

# RECLAMATION

*Managing Water in the West*

**Draft  
Environmental Assessment**

## **American Recovery and Reinvestment Act of 2009 New Wells Project—Region 3**

**FRESNO COUNTY**



U.S. Department of the Interior  
Bureau of Reclamation  
Mid-Pacific Region, Sacramento, California

**June 2010**

## **Mission Statements**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

**Draft  
Environmental Assessment**

# **American Recovery and Reinvestment Act of 2009 New Wells Project—Region 3**

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Bureau of Reclamation  
Mid-Pacific Region, Sacramento, California

**June 2010**



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## Acronyms and Abbreviations

μS/cm	microSiemens per centimeter
AB 3030	Assembly Bill 3030
AB 32	Assembly Bill 32
AF	acre-feet
AF/yr	acre-feet per year
APE	area of potential effects
ARRA	American Recovery and Reinvestment Act
BBID	Byron-Bethany Irrigation District
CAA	federal Clean Air Act
CAAA	1990 Clean Air Act Amendments
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCAR	California Climate Action Registry
CDC	California Department of Conservation
CDF	California Department of Finance
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO <sub>2</sub> e	carbon dioxide equivalents
Construction General Permit	NPDES General Permit for Construction Activities
CVHM	USGS Central Valley Hydrologic Model
CVP	Central Valley Project
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DFG	California Department of Fish and Game
DMC	Delta-Mendota Canal
DOI	U.S. Department of the Interior
DPM	diesel particulate matter
DPSs	distinct population segments
DPWD	Del Puerto Water District
Drought Act	Reclamation States Emergency Drought Relief Act of 1991, as amended
DWR	California Department of Water Resources

EA	Environmental Assessment
EC	electrical conductivity
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	federal Endangered Species Act
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
FSWD	Fresno Slough Water District
FTA	Federal Transit Administration
GHGs	greenhouse gases
GPS	global positioning system
GRCD	Grassland Resource Conservation District
GWD	Grassland Water District
hp	horsepower
HUD	Housing and Urban Development
ISAC	Invasive Species Advisory Committee
ITAs	Indian Trust Assets
JID	James Irrigation District
kV	kilovolt
kWh	kilowatt hours
$L_{dn}$	day-night sound level
$L_{eq}$	equivalent sound level
$L_{min}$ and $L_{max}$	minimum and maximum sound levels
$L_{xx}$	percentile-exceeded sound levels
maf	million acre feet
MBTA	Migratory Bird Treaty Act
mg/l	milligrams per liter
MOU	memorandum of understanding
msl	above mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NISC	National Invasive Species Council
NMFS	National Marine Fisheries Service
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places

PG&E	Pacific Gas and Electric Company
PM2.5	particulate matter 2.5 microns in diameter or less
PM10	particulate matter 10 microns in diameter or less
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RGL	Regulatory Guidance Letter
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SLDMWA	San Luis and Delta-Mendota Water Authority
SLWD	San Luis Water District
SO <sub>2</sub>	sulfur dioxide
State Water Board	State Water Resources Control Board
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
taf	thousand acre-feet
TDS	total dissolved solids
TID	Tranquillity Irrigation District
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WA	Wildlife Area
WSID	West Stanislaus Irrigation District



# **Chapter 1 Purpose and Need for Action**

## **1.1 Background**

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) has developed the Drought Relief Program to participate in efforts to aid farmers on the west side of the San Joaquin Valley. As has been widely reported, severe reduction in water deliveries over the last three years has caused a drop in agricultural production on the west side of the San Joaquin Valley, with secondary social and economic consequences in many San Joaquin Valley communities (including minority and low-income communities). Development of additional groundwater pumping capacity in the west side of the San Joaquin Valley is expected to alleviate these current and likely future drought impacts by providing supplemental water supplies to area farmers when Reclamation is not able to satisfy critical water needs. Reclamation has worked closely with local water districts to identify potential drought relief projects, identified in the following categories: (1) installation of temporary pipelines and pumps; (2) enhancement of existing wells; and (3) installation of new wells.

## **1.2 Purpose and Need**

The Reclamation States Emergency Drought Relief Act of 1991, as amended (Drought Act), Section 101(a), authorizes the Secretary of the Interior to undertake construction, management, and conservation activities that will minimize, or can be expected to have an effect on minimizing, losses and damages resulting from drought conditions. Construction activities are limited to temporary facilities, except that wells may be permanent facilities. Consistent with this authority, Reclamation is planning to use \$40 million from the American Recovery and Reinvestment Act (ARRA) to fund emergency drought relief projects that can quickly and effectively mitigate the consequences of the current and future drought in the San Joaquin Valley. ARRA funds are intended to assist west-side farmers by supplementing water supplies to preserve permanent crops, minimize economic loss for the surrounding community, and preserve employment. The overall program assists Reclamation in its management of the Central Valley Project (CVP) and the drought relief program. The primary benefit is to offset the effects of the drought on farmers that would otherwise receive surface water from Reclamation through the CVP. Further, the purposes of the Drought Relief Act could not be accomplished without the use of private wells.

Reclamation proposes to provide funding under Title IV of the ARRA for up to seven wells in three water districts, referred to for the purposes of this analysis as Region 3. The purpose of these wells is to supplement the water district's water supply in years when surface water allocation is constrained.

### **1.3 Scope of Analysis**

This Environmental Assessment (EA) addresses the construction of up to seven new wells in Region 3. The water from each new well is intended to be used for permanent crops or orchards in the water district. The pumped groundwater would be delivered through the landowner's existing conveyance facilities or district canals and/or pipelines. More information about the specific location of the wells, their associated infrastructure facilities, and location of use is provided in Chapter 2. No new irrigation delivery systems would be constructed through this project. The majority of pumping from these new wells would occur during the normal irrigation season of April–October, with the potential for some pumping for pre-irrigation occurring during the winter months.

### **1.4 Potential Issues**

The resources potentially affected by the Proposed Action and therefore analyzed in this EA are:

- Water Resources
- Land Use
- Biological Resources
- Air Quality and Climate Change
- Noise
- Cultural Resources
- Indian Trust Assets
- Utilities and Infrastructures
- Socioeconomic Resources
- Environmental Justice
- Cumulative Effects

## **1.5 Resources Not Evaluated in This Environmental Assessment**

The following resources are not expected to be affected by the Proposed Action and therefore are not analyzed further in this EA.

### **1.5.1 Aesthetics**

Each of the well sites is located in a rural area with existing infrastructure similar to the proposed new wells and associated infrastructure. Construction equipment would be present for a short period of time, but this equipment is similar to the equipment used for normal farming and maintenance activities. The presence of this equipment and new wells would not represent a change from the current visual character of the area.

### **1.5.2 Traffic and Transportation**

The slight increase in the number of vehicles on local roadways associated with construction of the new wells would be temporary and minimal. Wells are located throughout the region, and increased traffic would not be concentrated in any one area. Any change in traffic would be negligible because the wells are located in areas where vehicles currently travel on a daily basis.

### **1.5.3 Growth-Inducing Effects**

The seven proposed wells would supplement agricultural water supplies in drought years. There would be no additional water supply available to support growth or remove an obstacle to growth; therefore, there would be no growth-inducing effects as a result of new well construction.

## **1.6 Reclamation's Authority for the Proposed Action**

As described above, Reclamation is providing ARRA funds for the construction of new wells pursuant to Section 101(a), which authorizes construction, management, and conservation activities that will minimize losses and damages resulting from drought conditions. Construction activities are limited to temporary facilities, except that wells may be permanent facilities.





# Chapter 2 Alternatives

## 2.1 Introduction

As described in Chapter 1, Reclamation is funding a drought relief program through the ARRA. The new wells portion of the drought relief program is intended to improve water supply during droughts. In the case of most south-of-Delta CVP contractors, the only water supplies are from the DMC and groundwater. During drought conditions, supplies from the DMC are limited. As such, the alternatives to meet the purpose and need involve providing access to groundwater supplies. Providing additional access to groundwater supplies can be accomplished by constructing new wells or enhancing existing wells. When appropriate, enhancing existing wells also was considered and analyzed through a separate environmental document (Reclamation, Mid-Pacific Region, *NEPA Categorical Exclusion Checklist for American Reinvestment and Recovery Act (ARRA) Drought Relief Well Enhancements Project*, approved November 9, 2009). Therefore, only the No Action Alternative and the Proposed Action are evaluated in this EA (Section 102(2)(E) of the National Environmental Policy Act [NEPA]).

## 2.2 No Action Alternative

The No Action Alternative assumes that west-side farmers would continue to use existing water supplies to meet demand.

## 2.3 Proposed Action

### 2.3.1 Well Locations and Facilities

Region 3 and its associated proposed new wells are shown in Figure 2-1. A total of up to seven new wells and related power and water supply connections and appurtenant structures would be constructed and operated for use by the following districts and their landowners:

- Fresno Slough Water District (FSWD): installation of one new well
- James Irrigation District (JID): installation of four new wells
- Tranquillity Irrigation District (TID): installation of two new wells

The aboveground facilities at each well site would occupy an area of approximately 30 feet by 30 feet (well pad). The features of each well would include:

- A new 16- to 18-inch-diameter well that would be operated generally during the irrigation season (April through October).
- An aboveground pump to operate the well. Power to the pump motors would come from an adjacent overhead power line.
- A discharge pipe connecting the well to an existing irrigation system adjacent to the well. An integrated flow meter would be installed on the discharge pipe to record pumping use.

Table 2-1 identifies each of the seven proposed new wells and their specific characteristics. Figures 2-2 to 2-8 provide detailed maps (scale of one inch:3,200 feet) using U.S. Geological Survey (USGS) 1:24,000 topographic sheets as the base map for each individual well location and the connection to power and water conveyance.

All of the wells would be operated as district wells and would be connected with an aboveground or belowground pipeline discharging into the district canal.









**Figure 2-2**  
**Location of Well T-1**  
Fresno County  
T. 15 S, R. 16 E  
7.5' USGS Topo Quad:  
Jamesan

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction







**Figure 2-3**  
**Location of Well T-2**  
Fresno County  
T. 15 S, R. 16 E  
7.5' USGS Topo Quad:  
Jamesan

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction







**Figure 2-4**  
**Location of Well F-1**  
Fresno County  
T. 14 S, R. 16 E  
7.5' USGS Topo Quad:  
Tranquillity

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction



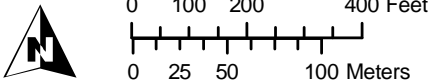




**Figure 2-5**  
**Location of Well J-1**  
Fresno County  
T. 16 S, R. 17 E  
7.5' USGS Topo Quad:  
San Joaquin

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply

- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction

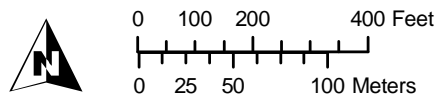






**Figure 2-6**  
**Location of Well J-2**  
Fresno County  
T. 16 S, R. 16 E  
7.5' USGS Topo Quad:  
San Joaquin

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction

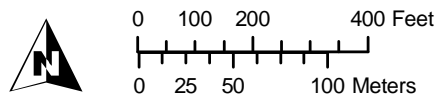






**Figure 2-7**  
**Location of Well J-3**  
Fresno County  
T. 15 S, R. 16 E  
7.5' USGS Topo Quad:  
San Joaquin

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction

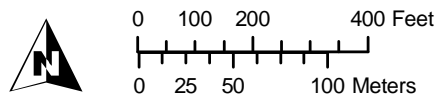






**Figure 2-8**  
**Location of Well J-4**  
Fresno County  
T. 15 S, R. 17 E  
7.5' USGS Topo Quad:  
San Joaquin

- Legend**
- Potential Utility Connections**
- Power Supply
  - Power & Water Supply
  - Water Supply
  - Construction Water Supply
- Disturbance Areas**
- Permanent Disturbance Area for Well Pad (30 Sq. Feet)
  - Temporary Disturbance Area for Well Pad Construction



**Table 2-1.** Locations and Well Characteristics for New ARRA Wells in Region 3

Well ID Number	District	Anticipated Well Depth (feet)	Casing Diameter (inches)	Above/Below Corcoran Clay	Estimated Annual Production			Required Power (HP)	Estimated Distance to Power Lines	Estimated Number of Power Poles
					(AF)	Main Crops	Acreage			
T-1	TID	800	18	Below	5,500	Mix	12,000	250	75 feet	2
T-2	TID	800	18	Below	5,500	Mix	12,000	250	175 feet	3
F-1	FSWD	800	18	Below	1,200	Mix	1,200	250	200 feet	3
J-1	JID	600	16	Above	720	Mix	23,000	150	100 feet	2
J-2	JID	600	16	Above	720	Mix	23,000	150	50 feet	2
J-3	JID	600	16	Above	720	Mix	23,000	150	60 feet	2
J-4	JID	600	16	Above	720	Mix	23,000	150	45 feet	2

AF = acre-feet.

HP = horsepower.

### 2.3.2 Construction Activities

Construction activities would include the well construction and connection (i.e., trench for pipeline) to the water distribution canal or pipeline and the connection to the power supply. In addition, construction activities would involve vegetation removal, soil excavation and trenching, grading, stockpiling and spreading of excavated material, installation of well and pipeline facilities, constructing a temporary percolation pond, and backfilling materials into excavated areas. These activities would result in the temporary disturbance of approximately 10,000 square feet of agricultural land at each well location, plus minor additional disturbance associated with the construction of power and water connections.

A temporary settling pond approximately 50 feet by 50 feet in size would be constructed at each well site by creating earthen berms around the pond area. The purpose of the pond would be to store water and sediment discharged from the well during the drilling and development activities. Sediment and well drilling debris would remain in the pond. Water generated from the well drilling would be discharged to the pond and would percolate from the pond to the shallow groundwater. Clean water from well testing would be discharged into the pond or to an adjacent agricultural irrigation system.

The well discharge pipeline would connect to either an onsite private distribution system or to a district facility through an underground pipeline. The pipeline would be installed by excavating a small trench, generally 12 to 16 inches wide, to a depth of approximately 42 inches. A trencher or small excavator would be used to dig the trench, and materials would be stockpiled alongside the trench. Bedding material, such as gravel or engineered fill, would be laid at the bottom of the trench. The pipe would be laid on top of the bedding material and covered with additional bedding material and with excavated material. Excess material excavated from the trench would be disposed of on site. Storage of pipeline materials would occur at the well construction site.

The power line for each well would require the installation of new wooden poles, each approximately 30 to 45 feet high. No on-the-ground structural features would be required at the tie-in points, and equipment required for conductor pulling at each end of the power line would use existing access areas. The power poles would be installed in augered holes using truck-mounted equipment. The number of poles for each well is shown in Table 2-1.

Equipment expected to be used during construction would include:

- a drill rig,
- a backhoe,
- a pipe trailer,

- a pump setting rig,
- welding equipment for well casing construction, and
- semitrailer trucks for material delivery.

Chemicals associated with maintaining drill rig operation (lubrication oil, diesel, gasoline, etc.) would be stored on the site. During drilling, bentonite (drilling mud) and additives (e.g., soda ash, polymers) would be stored and used at the site and disposed of in the temporary pond. After well construction is completed, the temporary earthen berms used to form the temporary settling pond would be filled back into the pond area. The sediment and debris remaining in the settling pond would be mixed with the soil material and would remain suitable for agricultural production.

Five construction workers would be at the project site throughout the eight-week project construction period. During the six-week well drilling, construction, and development period, it is expected that no more than 20 material and equipment deliveries would occur. After the well is constructed, an additional five deliveries would be made over a two-week period to test the well, install the permanent pump, and connect the well to the water distribution system.

### ***Construction Schedule***

Construction of the Proposed Action is anticipated to begin no earlier than September 2010. Installation of each well is expected to take no more than two months. Construction of multiple wells can occur simultaneously; however, it is anticipated that construction activities could continue for up to two years. Well installation consists of the following phases.

