW.

BIO 18 - BVWSD should designate a project representative as the contact for any employee or contractor who finds a dead, injured, or entrapped special-status wildlife species.

BIO 19 - If ground disturbing activities are planned to occur during the breeding season of migratory bird or raptor species (February through mid-September), surveys for active nests will be conducted by a qualified biologist no more than 14 days prior to the start of project activities. Pre-construction surveys will be conducted for nesting migratory birds and raptor species in the project sites and areas that support potential nesting habitat.

BIO 20 - If no active nest(s) are found, then project activities may proceed and no further mitigation measures will be required.

BIO 21 -If active nest(s) are found, then exclusion zones will be established a minimum of 250-feet around a nest. Project activities will avoid disturbance within the exclusion zone during the nesting season.

BIO 22 - To meet the minimum level of protection for Swainson's hawk, surveys to identify birds and active nest sites should be completed by a qualified biologist for a ½ mile radius around all project activities. Surveys should be completed in accordance with the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000).

BIO 23 - If project activities are scheduled to occur outside the breeding or nesting season (August through December), then no additional surveys for Swainson's hawk are required.

BIO 24 - If ground disturbing activities are planned to occur during the breeding or nesting season of Swainson's hawk (late March through late July) additional surveys to detect adults birds and nest(s) are recommended. The survey periods, times, and number of survey days are as follows:

Survey Dates	Search Image	Survey Time	Number of Surveys
January – March 20	Potential Nest Locations	All day	1 (optional)
March 21 – April 5	Arrival	Sunrise to 1000 1600 to Sunset	3
April 6-April 20	Breeding	Sunrise to 1200 1630 to Sunset	3
April 21-June 10	Nesting (egg-laying & incubation	Monitor known nest sites only	Initiating surveys is not recommended
June 11 – July 30	Nest sites (post-fledging)	Sunrise to 1200 1600 to Sunset	3

BIO 25 - If surveys locate a nest site within 0.5 mile, a Swainson's hawk Monitoring and Mitigation Plan will be prepared by a qualified biologist in consultation with the CDFW.

BIO 26 - During the breeding and nesting season (late March through late July), ensure no disturbance or other project related activities that may cause nest abandonment or forced fledging to occur within 0.5 miles of an active Swainson's hawk nest. Buffer zones may be adjusted in consultation with the CDFW.

BIO 27 - The following measures included in the CDFW's Staff Report on Burrowing Owl Mitigation (CDFG 2012) will be implemented by BVWSD for the proposed project:

a. Pre-construction (take avoidance) surveys will be completed by a qualified biologist no less than 14 days prior to ground disturbing activities to detect the presence of burrowing owls in the project site.

b. If no burrowing owls are detected during pre-construction (take avoidance) surveys, then project activities may proceed.

c. If burrowing owl presence is detected during pre-construction surveys the owls will be monitored to determine use in the project site.

d. Avoid impacting burrows occupied during the non-breeding season (by migratory or non-migratory resident burrowing owls).

e. Avoid disturbing occupied burrows during the burrowing owl nesting season (February 1 through August 31).

f. Recommended setback distances and restricted activity dates for burrowing owl nesting sites based on the level of disturbance are as follows:

Time of Year	Level of Disturbance		
	Low	Medium	High
April 1 – Aug 15	200 meters	500 meters	500 meters
Aug 16 – Oct 15	200 meters	200 meters	500 meters
Oct 16 – Mar 31	50 meters	100 meters	500 meters

Groundwater

GW 1 - Groundwater monitoring wells will be constructed on site before recharge operations begin. Groundwater samples will be collected from each of these wells before recharge operations begin. The purpose of this monitoring is to verify that shallow and deep groundwater beneath the site is free of priority pollutions before initiating recharge activities.

GW 2 - During construction of the recharge basins, approximately 5 feet of fine ground soils (silts and clays) will be excavated from each recharge basin to expose the underlying fine to medium grained sand in the base of each recharge basin. During soil excavation and removal the contractor and inspecting engineer will monitor for evidence of soil contamination (color, odor, buried tanks, pipelines). If contaminated soils are encountered during excavation, these soils will be analyzed to identify the type and extent (vertically and horizontally) of contamination present. Contaminated soils will either be treated on site or disposed of at a hazardous waste landfill.

GW 3 - If contaminated soils are encountered during construction, additional groundwater monitoring wells may be installed to verify that groundwater has not been impacted. As an added measure of protection, BVWSD will cease the construction of recharge basins in and adjacent to contaminated soils. During the operational phase of the Palms project, BVWSD will conduct annual monitoring to verify that groundwater quality is not being adversely impacted by the recharge operation.

Cultural Resources

CULT 1 - Preservation in Place of Archaeological Site RABV-1. The project will be designed to avoid any ground disturbing activities in the area of site RABV-1.