- Site clearing and percolation pond excavation (two days).
- Well drilling and well construction (four weeks). Drilling would occur seven days a week, 24 hours a day for two weeks, and well construction would occur seven days a week, 12 hours a day for two weeks.
- Well development and pumping tests (two weeks). Well development and pumping tests are expected to occur for 12 hours each day, then for two 24-hour days.
- Installation of the permanent pump and startup testing (one week). Installation of the permanent pump and startup testing would occur during the day only.
- Connection of the new well to the water delivery system (one week). The pipe construction (with welding) would occur during the day only.



### **Well Operation**

Each new well would supplement existing water supplies and is expected to be operated in years when the CVP agricultural water contractor allocation is constrained. The anticipated water production for each well is listed in Table 2-1. The general operational constraints for these wells are described below.

- Pumping would be generally confined to the normal irrigation season of April through October, although some pre-irrigation pumping may occur during the winter months.
- Operation of the new wells would be consistent with existing groundwater management plans for the district.
- All new wells would be metered and records would be provided by districts and/or landowners to the San Luis & Delta-Mendota Water Authority (SLDMWA) and/or Reclamation on an annual basis for groundwater monitoring and planning efforts. Access to the well site would be provided to SLDMWA and/or Reclamation staff for periodic water-level and water-quality monitoring. Water-quality monitoring would be determined based on the water use of the particular well. For agricultural uses, the monitoring would consist of groundwater levels, electrical conductivity, and boron.
- Rescheduled water (stored in San Luis Reservoir) would be used prior to the use of well water.

### **2.3.3 Environmental Commitments**

#### **Conduct Preconstruction Den Surveys for San Joaquin Kit Fox and American Badger and Avoid or Protect Dens**

Reclamation would retain a qualified biologist (as approved by the U.S. Fish and Wildlife Service[USFWS] [1999a, 1999b]) to conduct a preconstruction survey no more than 30 days before the beginning of ground disturbance or any activity that may affect San Joaquin kit fox or American badger. The biologist would survey the proposed construction area and a 200-foot buffer area around the construction area to identify suitable dens (USFWS 1999a). The work area includes all areas where ground disturbance would occur, access roads, staging areas, and spoils storage areas. The biologist would conduct den searches and classify dens according to USFWS protocol (1999a). Written results of the surveys would be submitted to USFWS and the California Department of Fish and Game (CDFG) within one week of the completion of surveys and prior to the beginning of ground disturbance and/or construction activities that could affect San Joaquin kit fox or American badger.

After preconstruction den searches and before the commencement of construction activities, a qualified biologist would establish and maintain the following

exclusion zones measured in a radius outward from the entrance or cluster of entrances of each den.

- Potential and atypical dens: A total of four–five flagged stakes would be placed 50 feet from the den entrance(s) to identify the den location.
- Known den: Orange construction barrier fencing would be installed between the construction work area and the known den site at a minimum distance of 100 feet from the den. The fencing would be maintained until all construction-related disturbances have been terminated. At that time, all fencing would be removed to avoid attracting subsequent attention to the den.
- Natal/pupping den: USFWS would be contacted immediately if a natal or pupping den is discovered at or within 200 feet of the boundary of the construction area.

Construction and other project activities would be prohibited or greatly restricted within these exclusion zones. Only essential vehicle operation on existing roads and foot traffic would be permitted. All other construction activities, vehicle operation, material and equipment storage, and other surface-disturbing activities would be prohibited in the exclusion zones.

All project effects on San Joaquin kit fox would be avoided. If a well pad or utility location is in conflict with an identified kit fox den, the well pad or utility would be moved.

### **Provide Escape Ramps or Cover Open Trenches at the End of Each Day to Avoid Entrapment of San Joaquin Kit Fox and American Badger**

To avoid entrapment of San Joaquin kit fox and American badger, all excavated steep-walled holes or trenches more than one foot deep would be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, holes or trenches would be covered with plywood or similar materials. Providing escape ramps or covering open trenches would prevent injury or mortality of foxes and badgers resulting from falling into trenches and becoming trapped. The biological monitor would thoroughly inspect trenches for the presence of federally listed species at the beginning of each workday.





# Chapter 3 Affected Environment and Environmental Consequences

This chapter describes the potential environmental effects of implementing the No Action Alternative and Proposed Action. The following resources are evaluated: water resources, land use, biological resources, air quality and climate change, cultural resources, noise, Indian Trust Assets, utilities and infrastructure, socioeconomic resources, and environmental justice.

## 3.1 Water Resources

### 3.1.1 Affected Environment

#### *Land Surface Topography*

The topography in the Fresno Slough area (Region 3) is relatively flat as it is in the San Joaquin Valley trough (low point), the dividing saddle between the Kings River and Tulare Lake bed to the south and Mendota Pool and the San Joaquin River to the north. The land surface elevations range from approximately 150 feet near Mendota Pool to about 175 feet in the irrigated areas upstream (south) of TID) and the uplands away from the trough.

#### *Water Supply and Uses*

The DMC is the primary canal that carries CVP water south from the Delta to the agricultural lands of the northern San Joaquin Valley (north of Mendota Pool). The DMC is approximately 117 miles long and terminates on the San Joaquin River at Mendota Pool. Mendota Pool is formed by a dam on the San Joaquin River near the confluence of the San Joaquin River and Fresno Slough (north fork of the Kings River). Mendota Pool is used to supply water to several canals. The DMC also supplies surface water to agricultural users along the upper DMC, including SLDMWA member agencies JID), TID, and FSWD.

Table 3.1-1 presents the irrigated land area and water supply (acre-feet per year [AF/yr]) available for each of these water districts.

**Table 3.1-1.** Water Districts and Water Supplies within Region 3 (Fresno Slough)

District	Area (acres)	San Joaquin River Water	CVP Agricultural Contract (AF/yr)	San Joaquin River	Groundwater Pumping Capacity	New Wells
				Exchange or Settlement Contract (AF/yr)		
JID	17,500	no	35,300	9,700	yes	4
TID	9,700	no	13,000	20,200	yes	2
FSWD	800	no	4,000	866	yes	1

The water supply for these districts is obtained from surface water diverted from the Delta and conveyed in the DMC, surface water diverted from Fresno Slough, or pumped groundwater. During drought conditions, supplies from the DMC and Fresno Slough are limited, which results in many water users pumping groundwater to meet some of their water demands. Most of the existing groundwater pumping is in years when the surface water supplies are insufficient to meet water demands (AECOM 2009).

The groundwater pumping in Region 3 is therefore a conjunctive water supply that is used mostly in years when surface water is limited. The groundwater supply may be constrained by availability (i.e., groundwater storage and pumping drawdown) and groundwater quality (i.e., salinity and other minerals such as boron).

### ***Regulations and Management Plans***

There are no statewide regulations for groundwater in California. Therefore, only local regulations apply.

#### ***Fresno County***

Fresno County Groundwater Management Ordinance Code (Title 14, Chapter 3) regulates groundwater pumping and the transfer of groundwater outside of the County. It requires that the groundwater resources of Fresno County be protected from harm resulting from extraction and transfer of groundwater for use on lands outside the County and consequential transfer of surface water outside of the County due to extraction. A County-issued permit is required for groundwater transfer, directly or indirectly, outside of the County, unless the action is exempted or a permit first obtained.

#### ***Regional Groundwater Management Plan***

Assembly Bill 3030 (AB 3030), signed in 1992, established procedures for existing local agencies to develop and implement these plans. The SLDMWA

prepared a groundwater management plan in 1996 (split into the upper DMC and lower DMC plans), which has recently been updated. The lower DMC management plan covers all of the Proposed Action Region 3 wells (AECOM 2009).

The management plan includes several general objectives and guidelines, which the Proposed Action wells would follow. These groundwater management objectives include:

- Assure an affordable groundwater supply for the long-term needs of the water users.
- Prevent long-term depletion of groundwater resources and maintain adequate groundwater supplies for all water users.
- Maintain groundwater quality to meet the long-term needs of users.
- Reduce or prevent land subsidence due to groundwater overdraft.
- Conduct groundwater monitoring (water levels and water quality).

TID also has a separate groundwater management plan (2005).

#### *Water Quality Regulations*

Section 402 of the Clean Water Act (CWA) regulates discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program. Most construction activities that disturb more than one acre of land are required to obtain a General Permit for Construction Activities (Construction General Permit), which requires a stormwater pollution prevention plan (SWPPP). Installation of each well will require disturbing less than one acre of land; therefore, Section 402 is not applicable.

#### ***Hydrogeology and Aquifers***

The Proposed Action wells would be located in the Delta-Mendota and Kings subbasins, near the southern boundary of the Delta-Mendota subbasin, the eastern boundary of the Westside subbasin, and the northern boundary of the Kings subbasin (of the San Joaquin Region). Groundwater in these basins occurs in the Upper Zone and Lower Zone (DWR 2005), which are separated by the Corcoran Clay. Although there are some regions where the Upper Zone is semi-confined, the Upper Zone is commonly referred to here and elsewhere as the unconfined aquifer. The Upper Zone contains semi-confined and unconfined water in an upper section of the Tulare Formation and younger deposits above the Corcoran Clay. The Tulare Formation and the Corcoran Clay dip eastward from the Coast Range towards the trough of the valley. The Corcoran Clay occurs near the top of the Tulare Formation at elevations of -200 feet above mean sea level (msl) to

-300 feet msl (base) with corresponding depths from land surface ranging from about 400 feet msl to 500 feet msl along the Fresno Slough (DWR 2003).

A layer of older alluvium (Sierra sands) consisting of loosely to moderately compacted sand, silt, and gravel are deposited in alluvial fans above the Tulare Formation. The thickness of the older alluvium is up to about 150 feet. It is moderately to locally highly permeable. A layer of younger alluvium overlies the layer of older alluvium. Sand and gravel zones in the younger alluvium are highly permeable.

The Lower Zone contains confined water in a lower section of the Tulare Formation, below the Corcoran Clay. The cumulative thickness of the Tulare Formation deposits is about 3,000 feet along the trough of the valley below Fresno Slough and the San Joaquin River. The Tulare Formation is composed of beds, lenses, and tongues of clay, sand, and gravel that have been alternately deposited in oxidizing and reducing environments. The confined zone underlying the clay stratum extends downward from the base of the Corcoran Clay to the base of fresh water that is about 2,000 feet below the valley trough.

### ***Groundwater Levels and Pumping***

Groundwater pumping has been occurring in the San Joaquin Valley for the past century. California Department of Water Resources (DWR) Bulletin 118 reports that about 30 percent of the total water used (long-term average) is from groundwater pumping (DWR 2003). Total groundwater pumping from the San Joaquin Valley groundwater basin (Westlands Water District north to Tracy) is more than six million acre feet (maf) in dry years, with about two maf pumped from some areas every year. Along the west side of the San Joaquin River in the vicinity of the Proposed Action new wells (located primarily in the Delta-Mendota subbasin), there is about 500 thousand acre-feet (taf) of groundwater pumping in dry years and about 100 taf of pumping in every year (based on input to the USGS Central Valley Hydrologic Model [CVHM], Faunt et al. 2009). The seven new wells proposed for Region 3 represent less than two percent of the additional historical pumping that occurs in dry years in the Delta-Mendota subbasin (approximately 400 wells assuming one taf per well).

The CVHM was used to simulate groundwater elevations in the San Joaquin Valley (Faunt et al. 2009). Figure 3.1-1 shows simulated historical groundwater elevations for September 1992, a time when groundwater elevations were at one of the lowest points between 1970 and 2010. These simulated groundwater elevations represent the piezometric water surface elevations in wells (groundwater elevations under non-pumping conditions). For an unconfined aquifer, the elevations of the piezometric surface are roughly the same as those of the groundwater table. However, for confined aquifers, such as the aquifer below



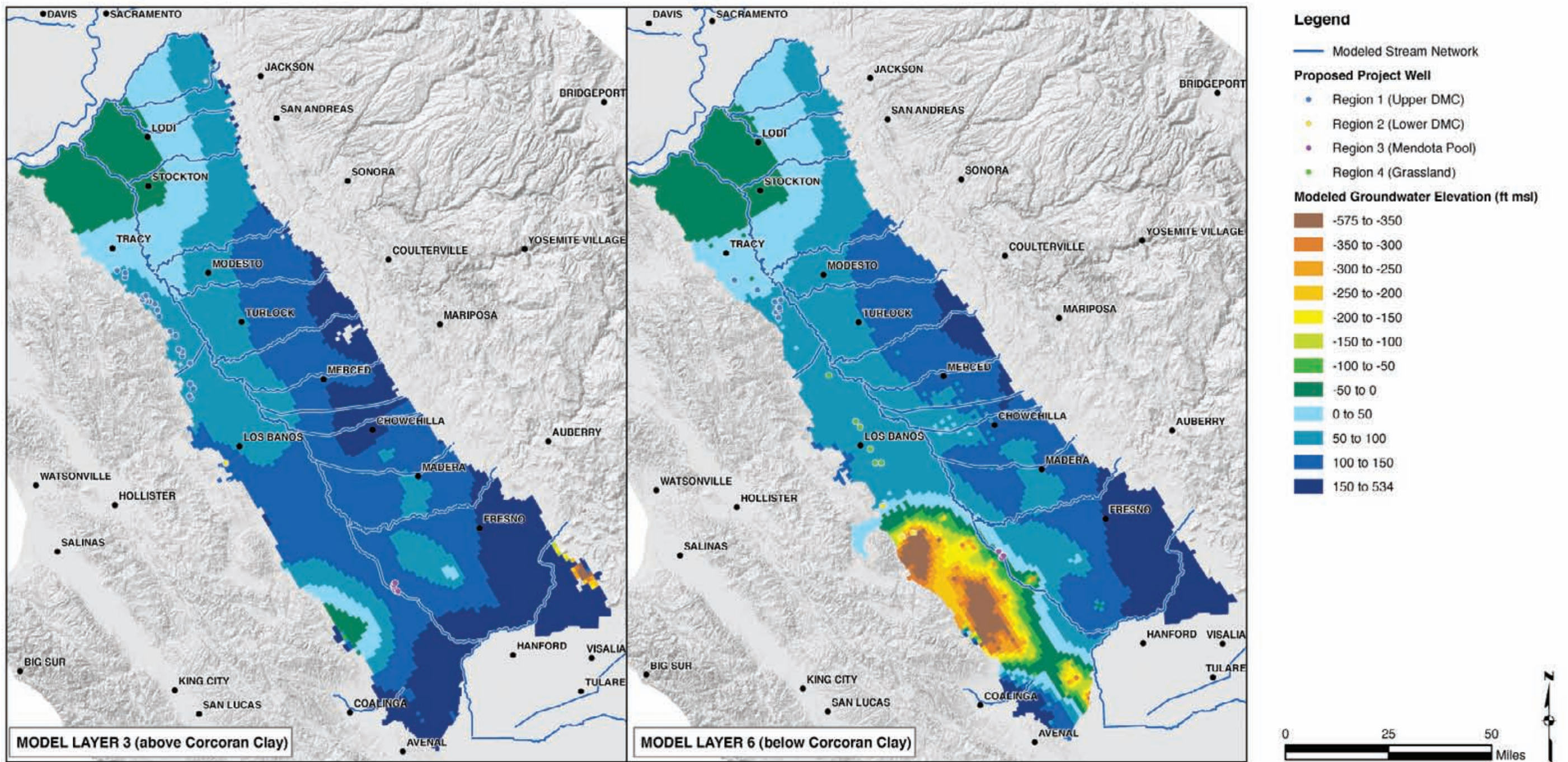


Figure 3.1-1  
Modeled September 1992 Groundwater Elevations above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay





the Corcoran Clay, the groundwater elevations may be considerably different than the top of the aquifer.

In the groundwater model, Layer 3 represents the semi-confined depth interval above the Corcoran Clay, and Layer 6 represents the confined depth interval below the Corcoran Clay. Groundwater elevations in Layer 6 typically are lower than those in Layer 3. In most areas, the difference appears to be less than 50 feet (Figure 3.1-1), but in the southern part of the San Joaquin Valley near Westlands Water District, the Layer 6 well elevations are much lower (up to about 500 feet lower) than the Layer 3 elevations. Region 3 is located at the edge of the area of very low well elevations for Layer 6.

Fluctuations in groundwater levels caused by pumping along the eastern boundary of the Westlands Water District have been somewhat less than for the central or western portions of the Westside subbasin. Schmidt provided lower zone (below the Corcoran Clay) water elevation contour maps for 1965, prior to San Luis Canal water deliveries. The 1965 water levels represent the lowest elevations for many of the wells in the Westside subbasin. Water elevations along the valley trough and Fresno Slough were about 0 feet to 25 feet msl. In contrast, the water elevations along the San Luis Canal to the west were -200 feet to -225 feet. Water elevations in 1986, representing full recharge to highest historical levels were 100–125 feet in the TID and JID area. Water levels had recovered to between about 50 feet and 75 feet along the San Luis Canal. Water levels in 1993, following the 1987–1992 drought, were about 25 feet along Fresno Slough near TID, and were -75 feet to -100 feet along the San Luis Canal.

Historical groundwater levels recorded in two representative monitoring wells located within the Fresno Slough area are shown in Figure 3.1-2. The groundwater levels depicted in these hydrographs show the declining levels in recent years resulting from a decreased availability of surface water deliveries and the effects of increased groundwater pumping on groundwater levels. The northern well had water elevations of about 120 feet in the 1950s and 1960s, increasing to 140 feet in the 1970s and 1980s. The water level declined to about 90 feet msl during the 1987–1992 drought period, recovered to 160 feet in the late 1990s (wet period) and has declined to about 140 feet in recent years. The range in historical elevations was about 70 feet, which is fairly moderate compared to other wells in the Westside subbasin.

A second monitoring well south of TID had a greater range of elevations. The southern well was about 100 feet msl in 1940, and declined to -20 feet msl in the early 1960s prior to San Luis Canal deliveries to Westlands Water District. The water elevations increased consistently until the late 1980s with a maximum elevation of about 120 feet msl. The well elevations declined in the early 1990s to about 20 feet msl and recovered to about 80 feet msl in recent years. It is difficult to know which of these patterns (if either) would characterize the regional water levels.

In 2001, TID acquired lands, including some of the associated water rights from those lands, and assumed water delivery responsibilities within the Fresno Slough WD. Since then, a series of five groundwater wells that pump from below the Corcoran Clay have been developed in this area due to its proximity to the Fresno Slough. These wells, developed between 2003 and 2008, are part of a network of groundwater wells regularly used for “transfer pumping” through Mendota Pool so that TID can “stockpile” pumped groundwater through temporary storage in Mendota Pool. TID developed joint groundwater management plans with FSWD, an indication of the districts’ involvement in management of their groundwater resources (Bureau of Reclamation 2009a).

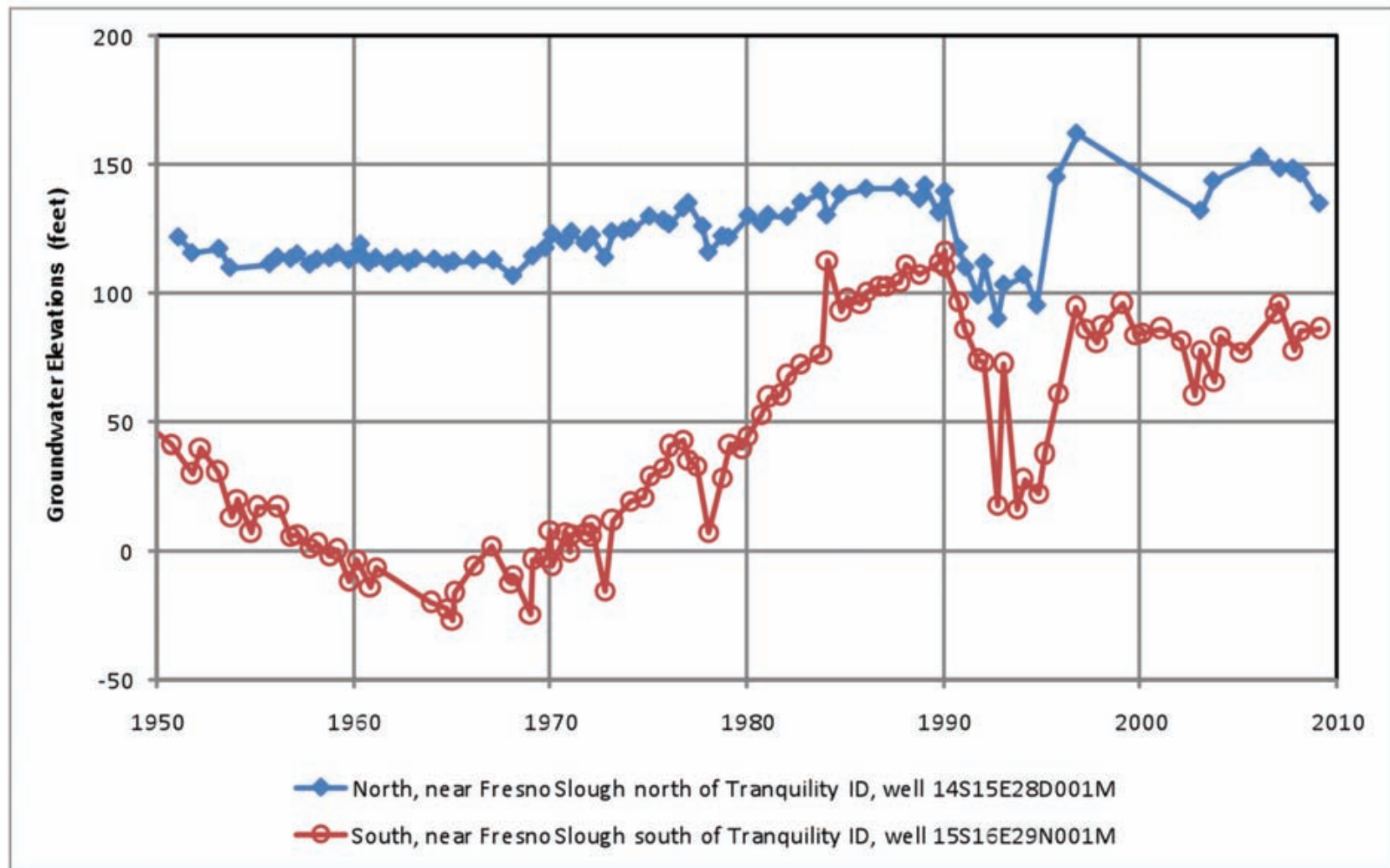
Pursuant to previous agreements regarding water quality associated with pumping groundwater for exchange in Mendota Pool, such pumped groundwater would be tested and held subject to water quality standards established for pumped groundwater entering Mendota Pool (e.g., 1,200 milligrams per liter [mg/l] total dissolved solids [TDS] and two µg/l selenium). TID would monitor groundwater levels in the TID Well Field to prevent groundwater levels from reaching what are believed to be historic low levels in order to ensure that there would be no inelastic subsidence in the area. Current water levels are at approximately 40 feet msl.

### ***Land Subsidence***

Land subsidence, a lowering of the ground surface over a large area, can be caused by several processes. Subsidence along the western side of the San Joaquin Valley has resulted almost entirely from compaction of clay layers in the groundwater basin as a result of groundwater withdrawal. Subsidence in this area has been studied extensively by the USGS (Bull 1975; Bull and Miller 1975; Bull and Poland 1975; Poland and Lofgren 1984). The amount and type of clay in basin sediments affect the total amount of subsidence possible. Alluvium derived from the Coast Ranges generally contains a greater total thickness of clay than Sierra sediments, and the clays are mostly of the relatively compressible type. The largest amounts of historical subsidence occurred where large water-level declines coincided with deposits of Coast Range alluvium.

The USGS (Galloway and Riley 1999) has estimated that the large quantity of groundwater pumping in the Westside subbasin caused some of the water-bearing sediments (i.e., clays) to be compacted and resulted in land subsidence ranging from one to 25 feet between 1926 and 1972. However, subsidence along the eastern boundary of the Westside subbasin (the valley trough) was less than four feet (moderate). Subsidence does not appear to be a major issue along Fresno Slough in the vicinity of TID and JID.





**Figure 3.1-2**  
**Groundwater Elevations Measured in Two Region 3 Wells**



### ***Groundwater Quality***

Chemical constituents of concern in the groundwater of the San Joaquin Valley include nitrate, boron, chloride, arsenic, molybdenum, iron, mercury, and uranium. In addition, agricultural herbicides and pesticides have been detected in the groundwater throughout the region (DWR 2003; Planert and Williams 2010). However, selenium and salinity are the constituents of greatest concern. Salinity is expressed as TDS or can be assessed with measurements of electrical conductivity (EC). TDS and selenium found in the western portion of the San Joaquin Valley Groundwater Basin originate from groundwater recharge in areas of marine sediments in the Coast Ranges.

Groundwater quality in the San Joaquin Valley is variable and depends on factors such as well depth (including location above or below the Corcoran Clay), soil composition, surface water quality, and agricultural practices. Because measurements generally come from functioning wells (i.e., wells with adequate water quality), the water quality assessment is inherently biased toward better water quality. The confined aquifer below the Corcoran Clay generally has lower TDS than the unconfined or semiconfined aquifer above the Corcoran Clay. However, the bottom of the confined aquifer is saline, so the depth of usable water in the confined aquifer is uncertain in Region 3. Water quality in the unconfined aquifer above the Corcoran Clay is more variable and less well-documented than the water quality in the confined aquifer below the Corcoran Clay.

Shallow groundwater (either perched or at the top of the unconfined layer) in the western San Joaquin Valley is often of poor quality. A number of factors such as shallow layers of impermeable clay, leaching from marine sediments, and concentration of chemical constituents as a result of irrigation and evaporation, have resulted in excessive levels of boron, chromium, mercury, and selenium (Planert and Williams 2010) in shallow groundwater of the western San Joaquin Valley. As a result, shallow groundwater often is not a suitable source of water.

Along the western San Joaquin Valley, TDS concentrations in groundwater are relatively high. In Region 3, TDS concentration in wells is relatively high and tends to vary between about 500 mg/L to 1,500 mg/L (Bertoldi et al. 1991). A recent report for Westlands WD (Kenneth D. Schmidt and Associates 2008) indicates that the water quality below the Corcoran Clay is better than the water quality above the Corcoran Clay in the TID region. TDS concentrations from six wells from below the Corcoran Clay ranged from 700 to 1,200 mg/l, with corresponding EC values of 1,300–1,700 microSiemens per centimeter ( $\mu\text{S}/\text{cm}$ ). The chloride concentrations were 40–100 mg/l and the boron concentrations were 1.2–1.8 mg/l. This water quality is acceptable for direct irrigation use (generally less than 1,250 mg/l of TDS or 2,000  $\mu\text{S}/\text{cm}$ ) or some blending with surface deliveries.

### 3.1.2 Environmental Consequences

#### ***No Action Alternative***

Under the No Action Alternative, surface water supplies would continue to be limited in some years and dependent on upstream water supply and Delta regulations. During the past several years, the CVP allocation for south-of-Delta agricultural contractors has been low: 50 percent in 2007, 40 percent in 2008, and 10 percent in 2009 and is 40 percent in 2010.

#### ***Proposed Action***

The Proposed Action would allow construction of seven new water wells that would each be capable of pumping about 1,000 acre-feet during year-round pumping under dry conditions. In addition to temporary and localized construction impacts, increased groundwater pumping during drought conditions could cause the following impacts in the water districts:

- temporary water quality impacts from construction activities;
- hydraulic interference (e.g., increased depth to water table) with other nearby wells;
- groundwater pumping overdraft (more than average sustainable recharge);
- land subsidence caused by pumping to below historical minimum water table level;
- increased salinity of agricultural water supply and soils;
- increased salinity of agricultural drainage and shallow groundwater; and
- reduced surface water (e.g., wetlands) as a result of groundwater pumping.

These potential impacts on water resources from the Proposed Action are discussed in the following impact assessment sections.

#### ***Impact Water-1: Temporary Impact on Water Quality from Construction Activities***

The Proposed Action would include construction of seven new wells and associated conveyance connections and appurtenant structures.

In general, the severity of construction-related water quality impacts depends on soil erosion potential; construction practices; the frequency, magnitude, and duration of precipitation events; and the proximity of construction to stream channels or water bodies. Construction of the Proposed Action would occur on relatively flat terrain (agricultural fields or orchards) in areas of low precipitation, so erosion potential would be very low.

The Proposed Action would not result in significant effects on water quality due to temporary construction activities.

#### *Impact Water-2: Interference with Water Level in Nearby Wells*

The USGS CVHM was used to investigate the potential groundwater impacts of the dry year pumping from these new wells on regional groundwater elevations. This model simulates monthly groundwater elevations in one-square mile cells (Faunt et al. 2009). The model simulates the historical groundwater conditions from April 1961 to September 2003. The monthly groundwater elevations in the aquifer above the Corcoran Clay (i.e., model Layer 6) and the hydraulic elevation in the aquifer below the Corcoran Clay have been compared for the historical pumping (no new wells) and the Proposed Action pumping (with seven new wells in Region 3). The historical pumping varies spatially and temporally within the San Joaquin Valley between wet years with lowest pumping and dry years with the most pumping.

The possible impact of the new wells interfering with existing wells in the region can be described using the simulated effects of the new pumping on groundwater levels in the aquifers above and below the Corcoran Clay. The new wells were simulated to be operated in about half of the years between 1961 and 2002, and the effects are greater in periods when the wells are used for multiple years. Simulated changes in water elevations in 1992, at the end of the six year drought of 1987–1992, provide an indication of the largest expected impact from the new wells at the end of an extended dry period.

Figure 3.1-3 shows the simulated groundwater elevation changes caused by pumping of the seven new wells. Because there are two distinct aquifers in Region 3, the changes in water elevations are shown for above the Corcoran Clay (Layer 3 in the CVHM) and below the Corcoran Clay (Layer 6 in the CVHM). There are four wells (in James ID) that would be screened above the Corcoran Clay and three wells (in TID and FSWD) that would be screened below the Corcoran Clay.

In the unconfined aquifer, the simulated groundwater elevations for September 1992 were lowered by less than five feet for all of Region 3 (Figure 3.1-3). Because the existing wells are designed to operate within the range of historical groundwater elevations, these simulated changes in groundwater elevations at other wells at the end of the six-year drought period would not be considered significant.

The simulated changes in the groundwater elevations of the confined aquifer (for September 1992) were less than 10 feet in most of the Region 3, but were greater than 10 feet in the vicinity of the three wells located below the Corcoran Clay. There were about 50 cells with a simulated reduction in groundwater elevation of more than 10 feet in the vicinity of the three new wells. This was the simulated

effect of pumping more groundwater with the new wells for irrigation within the districts. However, the simulated change in groundwater elevations at other existing wells outside the boundaries of the JID and TID was less than five feet.