CULT 2 - Consultation with Professional Archaeologist. In the event that archaeological resources are discovered during construction of the project, BVWSD will consult with a professional archaeologist on appropriate measures to preserve and protect the resource.

Section F. List of Preparers

Ginger Gillin – Principal Environmental Scientist, Project Manager. GEI Consultants, Inc.

Stephanie Breeden – Environmental Scientist and Initial Study Author. GEI Consultants, Inc.

Robert Booher, R.E.A. – Robert A. Booher and Associates. Biological Assessment.

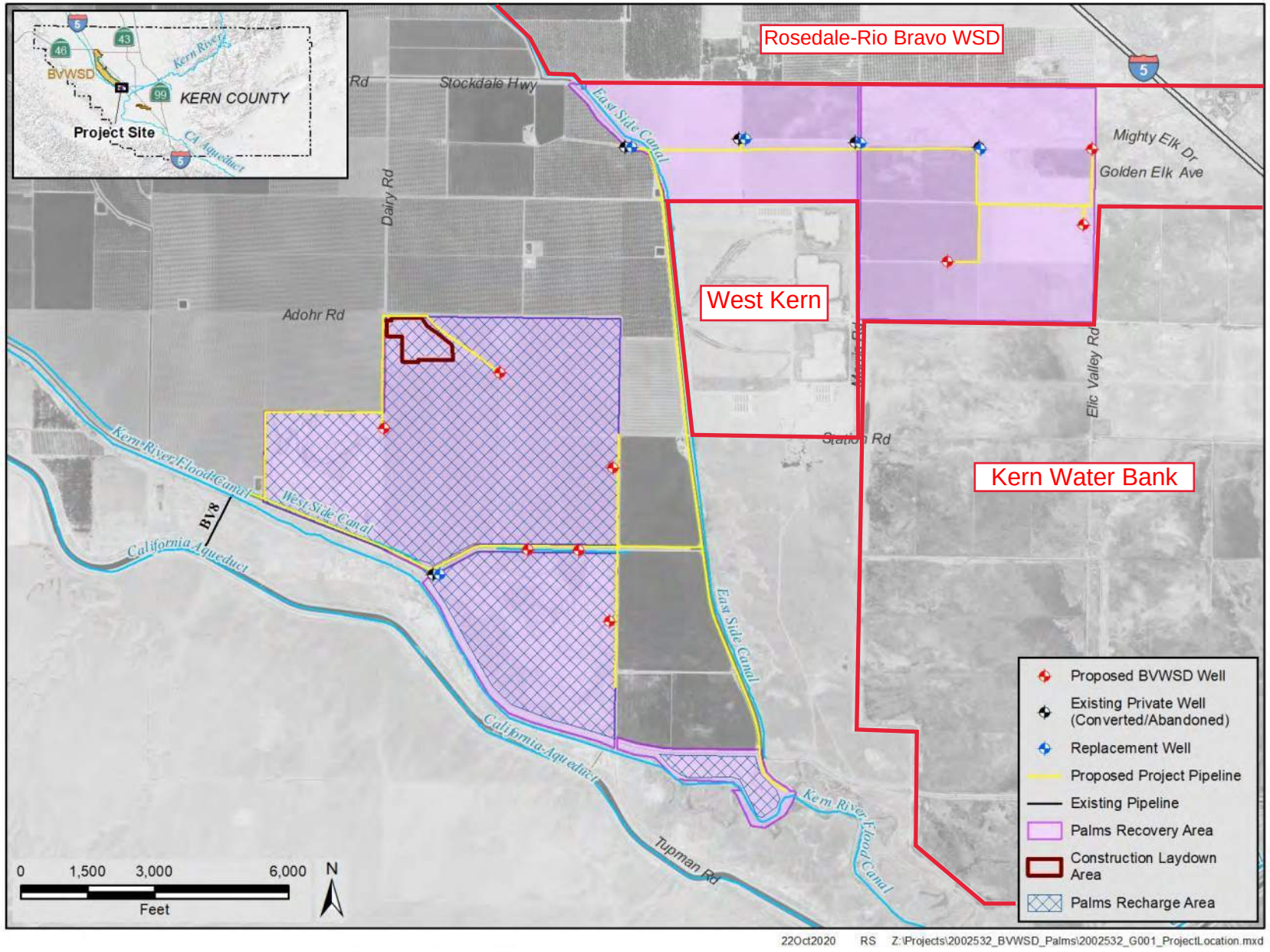
David Fairman – Staff Geologist. Professional Geologist, CA No. 9025. GEI Consultants, Inc. – Groundwater Resources Report

Peter A. Carey, M.A., R.P.A. – Associate Archaeologist. ASM Affiliates – Cultural Resource Survey and Report

David S. Whitley, Ph.D., R.P.A. – Principal Investigator. ASM Affiliates – Cultural Resources Cultural Resource Survey and Report

Chris Petersen – Hydrogeologist, Professional Geologist, CA No. 6189; Certified Hydrogeologist, CA No. 463. GEI Consultants, Inc.