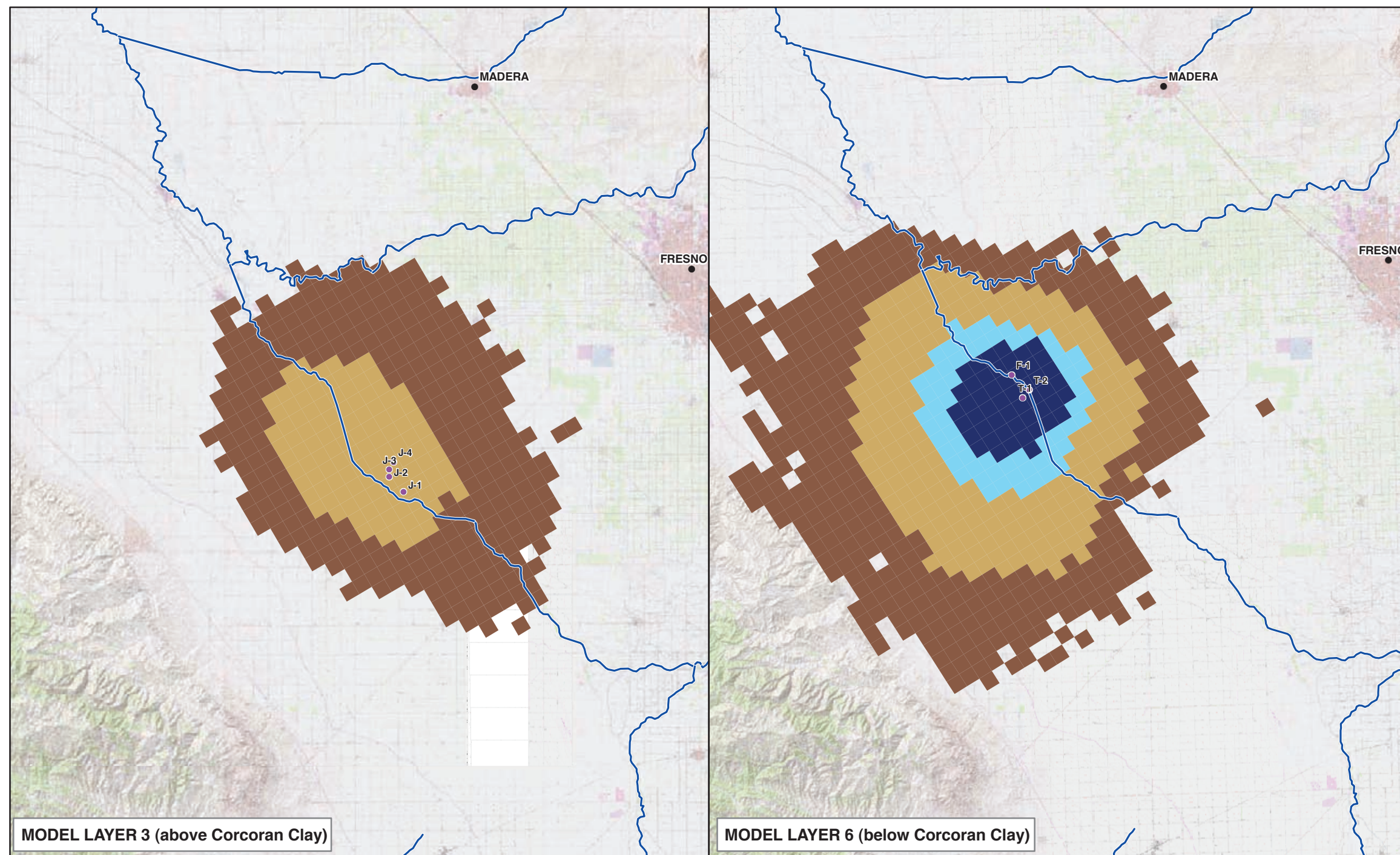
The CVHM has a model grid resolution of one square mile. The result is that groundwater-level changes that occur at scales less than one square mile cannot be adequately simulated by the CVHM. One example of this is the groundwater levels that occur close to a production well. In reality, the operation of a production well creates a steep cone of depression in the water table centered on the pumping well, and water levels increase with increasing distance from the well. Yet, CVHM reports the average simulated groundwater elevation that would occur over the entire square mile grid cell. In most cases, the square mile grid spacing is adequate to simulate the regional effects of increased groundwater pumping on groundwater levels. However, if a domestic or agricultural well lies within a quarter-mile or half-mile from a proposed pumping well, the potential exists for a new well to create a cone of depression that would interfere with these wells. This potential lowering of groundwater elevations in the vicinity of existing wells is not a significant impact because it is assumed that adjacent wells are constructed to operate within the historical fluctuations that have occurred over the modeled period, existing wells also create cones of depression and pumps are set low enough in the well to deal with this phenomenon, and the districts and landowners would continue to operate according to the guidelines provided in the approved groundwater management plan whereby the districts participate in monitoring groundwater levels and adjusting well use to ensure all users have an available supply.

### *Impact Water-3: Increased Pumping Contributes to Overdraft of Regional Groundwater Basin*

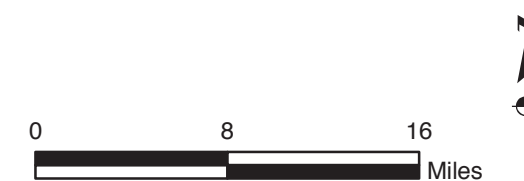
Groundwater overdraft of a groundwater basin is caused by long-term pumping that is greater than the long-term recharge of the groundwater storage. A reduction in the groundwater elevations during dry periods (Figure 3.1-3), with increased groundwater elevations in normal or wet years is the expected and sustainable conjunctive water use pattern for Region 3. Figure 3.1-4 shows representative groundwater elevation series (hydrographs) for the unconfined aquifer and the confined aquifer in Region 3 for some of the model grid cells most affected by the new wells.

The top graph shows the simulated groundwater elevations for the unconfined aquifer with historical pumping and with project pumping from the model grid cell with the greatest simulated project-related reduction in groundwater elevations. The historical groundwater elevations varied from about 100 feet msl in 1992 to a maximum of about 150 feet msl in the early 1970s and about 125 feet in the late 1990s (wet periods). Judging from this moderate range of water table elevations, the historical pumping from the unconfined aquifer in Region 3 is





- Legend**
- Modeled Stream Network
  - Proposed Project Well**
    - Region 1 (Upper DMC)
    - Region 2 (Lower DMC)
    - Region 3 (Mendota Pool)
    - Region 4 (Grassland)
  - Modeled Region 3 Water-level Lowering (ft)**
    - 1 to 2
    - 2 to 5
    - 5 to 10
    - > 10



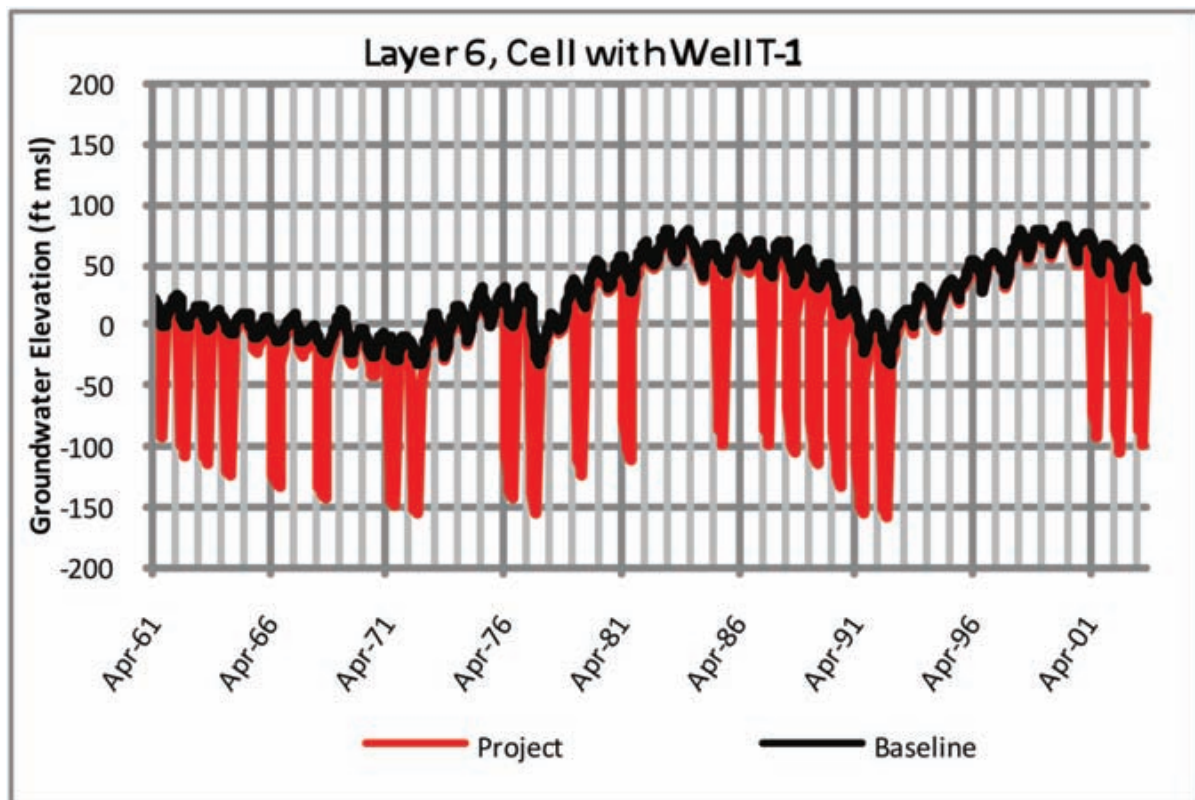
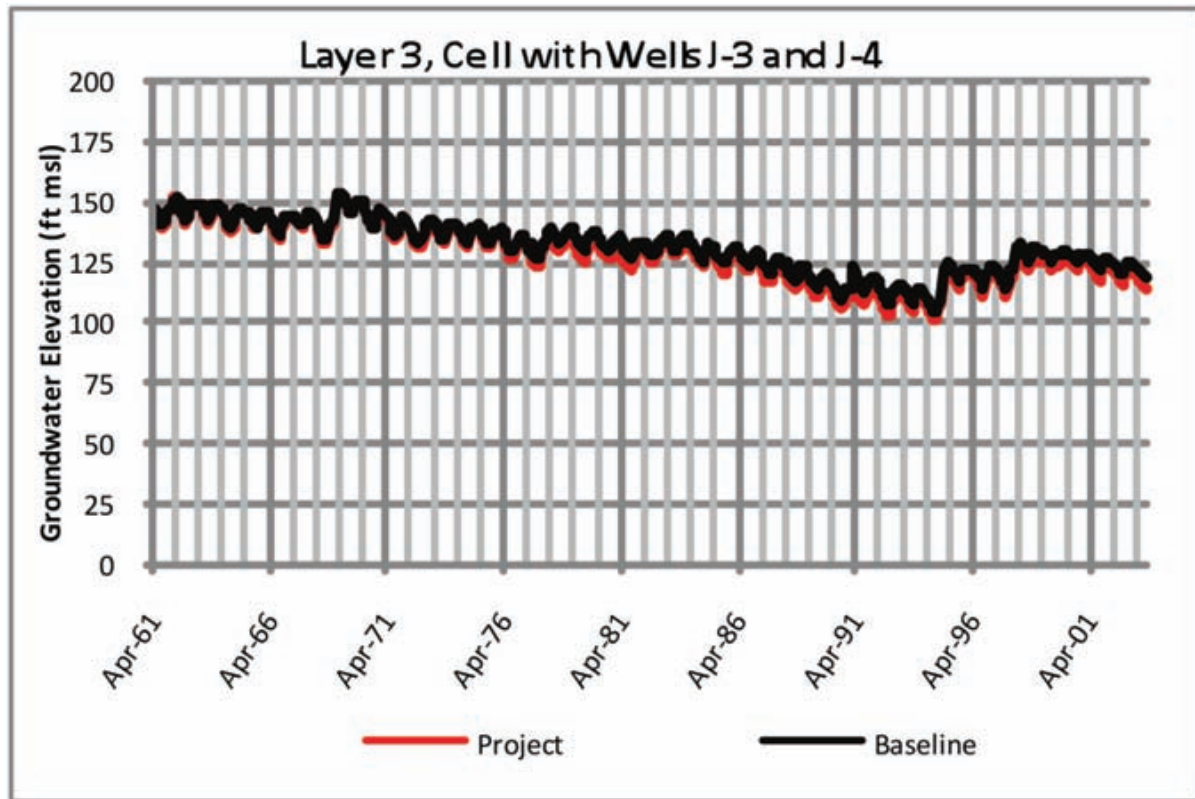
**Note**  
Proposed project wells with pumping assigned in Model Layer 3 are displayed on the Model Layer 3 image, whereas those assigned in Model Layer 6 are displayed on the Model Layer 6 image.

**Modeled Incremental Water-level Lowering Due to Implementation of Region 3 Proposed Project**  
ARRA Drought Relief Project

**Figure 3.1-3**  
**Simulated Effect of Project on Region 3 Groundwater Levels during September 1992 above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay**







**Figure 3.1-4**

**Simulated Effect of Project on Selected Groundwater Elevations  
above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay**



relatively low. The four new wells would reduce the groundwater elevation therein only by about two feet by the end of a multiyear drought similar to 1987–1992. Further, the model suggests that groundwater levels would recover within a few years following such a multiyear drought.

The bottom graph in Figure 3.1-4 shows the simulated groundwater elevations in the confined aquifer with historical pumping and with the three new wells from the model cell with the greatest simulated project-related reductions in groundwater elevations. The historical groundwater elevations varied from about -25 feet msl in 1992 to a maximum of about 75 feet msl in the early 1980s and the late 1990s (wet periods).

The simulated reduction in groundwater elevation from the three new wells was about 150 feet under Proposed Action pumping conditions, but the elevations returned to the historical elevations rapidly once Proposed Action pumping ceased. The simulated rapid reduction in groundwater elevations each year during the pumping season is the expected temporary local hydraulic effect of the three new wells screened in the confined aquifer, and is not considered a significant impact. The long-term changes in the simulated groundwater elevations indicate that there would be no permanent groundwater overdraft effects from the new wells, and therefore there would be no significant effect.

#### *Impact Water-4: Increased Pumping Contributes to Land Subsidence*

Subsidence is unlikely to be a significant Proposed Action impact because historical subsidence was not a large problem in Region 3. Region 3 subsidence was estimated to have been 1 to 3 feet for 1961 and 1975, an era of relatively large subsidence in the San Joaquin Valley. Greater subsidence (up to 8 feet) was estimated for areas south and west of Region 3 (Williamson et al. 1989). In addition, under the groundwater management plans, conjunctive pumping in dry years would maintain groundwater storage within the historical range of groundwater elevations, so future subsidence is unlikely. Because subsidence is unlikely to occur and because the simulated groundwater elevations were within the historical range of groundwater elevations in Region 3, this impact would not be significant.

#### *Impact Water-5: Increased Pumping Increases Salinity of Applied Water and Soil Water and Damages Sensitive Crops*

Some crops are more sensitive to salinity than others, but most crops can produce maximum yields with salinity of less than 500 mg/l in the applied water. Applied water salinity of 500 mg/l corresponds to soil salinity of about 1,000–2,500 mg/l (two to five times the applied water salinity), depending on the drainage fraction (i.e., drainage/applied water) and soil characteristics (Ayers and Westcott 1985). A salinity of 2,000 mg/l is considered an upper limit for acceptable applied water,

with severe salinity problems above this salinity (requires extreme leaching for soil salinity to remain acceptable). The water quality of each well would be tested for salinity and other parameters as part of the established SLDMWA groundwater management plan monitoring program, and the landowner (or district) would decide whether to develop and use the well during drought conditions.

Because groundwater from the new wells would be used for agriculture, water use would be restricted only by the requirements of the crops being grown and the availability of surface water to blend with the groundwater. High levels of TDS or boron in groundwater could be a concern for farmers. Because most landowners would be able to blend well water with surface water, most new wells are expected to have acceptable water quality with well water TDS of less than 1,500 mg/l. Blending the groundwater with some surface water still would increase the normal salinity of the applied water and may contribute to the cumulative salinity impacts from high soil salinity in these districts. Direct salinity impacts of the Proposed Action on irrigated crops would not be significant because the salinity of pumped groundwater must be suitable for direct use on local crops (perhaps with some blending).

*Impact Water-6: Increased Pumping Increases Salinity of Drainage Water and Groundwater below Irrigated Lands*

Groundwater pumping of higher-salinity water would increase the salinity near the top of the unconfined aquifer (or shallow perched aquifer) because the recharge salinity would be about five times the pumped salinity for an assumed irrigation efficiency of about 80 percent (drainage of 20 percent the applied water). The Proposed Action would not cause significant overall deterioration of water quality in shallow groundwater or drainage water because the amount of additional groundwater pumping represents only a small fraction of the total amount of water applied in the San Joaquin Valley. Poor water quality (salinity, selenium, and boron) in shallow groundwater is a problem in some regions of the San Joaquin Valley, but the problem would not be substantially increased by the Proposed Action. This impact would not be significant.

*Impact Water-7: Reduced Surface Water as a Result of Groundwater Pumping*

The additional groundwater pumping associated with the Proposed Action wells is not expected to significantly draw down the aquifer as a whole, but pumping at individual wells could cause local depressions in the groundwater elevation, which potentially could affect local surface water (i.e., ponds or wetlands). This effect would occur only if there is a hydraulic connection between the aquifer and the surface water. If the surface water is isolated from the groundwater either by dry soil or by an impermeable clay layer, groundwater pumping is unlikely to affect surface water.

The wells near Fresno Slough have some potential to pull water from the channels and wetlands connected with Mendota Pool. However, studies have indicated that there is no link between Mendota Pool or the Mendota Wildlife Area (WA) wetlands and groundwater pumped from wells adjacent to the pool (AECOM 2009). This impact is not significant.

### ***Cumulative Effects***

Groundwater overdraft, subsidence, and groundwater quality are cumulative water resources issues of concern in the San Joaquin Valley. This cumulative analysis relied primarily on the CVHM and was based on the Proposed Action combined with the additional 42 wells proposed by Reclamation for Regions 1, 2, and 4. The location of these wells is shown in Figure 3.1-5. There are insufficient data on other potential groundwater development projects to be included in the model. This slight contribution may be overstated if some of these wells were constructed in the absence of funding provided by Reclamation. However, it was assumed that no wells would be constructed under the No Action Alternative. Based on personal communications with the participating districts and the last two years of drought where many wells have been constructed in the San Joaquin Valley without ARRA funding, this assumption may exaggerate the incremental contribution of the Proposed Action.

The CVHM model (Faunt et al. 2009) was used to simulate the long-term variations in San Joaquin Valley groundwater conditions, including the cumulative effects of the proposed 49 ARRA new wells (seven within Region 3) on the groundwater elevations of the unconfined aquifer above the Corcoran Clay and the confined aquifer below the Corcoran Clay. The long-term changes in aquifer groundwater elevations indicate the effects of drought conditions (increased pumping) and wet year conditions (increased recharge) in the conjunctive water use patterns within the region of the ARRA new wells. The cumulative impacts assessment also relies on the existing groundwater management plans that require water elevation monitoring and are intended to assist managers in maintaining aquifer water elevations within the recent historical range, to prevent long-term groundwater overdraft and minimize additional land subsidence.

Figure 3.1-5 shows the cumulative drawdown estimated for the end of the six-year drought of 1987–1992. There were a total of 28 new wells above the Corcoran Clay (shown on left-side map) and a total of 21 new wells below the Corcoran Clay (shown on right-side map). The simulated reductions in water elevations in the unconfined aquifer were generally less than five feet. The simulated incremental reductions in groundwater elevations in the unconfined aquifer due to cumulative pumping were less than five feet throughout most of the area shown on Figure 3.1-5. The simulated reductions in the groundwater elevations in the confined aquifer were less than 10 feet throughout most of the

area shown on Figure 3.1-5, except in the vicinity (within a mile) of the new wells. The overlap of hydraulic effects from wells in each of the four regions was generally small because the regions are generally separated from each other by at least 10 miles. The changes in the aquifer groundwater elevations caused by historical pumping between wet years (with minimum groundwater pumping) and dry years (with five times the minimum groundwater pumping) are much larger than the cumulative effects from these 49 proposed new wells.

#### *Groundwater Overdraft*

Groundwater overdraft is unlikely because these new wells would be part of a groundwater management program (AECOM 2009) for conjunctive drought water supply (i.e., during most years irrigation with surface water supplies would be augmenting the aquifer recharge). Each water district would be limited to pumping that maintains groundwater elevations within the historical range of groundwater elevations. Because the new wells would be monitored and included in the groundwater management plans, the cumulative impacts on aquifer overdraft would not be significant.

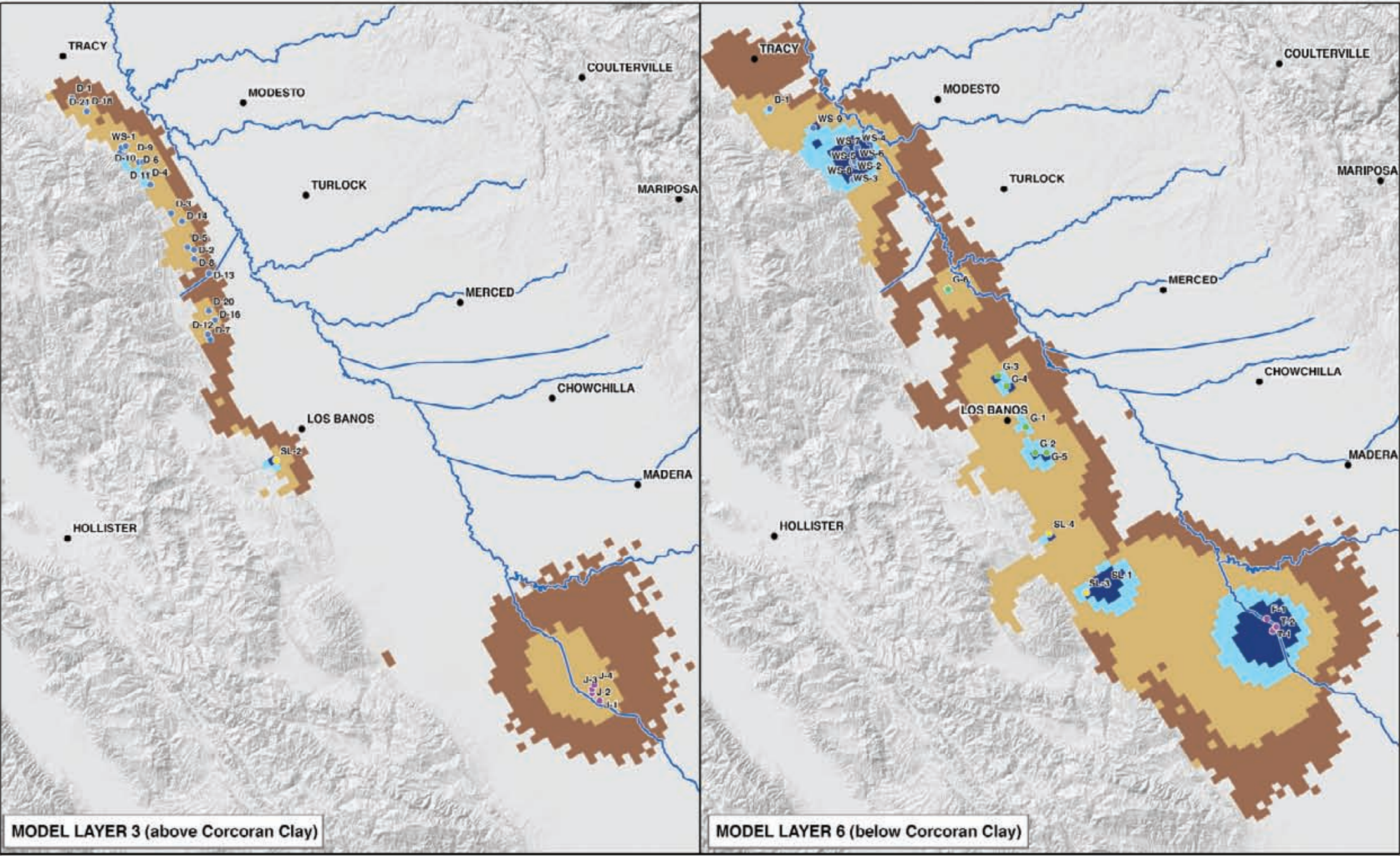
#### *Land Subsidence*

The Proposed Action is not expected to result in land subsidence which is often associated with lowered groundwater elevations caused by groundwater pumping in areas with high clay content. Because the ARRA proposed new wells would be part of the conjunctive groundwater management program, pumping would be limited to maintain aquifer water levels within the historical range of water elevations, so there would be no cumulative effect on subsidence.

#### *Increased Shallow Groundwater Salinity*

Groundwater pumping of water with higher salinity than surface irrigation water would increase the salinity near the top of the unconfined (or shallow perched) aquifer because the recharge salinity would be about five times the pumped water salinity. Recharge is assumed to be about 20 percent of the applied water. Increased salinity of the shallow groundwater is a cumulative impact for the San Joaquin Valley groundwater basin, but the Proposed Action would not cause substantial deterioration of water quality in shallow groundwater because the amount of groundwater pumping associated with the Proposed Action represents a small increase (less than two percent of the total amount of dry year conjunctive pumping in the vicinity of the proposed new ARRA wells) and the wells would be used in only about half of the years. Furthermore, the majority of the applied water in Region 3 is from surface water with a much lower salinity. This cumulative shallow groundwater salinity impact would not be substantially increased by the Proposed Action.





**Legend**

— Modeled Stream Network

**Proposed Project Well**

- Region 1 (Upper DMC)
- Region 2 (Lower DMC)
- Region 3 (Mendota Pool)
- Region 4 (Grassland)

**Modeled Cumulative Water-level Lowering (ft)**

- 1 to 2
- 2 to 5
- 5 to 10
- > 10



**Modeled Incremental Water-level Lowering Due to Implementation of the Cumulative Proposed Project**  
ARRA Drought Relief Project

**Note**  
Proposed project wells with pumping assigned in Model Layer 3 are displayed on the Model Layer 3 image, whereas those assigned in Model Layer 6 are displayed on the Model Layer 6 image.

**Figure 3.1-5**  
**Simulated Cumulative Effect of ARRA Wells on Groundwater Levels in the San Joaquin Valley during September 1992 above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay**





## 3.2 Land Use

### 3.2.1 Affected Environment

Region 3 is located in the San Joaquin Valley of California, in Fresno County. As part of the Proposed Action, seven wells would be constructed in the region.

#### *Environmental Setting*

##### *Fresno County*

Agriculture is the most common land use in Fresno County, accounting for approximately 1,863,147 acres, 48 percent, of the 3,843,200 acres in the county (Fresno County 2000). In 2008, field crops (mostly cotton, grains, and pasture) composed the largest portion of this acreage, followed by fruit and nut crops and vegetable crops (Fresno County 2008). The seven Proposed Action wells to be constructed would be located in the Westside Valley Area of Fresno County. Fresno County has approximately 1,385,455 acres of important farmland (CDC 2006). Table 3.2-1 provides land use information for each well, including the county zoning designation, the California Department of Conservation (CDC) farmland mapping designation, whether the proposed well would be constructed on a property under Williamson Act contract (defined below under the Regulatory Setting section), and the water district of which the well is a part.

**Table 3.2-1.** Fresno County Land Characteristics

Well No.	Zoning	Farmland Designation	Williamson Act Contract	Water District
T-1	Agriculture	Farmland of Statewide Importance	Yes	TID
T-2	Agriculture	Farmland of Statewide Importance	No	TID
F-1	Agriculture	Farmland of Statewide Importance	No	FSWD
J-1	Agriculture	Prime Farmland	Yes	JID
J-2	Agriculture	Prime Farmland	Yes	JID
J-3	Agriculture	Prime Farmland	Yes	JID
J-4	Agriculture	Prime Farmland	No	JID

Sources: Fresno County 2000, CDC 2006, 2007.

## ***Regulatory Setting***

### ***Farmland Protection Policy Act***

The purpose of the Farmland Protection Policy Act (FPPA) is to minimize the extent to which federal programs contribute to the irreversible conversion of farmland to nonagricultural uses, and to ensure that federal programs are administered in a manner that will be compatible with state, local, federal, and private programs and policies to protect farmland. For the purpose of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be used currently for agriculture. These lands may be forest land, pasture land, cropland, or other land but may not be water or urban built-up land.

### ***Farmland Designations***

The CDC produces maps used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status. Prime farmland has the best combination of physical and chemical characteristics to sustain long-term agricultural production. Farmland of statewide importance is similar to prime farmland, but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Unique farmland consists of lesser-quality soils used for the production of the state's leading agricultural crops and usually is irrigated. Farmland of local importance is land that does not meet the definitions of prime, statewide, or unique, but is or has been used for irrigated pasture, dryland farming, confined livestock, aquaculture, and grazing land.

### ***Williamson Act***

The Williamson Act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. Several wells in Region 3 are located on properties under Williamson Act contracts.

### ***Fresno County General Plan***

The Fresno County General Plan contains goals and policies to promote the long-term conservation of productive and potentially productive agricultural lands, as well as accommodating agricultural-support services and agriculture-related activities that support viable agriculture. Also included is a policy to support programs that seek to protect and enhance surface water and groundwater resources critical to agriculture.

### **3.2.2 Environmental Consequences**

This section quantitatively describes the land use effects of constructing and operating the seven groundwater wells in the TID, FSWD, and JID.

#### ***No Action Alternative***

Under the No Action Alternative, it is assumed that the districts and west side farmers would continue to use existing water supplies to meet demand.

#### ***Proposed Action***

##### ***Impact LU-1: Permanent Conversion of Important Farmland***

Under the Proposed Action, all seven wells would be constructed in areas of Fresno County that are considered important farmland. Each well site would permanently occupy an area of approximately 30 feet by 30 feet, which would mean a total permanent loss of approximately 0.15 acre of important farmland for the seven wells. This permanent conversion of important farmland would be negligible compared to the total important farmland within each county. Although there would be a permanent loss of important farmland, the purpose of the wells is to supply water in dry years to maintain agricultural production. Without the additional wells, there would be potential for land to be taken out of agricultural use because of lack of water.

Therefore, the benefits of the well installation would outweigh the small loss of important farmland. As such, this impact is not significant.

##### ***Impact LU-2: Temporary Loss of Important Farmland***

Under the Proposed Action, each well would have a temporary disturbance area of approximately 10,000 square feet, which would temporarily remove land from agricultural production. Similar to the effects of Impact LU-1, the total amount of important farmland that would be temporarily disturbed would be negligible (0.00008%) compared to the total amount of important farmland in Fresno County.

Additionally, the disturbance area would be only temporary, and the area would be returned to agricultural use following the completion of construction activities.

*Impact LU-3: Incompatibility with County Land Use Designations*

The wells would be located in areas that are zoned as agricultural. Constructing and operating the seven wells would be consistent with the agricultural land use designations of the Fresno General Plan and therefore, there would be no impact.

*Impact LU-4: Incompatibility with Adjacent Land Uses*

The wells would be located in areas surrounded by agricultural land.

As the purpose of the wells is to support this land use, there would be no conflict with adjacent land uses, and this would not be a significant impact.

***Cumulative Effects***

The Proposed Action involves only a minor conversion of open space, public/quasi public, and CDC-designated important farmland. The wells would be consistent with existing surrounding land uses, and their operation would enhance agricultural uses in the San Joaquin Valley. Combined with other projects, there would not be any significant cumulative impacts.

### **3.3 Biological Resources**

This section describes the existing environmental conditions and the consequences associated with the Proposed Action on biological resources. For the purpose of this EA, biological resources include vegetation, wildlife, and waters of the United States. There is no suitable aquatic habitat for fisheries resources in the action area, and therefore fisheries resources (including federally listed fish) are not discussed in this section.

Table 3.3-1 provides a summary of the sensitive biological resources associated with each well and associated power and water tie-ins. As discussed in this section and summarized in Table 3.3-1, most of the sensitive biological resources associated with the Proposed Action elements are special-status wildlife species and associated habitats for these species.