Annotated Figure 2-2. Recovery Project Location



January 11, 2021

Jonathan Parker
Kern Water Bank Authority
1620 Mill Rock Way, Suite 500
Bakersfield, California 93311

RE: Comments on the Draft Environmental Impact Report for the Palms Groundwater Recovery Project - SCH# 2020060315

Dear Mr. Parker:

South Valley Biology has reviewed the subject Draft Environmental Impact Report (DEIR). Please see the following observations/comments.

Section 3.2. Biological Resources:

Table 3-1:

1) Horn's milkvetch (*Astragalus hornii* var. *hornii*) on or adjacent to the project site should include the Outlet Canal and other periodically flooded areas. This species is known from occurrences in the Outlet Canal just south of the project site and also from some of the recharge basins and water conveyances on the KWB.
2) Lesser saltscale (*Atriplex minuscula*) is known to occur in the bush seepweed habitat adjacent to the northeast portion of the project site.

Table 3-2:

1) The table indicates that there is no habitat for coast horned lizard (*Phrynosoma blainvillii*) on or adjacent to the project site; however, the bush seepweed habitat adjacent to the northeast portion of the project site provides suitable habitat for this species.
2) The table indicates that Tulare grasshopper mouse (*Onychomys torridus* ssp. *tularensis*) is not known to occur at the KWB. This is incorrect. This species has been identified in several areas at KWB, including trapping grids, the Cheng Property, and the saltbush scrub habitat portion of the Nikkel Property.

3-21 Special-status Birds: In paragraph 3, the DEIR correctly indicates that Swainson's hawks (*Buteo swainsoni*) are known to nest at the nearby Tule Elk Reserve; however, this species also regularly nests at the KWB as well.

3-22 Special-status Birds: In paragraph 4, the DEIR states that "…No suitable nesting habitat for tricolored blackbird (*Agelaius tricolor*) is currently present on or adjacent to the project site…". However, this species has nested on occasion at the Tule Elk Reserve and frequently nests at the KWB.

The DEIR concludes the same for yellow-headed blackbird (*Xanthocephalus xanthocephalus*). This species also is known to nest at the KWB.

3-23 Special-status Mammals: In paragraph 2, the DEIR states that the Tulare grasshopper mouse nearest known occurrence is approximately 10 miles away from the project site. This species is known to occur in several areas at KWB, including trapping grids, the Cheng Property, and the saltbush scrub habitat portion of the Nikkel Property.

3-24 Special-status Mammals: In paragraph 1 on that page, the DEIR states "…No evidence of kit fox presence in the Biological Study Area was observed during focused field surveys…". Although I do not doubt this statement in any way, kit foxes are nevertheless known to occur in the surrounding area and the individuals can be wide ranging in their foraging habits. Therefore, it should be expected that this species is likely present at least time to time within the Biological Study Area.

3-31 Impact BIO-1: Horn's milkvetch should also be included in the Special-status Plants that are listed here, as it is also known to occur nearby within the Outlet Canal, similar to slough thistle.

3-32 Mitigation Measure BIO -1: Our experience has been that unless blunt-nosed leopard lizard surveys consistent with the 2019 CDFW protocols or some other CDFW-approved methodology are conducted, it is unlikely that fencing will be allowed to be installed. CDFW typically requires a very detailed fencing plan be prepared and approved prior to installing any exclusionary/barrier fencing. Additionally, CDFW does not normally approve fence installation within 50 feet of burrows that could be used by species such as Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) or San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) unless it can be demonstrated through an approved investigative trapping effort or other agreed upon method that these species are not present.

3-32 and 3-33 Special-status Birds: While I do not necessarily disagree with most of the statements and conclusions in these paragraphs, based on comments by CDFW in regard to Swainson's hawks they stated that …"The trees within the Project represent some of the only remaining suitable nesting habitat in the local vicinity". Hence, it seems that CDFW may view impacting a total of 10 acres of foraging habitat for this species as a significant impact. Swainson's hawks are definitely known to nest in the area nearby the project site and likely forage in some portions of the project site from time to time.

3-34 Mitigation Measure BIO 2b: The DEIR is proposing that a nest survey for potential Swainson's hawk nesting trees be conducted within 0.25 mile of the project site. From my experience, CDFW will typically require a nest tree survey for a minimum of 0.5 mile surrounding the project.

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

James W. Jones, Jr.

James W. Jones, Jr.
President and Senior Biologist III