**Table 3.3-1.** Sensitive Biological Resources Identified as Potentially Occurring in the Proposed Action Area

<b>Irrigation or Water District</b>	<b>Well ID #</b>	<b>WPTDA</b>	<b>Water Tie-In</b>	<b>Power Tie-In</b>	<b>Habitat</b>	<b>Resources</b>
TID	T-1				Agricultural crops; canal; wetland ditch; ruderal agricultural	None
TID	T-2				Agricultural crops/canals Unnamed creek adjacent to well pad	SJLF/BUOW/ AMBA
FSWD	F-1		X	X	Disked agricultural field; ruderal/drainage with hydrophytes Fresno Slough and associated riparian habitat adjacent to well pad	SJKF/BUOW/ AMBA
JID	J-1	X	X	X	Annual grassland/canal	SJKF/BUOW/ AMBA
JID	J-2				Agricultural crops	None
JID	J-3				Agricultural crops	None
JID	J-4				Agricultural crops; canal; ruderal	None

AMBA = American badger.

BUOW = burrowing owl.

SJKF = San Joaquin kit fox.

X = habitat present for biological resources.

### 3.3.1 Affected Environment

#### *Action Study Area*

The biological study area included the following Proposed Action elements: the temporary construction footprint, the permanent well structure and pad, connection of the well power source to existing Pacific Gas and Electric Company (PG&E) electrical transmission lines, and connection of well sites to existing water conveyances. No downstream effects would occur because the water from the new wells would be going into irrigation canals or applied to crops. The temporary construction footprint at each proposed well location was assumed to encompass approximately 10,000 square feet, with additional temporary access to water and power, where necessary, whereas the permanent well and pad are expected to encompass 1,100 square feet. Construction staging is assumed to be sited within the temporary construction footprint. The study area included an

additional 250 feet outside these Proposed Action elements to support an evaluation of the total area of potential effect on biological resources.

### **Sources of Information**

The key sources of information consulted to prepare this biological resources section are listed below.

- A California Natural Diversity Database (CNDDDB) records search for the action area. (2010. RareFind 3, Version 3.1 March 2010 update, Sacramento, California: California Department of Fish and Game).
- A USFWS list (dated May 14, 2010) of endangered, threatened, and candidate plant species for the Jamesan, San Joaquin, Tranquillity, Dos Palos, Broadview Farms USGS 7.5-minute quadrangles (U.S. Fish and Wildlife Service 2010).
- The California Native Plant Society's (CNPS's) 2010 online Inventory of Rare and Endangered Plants of California (2010. Inventory of Rare and Endangered Plants of California. Available: <<http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>>. Accessed: April 2010.)
- Hickman, J. C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.
- USFWS. 1996a. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants*. September 23. Sacramento, CA.
- Aerial imagery source: ESRI I3 Prime Imagery

### **Field Survey**

Biological field surveys were conducted in the study area on April 29 and May 24, 2010. A combination of aerial photograph interpretation, pedestrian surveys at select well and water and power tie-ins, and driving along access roads to these Proposed Action elements were used to survey for biological resources. In general, the purpose of the field surveys was to:

- Characterize existing conditions, habitat types, and wildlife habitat uses.
- Evaluate the potential for occurrence of special-status species and locate special-status species or signs of those species that may have been identifiable during the April and May field visits.
- Determine the need for additional field surveys (e.g., return to complete botanical surveys to identify late-blooming special-status species).

- Identify and map areas (e.g., drainages and canals) that may qualify as waters of the U.S. and subject to regulation by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA.
- Determine whether a formal wetland delineation would be required.

### 3.3.2 Existing Conditions

#### *Habitat Types*

The Proposed Action area has historically been heavily modified by agricultural and infrastructure-related activities, and as a result, largely lacks native habitats. The three major habitat types found in the Proposed Action area and described below are ruderal annual grassland, agriculture, and waterways (irrigation ditches, creeks, and canal systems).

#### *Ruderal Annual Grassland*

Ruderal annual grassland occurs in fallow fields, orchards, canals, and along public and private agricultural roads in the Proposed Action area. The grassland contains vegetation that is indicative of disturbance associated with the site's past and ongoing human activities. Annual grasses are the dominant species and consist of soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), slender wild oat (*Avena barbata*), and Italian ryegrass (*Lolium multiflorum*). Other nonnative annual grasses observed were foxtail barley (*Hordeum murinum* ssp *leporinum*) and rattail fescue (*Vulpia myuros* var. *myuros*). Nonnative forbs that tend to colonize disturbed area quickly also were well represented, and species observed were yellow star-thistle (*Centaurea solstitialis*), stinkweed (*Diuriscus graveolens*), Russian thistle (*Salsola tragus*), black mustard (*Brassica nigra*), prickly lettuce (*Lactuca serriola*), bristly ox-tongue (*Picris echioides*), and Mediterranean mustard (*Hirschfeldia incana*).

Annual grasslands provide breeding and foraging habitat for small mammals, birds, amphibians, and reptiles. Annual grasslands also provide foraging habitat for coyote (*Canis latrans*) and many birds, including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), and western meadowlark (*Sternella neglecta*). Grasslands near open water also may be used by a wide variety of waterfowl and wading birds that require resting, breeding, and foraging areas close to water. Annual grassland also provides habitat for special-status wildlife, including northern harrier (*Circus cyaneus*), San Joaquin kit fox (*Vulpes macrotis mutica*), and American badger (*Taxidea taxus*).

### *Agriculture*

Agriculture dominates the Proposed Action area and includes a variety of fruit and nut orchards. Fallow agricultural land occurs in the study area and consists of disked, open areas. As described above, ruderal annual grassland occurs within and along the edges of the orchards and dominates fallow agricultural land.

Agricultural lands are established on fertile soils that historically supported abundant wildlife. The quality of habitat for wildlife is greatly diminished when the land is converted to agricultural uses and is intensively managed. Many species of rodents and birds have adapted to agricultural lands, but they are often controlled by fencing, trapping, and poisoning to prevent excessive crop losses. However, certain agricultural lands have become important habitats for wintering waterfowl and breeding and wintering raptors. Wildlife species associated with agricultural lands include mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), sandhill crane (*Grus canadensis*), various raptor species, egrets, and many species of rodents (Mayer and Laudenslayer 1988.) Special-status wildlife that may forage in alfalfa fields in the study area include northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*) and San Joaquin kit fox.

### *Irrigation Ditches, Canals, and Creeks*

The Proposed Action area contains a variety of agricultural irrigation ditches and large water conveyance systems such as the DMC. Two natural creek systems occur in the action area (an unnamed creek and Fresno Slough). The two creek systems and associated riparian woodland habitat occur adjacent to Well T-2 (unnamed creek) and F-1 (Fresno Slough). Both of these creeks and associated riparian habitat will be avoided by the Proposed Action.

The canals and irrigation ditches in the Proposed Action area appear to be constructed in uplands and are not realigned natural creek systems. Irrigation ditches and canals in the Proposed Action area are earthen and concrete and are managed systems with no wetland or woody riparian vegetation.

Open water portions of drainages and canals provide foraging habitat for aquatic bird species such as double-crested cormorant (*Phalacrocorax auritus*) and grebes (Podicipedidae), and waterfowl. Open water habitat also may provide foraging habitat for other bird species, including belted kingfisher (*Ceryle alcyon*), swallows (Hirundinidae), and black phoebe (*Sayornis nigricans*).

### ***Special-Status Species***

For the purpose of this EA, special-status species are those that are legally protected under the federal Endangered Species Act (ESA), California



Endangered Species Act (CESA), or other applicable federal or state statutes (e.g., Migratory Bird Treaty Act [MBTA]) and include the following:

- Species listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.12 [listed plants], 50 CFR 17.11 [listed animals], various notices in the Federal Register; proposed species)].
- Species that are candidates for possible future listing as threatened or endangered under the ESA (73 FR 75176, December 10, 2008).
- Species protected under the MBTA (16 USC 703), which enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds.
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 California Code of Regulations [CCR] 670.5).
- Animal species of special concern to the CDFG (CDFG 2009).
- Animals fully protected in California (California Fish and Game Code Sections 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).

### *Special-Status Wildlife*

Twenty-six special-status wildlife species are known or have the potential to occur in the Proposed Action vicinity. The status, distribution, habitat, and potential for occurrence in the study area for each of these species are listed in Table 3.3-2. Eleven of the 26 species identified have potential to occur in the study area based on the presence of suitable habitat or known occurrences (western pond turtle, northern harrier, golden eagle, Swainson's hawk, white-tailed kite, western burrowing owl, loggerhead shrike, tricolored blackbird, pallid bat, San Joaquin kit fox, and American badger). Losses of foraging habitat for northern harrier, golden eagle, Swainson's hawk, white-tailed kite, loggerhead shrike, and tricolored blackbird would be small relative to existing amount in the surrounding area. Therefore, there would be no significant effects on special-status bird foraging habitat. Preconstruction surveys for special-status migratory birds will be conducted in all well locations that will be under construction during the breeding season.

Both cliff and barn swallows were observed nesting in several locations under bridges over canals. None of the bridges would be affected during construction, and there would be no significant effects on nesting swallows.

Additionally, non-special-status migratory birds could nest in the study area. Although these species are not considered special-status wildlife, their occupied

nests and eggs are protected by California Fish and Game Code 3503 and 3503.5 and the MBTA.

### *Special-Status Plants*

Two federally listed plant species were identified as having the potential to occur in the action area (Table 3.3-3). After conducting the field survey and reviewing existing species lists and databases for the geographic region (USFWS lists, CNDDDB, CNPS Inventory of Rare and Endangered Vascular Plants of California), biologists determined that the Proposed Action area has low to no potential to support any of these plant species. As described above, the Proposed Action area is primarily agricultural lands and has very little natural habitat that could support federally listed plants with potential to occur in the vicinity of the Proposed Action area. In addition, no special-status plants have been recorded on or near the well sites (CNDDDB 2010).

Therefore, this analysis assumes that no special-status plants (as defined above) occur in the action area and none would be affected by the Proposed Action. Special-status plants are not discussed further in this section.

### ***Regulatory Setting***

State and federal regulations and laws that apply to the biological resources present in the Proposed Action area are described in this subsection.

### *Endangered Species Act*

The ESA protects fish and wildlife species and their habitats that have been identified by the USFWS as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments (DPSs) that are in danger of extinction through all or a significant portion of their range. *Threatened* refers to those likely to become endangered in the near future.

The ESA is administered by USFWS and the National Marine Fisheries Service (NMFS). In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes, whereas other listed species are under USFWS jurisdiction. Provisions of Sections 7 and 9 of ESA are relevant to this project and are summarized below.

### **Section 7: Endangered Species Act Authorization Process for Federal Actions**

Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies. It applies to actions that are conducted, permitted, or

funded by a federal agency. Under Section 7, the federal agency conducting, funding, or permitting an action (the federal lead agency) must consult with USFWS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat.

Lead agencies determine the extent to which a proposed action would affect listed species or designated critical habitat. For the Proposed Action, Reclamation will determine whether it would result in effects. If a proposed action “may affect” a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the expected effect.

If a proposed action is “not likely to adversely affect,” the lead agency drafts a letter to the USFWS or NMFS describing the proposed action and the reasons for determining that the action is not likely to adversely affect a federally listed species or designated critical habitat.

### **Section 9: Endangered Species Act Prohibitions**

Section 9 prohibits the take of any wildlife species federally listed as endangered. Take of threatened species also is prohibited under Section 9, unless otherwise authorized by federal regulations.<sup>1</sup> *Take*, as defined by ESA, means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” *Harm* is defined as “any act that kills or injures the species, including significant habitat modification.” In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

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<sup>1</sup> In some cases, exceptions may be made for threatened species under Section 4[d]. In such cases, USFWS or NMFS issues a “4[d] rule” describing protections for the threatened species and specifying the circumstances under which take is allowed.

**Table 3.3-2.** Special-Status Wildlife Identified as Having the Potential to Occur in the Study Area

Species Name	Status <sup>1</sup>	Distribution	Habitat	Potential to Occur in Study Area
	Fed/State			
Invertebrates				
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T/–	Streamside habitats below 3,000 feet throughout the Central Valley.	Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant.	Would not occur—no elderberry shrubs in study area.
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	E/–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties.	Large, deep vernal pools in annual grasslands.	Would not occur—no suitable habitat in study area.
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	E/–	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County.	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools.	Would not occur—no suitable habitat in study area.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	E/–	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County.	Common in vernal pools; also found in sandstone rock outcrop pools.	Would not occur—no suitable habitat in study area.
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E/–	Shasta County south to Merced County.	Vernal pools and ephemeral stock ponds.	Would not occur—no suitable habitat in study area.
Amphibians				
California tiger salamander <i>Ambystoma californiense</i>	T/T	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County.	Small ponds, lakes, or vernal pools in grass-lands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy.	Would not occur—no suitable habitat in study area.
California red-legged frog <i>Rana draytonii</i>	T/SSC	Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County.	Permanent and semipermanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May aestivate in rodent burrows or cracks during dry periods.	Would not occur—no suitable habitat in study area.

Species Name	Status <sup>1</sup>	Distribution	Habitat	Potential to Occur in Study Area
	Fed/State			
Western spadefoot <i>Scaphiopus hammondi</i>	–/SSC	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California.	Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands.	Would not occur—no suitable habitat in study area.
<b>Reptiles</b>				
Blunt-nosed leopard lizard <i>Gambelia</i> (= <i>Crotaphytus</i> ) <i>sila</i>	E/E	Presently known from Merced County south through Kern County and along the eastern edges of San Luis Obispo and San Benito Counties.	Open habitats with scattered low bushes on alkali flats, and low foothills, canyon floors, plains, washes, and arroyos; substrates may range from sandy or gravelly soils to hardpan.	Would not occur—no suitable habitat in study area.
Western pond turtle <i>Actinemys marmorata</i>	–/SSC	Occurs throughout California west of the Sierra-Cascade crest. Found from sea level to 6,000 feet. Does not occur in desert regions except for along the Mojave River and its tributaries.	Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests.	May occur— small drainages and canals provide suitable habitat but will not be affected by the Proposed Action.
Coast (California) horned lizard <i>Phrynosoma coronatum</i> ( <i>frontale</i> population)	–/SSC	Sacramento Valley, including foothills, south to southern California; Coast Ranges south of Sonoma County; below 4,000 feet in northern California.	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging.	Unlikely to occur—low quality habitat adjacent to study area.
Giant garter snake <i>Thamnophis gigas</i>	T/T	Central Valley from the vicinity of Burrell in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno.	Sloughs, canals, low-gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.	Unlikely to occur—outside of species southernmost known range and no suitable habitat.
San Joaquin whipsnake <i>Masticophis flagellum</i> <i>ruddocki</i>	–/SSC	From Colusa County in the Sacramento Valley southward to the Grapevine in the San Joaquin Valley and westward into the inner coast ranges; isolated population occurs at Sutter Buttes; known elevation range from 66 to 2,953 feet (20 to 900 meters).	Occurs in open, dry, vegetative association with little or no tree cover; occurs in valley grassland and saltbush scrub associations; often occurs in association with mammal burrows.	Unlikely to occur—low quality habitat adjacent to study area.

Species Name	Status <sup>1</sup>	Distribution	Habitat	Potential to Occur in Study Area
	Fed/State			
Birds				
Northern harrier <i>Circus cyaneus</i>	–/SSC	Occurs throughout lowland California. Has been recorded in fall at high elevations.	Grasslands, meadows, marshes, and seasonal and agricultural wetlands.	May occur—suitable nesting and foraging habitat present. Loss of small amount of foraging habitat would not be a significant effect.
Golden eagle <i>Aquila chrysaetos</i>	PR/FP	Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands such as Central Valley.	Nests on cliffs and escarpments or in tall trees overlooking open country; forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals.	May occur—no suitable nesting habitat in study area but suitable foraging habitat is present. Loss of small amount of foraging habitat would not be a significant effect.
Swainson’s hawk <i>Buteo swainsoni</i>	–/T	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland, Yolo County.	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	Known to occur in study area—suitable nesting and foraging habitat in study area. Loss of small amount of foraging habitat would not be a significant effect.
White-tailed kite <i>Elanus leucurus</i>	–/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border.	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging.	May occur in study area—suitable nesting and foraging habitat. Loss of small amount of foraging habitat would not be a significant effect.
Western burrowing owl <i>Athene cunicularia hypugea</i>	–/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Rare along south coast.	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows.	Known to occur in study area—suitable nesting and foraging habitat present. Loss of small amount of foraging habitat would not be a significant effect.

Species Name	Status <sup>1</sup>	Distribution	Habitat	Potential to Occur in Study Area
	Fed/State			
Loggerhead shrike <i>Lanius ludovicianus</i>	–/SSC	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter.	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches.	May occur in study area—suitable nesting and foraging habitat in the study area. Loss of small amount of foraging habitat would not be a significant effect.
Tricolored blackbird <i>Agelaius tricolor</i>	–/SSC	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County; and at scattered locations in Lake, Sonoma, and Solano Counties. Rare nester in Siskiyou, Modoc, and Lassen Counties.	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grain fields. Habitat must be large enough to support 50 pairs. Probably requires water at or near the nesting colony.	May occur in study area—no suitable nesting habitat in study area but suitable foraging habitat is present. Loss of small amount of foraging habitat would not be a significant effect.
<b>Mammals</b>				
San Joaquin (Nelson's) antelope squirrel <i>Ammospermophilus nelson</i>	--/T	Western side of the San Joaquin Valley from southern Merced County south to Kern and Tulare Counties; also found on the Carrizo Plain in San Luis Obispo County and the Cuyama Valley in San Luis Obispo and Santa Barbara Counties.	Arid grasslands from 200 to 1,200 feet, with loamy soils and moderate shrub cover of atriplex and other shrub species.	Unlikely to occur in study area—no suitable habitat in study area.
Pallid bat <i>Antrozous pallidus</i>	–/SSC	Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations.	Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts but also uses caves, mines, bridges, and buildings.	May occur—suitable crevices for roosting may be present in overcrossings along canals; may forage in study area.

Species Name	Status <sup>1</sup>	Distribution	Habitat	Potential to Occur in Study Area
	Fed/State			
Fresno kangaroo rat <i>Dipodomys nitratooides exilis</i>	E/—	Historical geographic range of the Fresno kangaroo rat encompassed an area from the Merced River, Merced County, on the north, to the northern edge of the marshes surrounding Tulare Lake, Kings County, on the south, extending from the edge of the Valley floor near Livingston, Madera, Fresno, and Selma, westward to the wetlands of Fresno Slough and the San Joaquin River.	Grassland and chenopod scrub communities on the San Joaquin Valley floor, topography is often nearly level, consisting of bare alkaline clay-based soils subject to seasonal inundation which are broken by slightly rising mounds of more crumbly soils, which often accumulate around shrubs or grasses.	Unlikely to occur—no suitable habitat in study area and no known populations within the historic range.
Western mastiff bat <i>Eumops perotis californicus</i>	—/SSC	Occurs along the western Sierra primarily at low to mid elevations and widely distributed throughout the southern coast ranges. Recent surveys have detected the species north to the Oregon border.	Found in a wide variety of habitats from desert scrub to montane conifer. Roosts and breeds in deep, narrow rock crevices, but also may use crevices in trees, buildings, and tunnels.	Unlikely to occur—no suitable roosting habitat (crevices in cliff faces, cracks in boulders, buildings, trees, and tunnels).
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E/T	Occurs principally in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County to Contra Costa County.	Saltbush scrub, grassland, oak, savanna, and freshwater scrub.	Known to occur in study area—suitable habitat present in the study area.
American badger <i>Taxidea taxus</i>	—/SSC	Found throughout most of California except in northern North Coast area.	Suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils. Dig burrows in friable soils for cover.	May occur—suitable habitat present in the study area.



Species Name	Status <sup>1</sup>		Habitat	Potential to Occur in Study Area
	Fed/State	Distribution		
Notes:				
Species listed in table are generated from the USFWS species list (2010) and CNDDDB records (2010).				
<sup>1</sup> Status:				
<b>Federal</b>				
E	=	Listed as endangered under ESA.		
T	=	Listed as threatened under ESA.		
PR	=	Protected under the Bald and Golden Eagle Protection Act.		
–	=	No federal status.		
<b>State</b>				
T	=	Listed as threatened under CESA.		
C	=	Candidate for listing under CESA		
SSC	=	California species of special concern.		
FP	=	Fully protected under California Fish and Game Code.		
–	=	No state status.		

**Table 3.3-3.** Federal and State Special-Status Plants With their Potential to Occur within the Region 3 Study Area

Common and Scientific Name	Legal Status <sup>a</sup>	Geographic Distribution/Floristic Province	Habitat Requirements	Blooming Period	Potential to Occur in Study Area
	Federal/State				
Palmate-bracted bird's-beak <i>Cordylanthus palmatus</i>	E/E	Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County	Alkaline grassland, alkali meadow, chenopod scrub; 15–500 feet (5–155 meters)	May–October	None. Grassland habitat within study area is of poor quality and lacks soil requirements.
San Joaquin woollythreads <i>Monolopia congdonii</i>	E/–	Carrizo Plain and western San Joaquin valley from San Benito County to Kern County	Saltbush scrub, grassland, on flats in alkaline or loamy soils; 195–2600 feet (60–800 meters)	Mar–May	None. Grassland habitat within study area is of poor quality and lacks soil requirements.

Notes:

<sup>a</sup> Status explanations:

**Federal**

E = listed as endangered under ESA.

**State**

E = listed as endangered under CESA.

– = no listing.

### *Migratory Bird Treaty Act*

The MBTA (16 USC 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703; 50 CFR 21; 50 CFR 10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of the MBTA. USFWS is responsible for overseeing compliance with MBTA, and the U.S. Department of Agriculture's Animal Damage Control Officer makes recommendations on related animal protection issues.

Executive Order (EO) 13186 (January 10, 2001) directs each federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with USFWS to develop a memorandum of understanding (MOU) that will promote the conservation of migratory bird populations. Protocols developed under the MOU must include the following agency responsibilities.

- Avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.
- Restore and enhance habitat of migratory birds, as practicable.
- Prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

The EO is designed to assist federal agencies in their efforts to comply with the MBTA and does not constitute any legal authorization to take migratory birds. The Proposed Action would not result in a negative impact on migratory bird populations and therefore Reclamation would not need to enter into a MOU with USFWS.

### *Clean Water Act*

The CWA was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. The CWA serves as the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The CWA empowers the U.S. Environmental Protection Agency (EPA) to set national water quality standards and effluent limitations and includes programs addressing both *point-source* and *nonpoint-source* pollution. Point-source pollution is pollution that originates or enters surface waters at a single, discrete location, such as an outfall structure or an excavation or

construction site. Nonpoint-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool.

As discussed previously, many of the well sites occur immediately adjacent to irrigation ditches and canal systems. These ditches and canals are man-made features that convey water to an ultimate irrigation use or place of use. As defined in the USACE Regulatory Guidance Letter (RGL) 07-02 (dated July 4, 2007), irrigation ditches include the distribution system or parts thereof, consisting of manmade canals, laterals, ditches, siphons, and pump systems. Construction and maintenance of "irrigated ditches" are exempt from regulation

Under Section 404(f)(1)(C) of the CWA, discharges of fill material associated with construction or maintenance of irrigation ditches are not subject to regulation under Section 404 of the CWA. Ditch construction activities are defined in RGL 07-02 and include new work or work that result in an extension or expansion of an existing structure (including ditch relocation, ditch conversion into pipe, ditch lining, and placement of new control structures). Ditch maintenance is also defined under RGL 07-02 and includes excavation, re-shaping, bank stabilization, armoring, lining, and piping, and replacement of existing control structures.

Based on this guidance letter and the types of activities that are being proposed as part of the Proposed Action, the discharge of fill into irrigation ditches (including canals) would be exempt from regulation under Section 404 of the CWA. In addition, the Proposed Action would not result in a significant discernible alteration in flow or circulation, or a reduction in reach of waters of the United States.

Therefore, a Section 404 permit (e.g., Nationwide Permit authorization) to discharge fill material associated with water and power line crossing of irrigation ditches and canals is not required. No other CWA permits or compliances are required for the Proposed Action and are not discussed further.

EO 13112, Prevention and Control of Invasive Species, signed February 3, 1999, directs all federal agencies to prevent and control introductions of invasive species in a cost-effective and environmentally sound manner. The EO established the National Invasive Species Council (NISC), which is composed of federal agencies and departments and a supporting Invasive Species Advisory Committee (ISAC) composed of state, local, and private entities. The NISC and ISAC prepared a national invasive species management plan (NISC 2008) that recommends objectives and measures to implement the EO and to prevent the introduction and spread of invasive species. The EO requires consideration of invasive species in NEPA analyses, including their identification and distribution, their potential impacts, and measures to prevent or eradicate them. Invasive

species are not an issue in the action area, which is heavily managed for weed control.

#### *Executive Order 11990: Protection of Wetlands*

EO 11990 (May 24, 1977) requires federal agencies to prepare wetland assessments for proposed actions located in or affecting wetlands. Agencies must avoid undertaking new construction in wetlands unless no practicable alternative is available and the proposed action includes all practicable measures to minimize harm to wetlands. No wetlands were observed in the Proposed Action study area during the field surveys; therefore, no wetlands would be affected by the Proposed Action.

### **3.3.3 Environmental Consequences**

#### ***Impact Mechanisms***

The following impact mechanisms were used to assess project-related effects on biological resources in the study area (as defined previously):

- Grading and trenching activities.
- Potentially removing habitat and individuals of special-status species.
- Temporary stockpiling and sidecasting of soil, construction materials, or other construction wastes.
- Soil compaction, dust, and water runoff from the construction site.
- Development of soil stockpiling areas to contain material from excavation.
- Timing of construction in special-status species habitat.

#### ***Impact Assumptions***

Impacts on biological resources are associated primarily with construction activities.

In assessing the magnitude of possible construction-related effects, the following assumptions were used in this analysis:

- Construction activities would include vegetation removal; soil excavation and trenching; grading; stockpiling and spreading of excavated material; installation of well and pipeline facilities; constructing a temporary percolation pond; and backfilling of materials into excavated areas.
- All equipment and vehicle staging would occur within the study area.
- If any staging areas, laydown areas, office sites, or spoils areas are identified outside the study area, they would be located within previously

graded, paved, or disturbed areas that do not support any special-status plants, wildlife, wetlands/other waters, or sensitive natural communities (e.g., riparian habitat).

- These staging areas would be evaluated and approved by Reclamation prior to the contractor's use of the area.
- All proposed wells and water and power connection alignments are accessible via existing access roads (e.g., there would be no new roads constructed).
- Permanent habitat losses are associated with construction of the well and pad (1,100 square feet), and most are located in agricultural habitats with no effect on special-status wildlife or plants.
- There would be no permanent habitat losses attributable to construction of water utilities.
- There would be a negligible amount of permanent habitat losses attributable to construction of power utilities (the number of poles installed ranges from two to three, assuming three square feet per pole that would be a range from 0.0004 to 0.0006 acre per well).
- An above-ground trough-type structure would be used to store and percolate water discharged from the well during development activities. Water pumped during the well-testing activities would be discharged into the adjacent agricultural irrigation system. The trough would be removed upon completion of drilling.
- Construction of the undertaking is proposed to begin in September 2010 and is expected to last approximately six to 24 months.
- All discharge associated with power and water lines that cross irrigation ditches and canals does not require a Section 404 permit authorization and is exempt from regulation by the USACE under Section 404(f)(1)(C).
- Direct and indirect effects on the two creeks that occur adjacent to Well T-2 and Well F-1 would be avoided. Effects on these creek systems and associated riparian habitat are not discussed below.
- As discussed in Section 3.1, *Water Resources*, the additional groundwater pumping associated with the Proposed Action wells is not expected to significantly draw down the aquifer as a whole, but pumping at individual wells could cause local depressions in the groundwater elevation, which potentially could affect local surface water (i.e., wetland communities). However, the water table elevations are not expected to be close enough to the land surface to cause effects on wetland communities. There would be no significant effect on wetland communities as described in detail in Section 3.1 of this EA.

### **No Action Alternative**

The No Action Alternative would consist of the continuation of the existing conditions. There would be no effects on biological resources under the No Action Alternative.

### **Proposed Action**

Appendix C includes the CNDDB and USFWS Database Species Occurrence Information. Using this data combined with the field surveys and reviewed literature, it was determined that the following effects apply only to Wells T-2, F-1, and J-1. There are no biological resources associated with the remaining well sites. Table 3.3-1 summarizes biological resources for each well, water, and power utility.

#### ***Impact BIO-1: Potential Disturbance, Injury, or Mortality of San Joaquin Kit Fox and American Badger***

With implementation of the environmental commitments described in Chapter 2, the Proposed Action would avoid disturbance, injury or mortality of the San Joaquin kit fox and American badger. Damage to or destruction of dens, direct mortality from construction vehicles or heavy equipment, direct mortality from den collapse and subsequent suffocation, temporary disturbance from noise and human presence associated with construction activities, and harassment by construction personnel would be avoided. Avoidance measures are also incorporated as part of the Proposed Action to ensure that no exposed pipes or large excavated holes are left open after construction has finished for the day. Hence San Joaquin kit foxes and American badgers moving through the construction area would not be entrapped. The Proposed Action would have no significant effects on these species.

#### ***Impact BIO-2: Permanent Loss of Suitable Habitat for San Joaquin Kit Fox and American Badger***

The Proposed Action would permanently remove approximately 0.06 acre total in Region 3 of suitable foraging and denning (grassland) habitat for San Joaquin kit fox and American badger at Wells T-2, F-1, and J-1. The amount of habitat affected is a very small portion of the total amount of annual grassland in the Proposed Action region. The permanent loss of a small amount of suitable foraging and denning habitat would not significantly impact affect San Joaquin kit fox and American badger because grassland surrounding the Proposed Action would continue to provide foraging and denning opportunities for these species, such that they could continue to inhabit the area around the Proposed Action.

Therefore, the minor permanent loss of suitable foraging and denning habitat would not be a significant effect.

*Impact BIO-3: Potential Mortality or Disturbance of Western Burrowing Owl*

The ruderal annual grassland in the study area is suitable breeding and wintering habitat for western burrowing owl. This species has been observed in the study area in the past, and there are known records in the Proposed Action vicinity. Construction in and adjacent to occupied burrows could result in mortality of or disturbance to nesting or wintering western burrowing owls. Construction of the Proposed Action would permanently remove approximately 0.06 acre of suitable foraging or burrow habitat for this species at the same locations described above for San Joaquin kit fox. Nesting burrowing owls are protected under the MBTA and California Fish and Game Code Sections 3503 and 3503.5. Loss of active breeding or wintering burrows or disturbance of breeding burrows resulting in mortality of young and displacement of adults is considered an adverse effect. However, with implementation of the following mitigation measures, the Proposed Action would have no significant effects on this species.

**Mitigation Measure BIO-MM-1: Conduct Preconstruction Surveys for Western Burrowing Owl**

The CDFG's *Staff Report on Burrowing Owl Mitigation* (CDFG 1995) recommends that preconstruction surveys be conducted to locate active burrowing owl burrows in the construction work area and within a 500-foot-wide buffer zone around the construction area. The work area includes all areas where ground disturbance would occur, access roads, staging areas, and spoils storage areas. Reclamation will retain a qualified biologist to conduct preconstruction surveys for active burrows according to CDFG's guidelines. The preconstruction survey will include a breeding season survey (between April 15 and July 15). In addition to the seasonal survey, a preconstruction survey will be conducted within 30 days prior to construction to ensure that no additional owls have established territories since the initial surveys. If no burrowing owls or sign (e.g., feathers, white wash, prey remains) is detected, no further mitigation is required. If burrowing owls or their sign is found, Mitigation Measure BIO-MM-4 also will be implemented.

**Mitigation Measure BIO-MM-2: Avoid and Minimize Effects on Western Burrowing Owl**

Reclamation will avoid loss or disturbance of western burrowing owls and their burrows to the maximum extent possible. No burrowing owls will be disturbed during the nesting season (February 1 through August 31). A 250-foot buffer, within which no construction would be permitted, will be maintained between construction activities and nesting burrowing owls. The nesting owls will be monitored periodically by a qualified biologist to ensure that nesting activities are not being disrupted. This protected area will remain in effect until August 31 or,



at CDFG's discretion and based on monitoring evidence, until the young owls are foraging independently. If accidental take (disturbance, injury, or death of owls) occurs, CDFG will be notified immediately.

During the wintering season (September 1 through January 31), if avoidance is not possible in the work area or within 160 feet of the work area, eviction of owls may be permitted pending an evaluation of eviction plans by CDFG. The guidelines require that one-way doors be installed at least 48 hours before construction at all active burrows in the construction area so that the burrows are not occupied during construction activities. The one-way doors will be installed at that time to ensure that the owls can get out of the burrows and cannot get back in. The guidelines also require the enhancement of unsuitable burrows (enlarging or clearing of debris), or the installation of two artificial burrows for each occupied burrow that is removed, and compensation for loss of habitat. Artificial burrows will be constructed prior to the installation of one-way doors.

*Impact BIO-4: Potential Disturbance of Nesting Northern Harrier, Swainson's Hawk, White-Tailed Kite, Tricolored Blackbird, Loggerhead Shrike, and Non-Special-Status Migratory Birds*

There are no suitable nest trees for Swainson's hawk or white-tailed kite in the study area; however, suitable nest trees may be present within 0.5 mile of each well site. Suitable nesting habitat for northern harrier, tricolored blackbird, and loggerhead shrike are present in the study area. Raptors (e.g., eagles, kites, hawks, owls) could nest within 0.5 mile of each well site, and other birds may nest in the study area. Migratory birds and their nests are protected under both California Fish and Game Code Section 3503 (active bird nests) and the MBTA. Removal of nests or suitable nesting habitat and construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. Loss of raptor and other migratory bird eggs or nests, or any activities resulting in nest abandonment, would be considered an adverse effect. However, with implementation of the following mitigation measure, the Proposed Action would have no adverse effect on special-status or other migratory birds.

**Mitigation Measure BIO-MM-3: Avoid Construction during the Nesting Season of Migratory Birds or Conduct Preconstruction Survey for Nesting Birds**

To avoid disturbing any active ground-, tree-, or shrub-nesting migratory birds, including northern harrier, Swainson's hawk, white-tailed kite, tricolored blackbird, and loggerhead shrike, construction activities will be conducted during the non-breeding season (generally between September 1 and February 28). If construction activities cannot be avoided during the nesting season (generally between March 1 and August 30), a minimum of two preconstruction surveys will be conducted by a qualified biologist to determine whether there are active nests

in the construction area (within 500 feet of construction area) or any raptor nests within 0.5 mile of the construction area. The construction area is defined as any area where work will occur and includes gravel and dirt access roads and staging areas. The surveys will include a search of all trees and shrubs, as well as annual grassland areas, for ground-nesting birds. One of the surveys will be conducted no more than 14 days prior to construction. Nest sites will be marked on an aerial photograph, and the locations will be recorded using global positioning system (GPS). If the biologist determines that the areas surveyed do not contain any active nests, construction activities can commence without any further mitigation. If construction activities cease and begin again during a 12-month period, they should be reinitiated before the next breeding season begins or another set of preconstruction surveys will be conducted.

If an active Swainson's hawk nest is found, construction activities that would result in the greatest disturbance to the active nest site will be deferred until as late in the breeding season as possible.

If active raptor nests or other migratory bird nests are located on or adjacent to the project site during the preconstruction survey, and construction must occur during the breeding season, construction will not occur within 500 feet of an active nest until the young have fledged, as determined by a qualified biologist, or until Reclamation receives written authorization from USFWS and/or CDFG to proceed.

### ***Cumulative Effects***

Potential cumulative effects on biological resources could occur as a result of development projects, other changes in land use, and the implementation of an additional 45 wells in the San Joaquin Valley as proposed by Reclamation. These projects could result in impacts on vegetation and wildlife resources. However, the total area of sensitive habitat affected by the 49 proposed new wells (Proposed Action in addition to the 17 other wells proposed by Reclamation in Regions 2, 3, and 4) is small (0.30 acres of San Joaquin kit fox and American badger habitat, would be located in primarily disturbed agricultural areas, are located throughout a large geographic areas and are not contiguous). Most of the proposed wells would not affect any biological resources and environmental commitments and mitigation measures would minimize and avoid effects. These measures include preconstruction surveys, construction of ramps for kit fox and American badger, and other avoidance measures for burrowing owl. Local development projects and other projects that could affect ruderal grasslands and agricultural lands or habitats for Swainson's hawk, San Joaquin kit fox, American badger, or Western burrowing owl, combined with the Proposed Action would result in only a minor loss of these habitat types. There would be no significant cumulative effects.

## 3.4 Air Quality and Climate Change

This section describes the existing conditions pertaining to air quality and the potential environmental consequences that could result from implementation of the Proposed Action. Where appropriate, mitigation measures are presented to address potentially significant effects.

### 3.4.1 Affected Environment

#### *Environmental Setting*

##### *Climate and Meteorology*

The Proposed Action is located in the San Joaquin Valley Air Basin (SJVAB). The climate in the basin is characterized by warm, dry summers and cool winters. Summer high temperatures often exceed 100°F, averaging in the low 90s in the northern valley and high 90s in the south. Annual precipitation in the valley decreases from north to south, with about 20 inches in the north, 10 inches in the middle, and less than six inches in the southern part of the valley.

##### *Local Air Quality Conditions*

The existing air quality conditions in the Proposed Action area can be characterized by monitoring data collected in the region. Information collected for the SJVAB indicates that in the past three years (2006–2008), the region has experienced frequent violations of the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for ozone and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>)<sup>2</sup> (CARB 2009a).

Areas are classified as either attainment or nonattainment with respect to NAAQS and CAAQS based on local monitoring data. If a pollutant concentration is consistently lower than the state or federal standard, the area is classified as being in attainment of the standard for that pollutant. If a pollutant violates the standard for several consecutive years, the area is considered a nonattainment area. Finally, regions previously designated nonattainment areas that since have obtained attainment are designated maintenance areas.

The EPA has classified the SJVAB as a serious nonattainment area for the federal ozone standard, a nonattainment area for the federal PM<sub>2.5</sub> standard, and a serious maintenance area for the federal PM<sub>10</sub> standard (EPA 2010). The California Air Resources Board (CARB) has classified the SJVAB as a

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<sup>2</sup> PM<sub>10</sub> refers to particulate matter less than 10 microns in diameter and PM<sub>2.5</sub> refers to particulate matter less than 2.5 microns in diameter.

nonattainment area for the state ozone, PM<sub>2.5</sub>, and PM<sub>10</sub> standards (CARB 2009b).

## ***Regulatory Setting***

### ***Criteria Air Pollutants***

The federal Clean Air Act (CAA), enacted in 1963 and amended several times thereafter (most recently with the 1990 Clean Air Act Amendments [CAAA]), establishes the framework for modern air pollution control. The act directs the EPA to establish NAAQS for six pollutants: ozone, carbon monoxide (CO), lead, nitrogen dioxide (NO<sub>2</sub>), particulate matter, and sulfur dioxide (SO<sub>2</sub>). As discussed above, California also has established air quality standards to reduce pollutant concentrations within the state. Responsibility for achieving the CAAQS, which are more stringent than federal standards, is placed on the ARB and local air districts. The NAAQS and the CAAQS are shown in Table 3.4-1.

The CAAA requires that all federally funded projects conform to the appropriate State Implementation Plan (SIP) so that the Proposed Action does not interfere with strategies employed to attain the NAAQS. The conformity rule applies to federal projects in areas designated as nonattainment areas for any of the six criteria pollutants and in some areas designated as maintenance areas. Project-level conformance with the SIP is demonstrated through a general conformity analysis.

As discussed above, the SJVAB is classified as a federal nonattainment area for the ozone and PM<sub>2.5</sub> standards, and a maintenance area for the federal PM<sub>10</sub> standard. Consequently, a general conformity determination must be performed to demonstrate that total direct and indirect emissions of ozone and particulate matter would conform to the applicable SIP. More specifically, the general conformity analysis must identify whether emissions of ozone precursors (reactive organic gases [ROG] and nitrogen oxides [NO<sub>x</sub>]), PM<sub>10</sub>, and PM<sub>2.5</sub> meet the following criteria:

- emissions are below the appropriate *de minimis* threshold, which based on the nonattainment level of the SJVAB, is 50 tons per year for ozone emissions, 100 tons per year for PM<sub>10</sub>, and 100 tons per year for PM<sub>2.5</sub> emissions (40 CFR 51.853); and
- emissions are regionally insignificant (total emissions are less than 10 percent of the area's total emissions inventory for that pollutant).

**Table 3.4-1.** Applicable Federal and State Ambient Air Quality Standards

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria	
			California	National	California	National	California	National
Ozone*	O <sub>3</sub>	1 hour	0.09	NA	180	NA	If exceeded	NA
		8 hours	0.070	0.075	137	147	If exceeded	If fourth highest 8-hour concentration in a year, averaged over three years, is exceeded at each monitor within an area
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than one day per year
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than one day per year
(Lake Tahoe only)		8 hours	6	NA	7,000	NA	If equaled or exceeded	NA
Nitrogen dioxide	NO <sub>2</sub>	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than one day per year
		1 hour	0.18	0.100	339	NA	If exceeded	NA
Sulfur dioxide	SO <sub>2</sub>	Annual arithmetic mean	NA	0.030	NA	80	NA	If exceeded
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than one day per year
		1 hour	0.25	NA	655	NA	If exceeded	NA
Hydrogen sulfide	H <sub>2</sub> S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA
Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	24 hours	0.01	NA	26	NA	If equaled or exceeded	NA

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria	
			California	National	California	National	California	National
Inhalable particulate matter	PM10	Annual arithmetic mean	NA	NA	20	NA	NA	NA
		24 hours	NA	NA	50	150	If exceeded	If exceeded on more than one day per year
	PM2.5	Annual arithmetic mean	NA	NA	12	15	NA	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	NA	NA	NA	35	NA	If 3-year average of 98 <sup>th</sup> percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO <sub>4</sub>	24 hours	NA	NA	25	NA	If equaled or exceeded	NA
Lead particles	Pb	Calendar quarter	NA	NA	NA	1.5	NA	If exceeded no more than one day per year
		30-day average	NA	NA	1.5	NA	If equaled or exceeded	NA
		Rolling 3-month average	NA	NA	NA	0.15	If equaled or exceeded	Averaged over a rolling 3-month period

Source: CARB 2010.

Notes:

All standards are based on measurements at 25°C and one atmosphere pressure. National standards shown are the primary (health effects) standards.

NA = not applicable.

\* The EPA recently replaced the 1-hour ozone standard with an 8-hour standard of 0.08 part per million. EPA issued a final rule that revoked the 1-hour standard on June 15, 2005. However, the California 1-hour ozone standard will remain in effect.

### *Climate Change Regulations*

On December 7, 2009, the EPA Administrator found that current and projected concentrations of greenhouse gases (GHGs) threaten the public health and welfare. The Council on Environmental Quality (CEQ) also has issued a memorandum providing guidance on the consideration of the effects of climate change and GHG emissions under NEPA (Sutley 2010). The Draft Guidance suggests that the effects of projects directly emitting GHGs in excess of 25,000 tons annually be considered in a qualitative and quantitative manner.

The State of California also has several programs in place that reduce and minimize GHG emissions. The most stringent of these are EO S-3-05 and Assembly Bill 32 (AB 32). EO S-3-05 is designed to reduce California's GHG emissions to: (1) 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80 percent below 1990 levels by 2050. AB 32 sets the same overall reduction goals as EO S-3-05 while further mandating that ARB create a plan, which could include market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases."

While these federal and state actions represent important GHG reduction efforts, no specific thresholds have been published for determining NEPA effects related to climate change.

## **3.4.2 Environmental Consequences**

### ***Approach and Methods***

As discussed in Chapter 2, the Proposed Action would require the construction of new wells, conveyance tie-ins, and associated well facilities. Emissions associated with these activities were estimated using information summarized in the project description and the URBEMIS2007, Version 9.2.4 model. More detailed information on the emissions modeling may be found in Appendix A.

Once construction is completed, the wells would operate independently and require little to no maintenance. Criteria pollutant emissions associated with operation of the Proposed Action therefore were assumed to be negligible. No further quantification or analysis was performed.

Water conveyance and electricity usage for pumping would generate long-term GHG emissions. These emissions were estimated using the California Energy Commission's (CEC's) water-energy proxy for the San Joaquin River and emissions factors obtained from PG&E and the California Climate Action Registry (CCAR) (CEC 2006; PG&E 2007; CCAR 2009). More detailed information on the emissions calculations may be found in Appendix A.

### **No Action Alternative**

Under the No Action Alternative, it was assumed no wells would be constructed. Consequently, no construction or operational emissions would be generated.

### **Proposed Action**

#### ***Impact AIR-1: Generation of Construction Emissions in Excess of Federal de Minimis Thresholds***

Construction activities associated with the Proposed Action would generate short-term emissions of ROG, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, and GHGs. Emissions would originate from mobile and stationary construction equipment exhaust, employee vehicle exhaust, and dust from site grading. Construction-related emissions would vary depending on the level of activity, specific construction operations, types of equipment, number of personnel, and climatic conditions.

Table 3.4-2 summarizes the total emissions associated with the construction of seven wells in the region. Additional details on the modeling methods may be found in Appendix A.

**Table 3.4-2.** Summary of Construction Emissions under the Proposed Action (tons)

	ROG	NO <sub>x</sub>	CO <sup>a</sup>	Total PM <sub>10</sub> <sup>b</sup>	Total PM <sub>2.5</sub> <sup>b</sup>	CO <sub>2</sub> e <sup>a, c</sup>
Construction Emissions	0.49	4.24	1.90	0.22	0.20	488
<i>de Minimis</i> Threshold	50	50	–	100	100	–
10% Regional Emissions <sup>d</sup>	13,476	20,663	–	10,939	3,843	–
<i>Significant?</i>	<i>No</i>	<i>No</i>	–	<i>No</i>	<i>No</i>	–

<sup>a</sup> Region in attainment; no conformity analysis required.

<sup>b</sup> Includes emissions from dust and exhaust.

<sup>c</sup> Refers to carbon dioxide equivalents in which all GHGs are normalized on a scale that recasts total emissions in terms of carbon dioxide (CO<sub>2</sub>). See Appendix A for more information. Emissions are presented in metric tons.

<sup>d</sup> CARB 2009c.

Based on the data in Table 3.4-2, construction emissions are expected neither to exceed the federal *de minimis* thresholds nor to be regionally significant (i.e., more than 10 percent of the regional emissions inventory). Therefore, this impact is not considered to be significant.



***Impact AIR-2: Expose Sensitive Receptors to Substantial Amounts of Diesel Particulate Matter***

Diesel particulate matter (DPM), which is classified as a carcinogen by the ARB, is the primary pollutant of concern with regard to health risks to sensitive receptors. Sensitive receptors include residences, hospitals, schools, parks, and places of worship. The primary sensitive land uses in the Proposed Action area are rural residences. Table 3.6-4 in Section 3.6, Noise, identifies the distances between residences and the various construction sites.

Cancer health risks caused by exposure to diesel exhaust typically are associated with chronic exposure, in which a 70-year exposure period is assumed. Although diesel-powered equipment would operate at each well site, construction is anticipated to last for only two months at each well site, which is well below the recommended cancer risk–assessment period. Moreover, DPM emissions at each site would be minimal and dissipate as a function of distance. Therefore, concentrations would be even lower at the closest rural residence (see Section 3.6, Noise).

Thus, because construction would last only two months and emit minimal levels of DPM, elevated cancer risks are not anticipated. There is no significant effect.

***Impact AIR-3: Generation of a Significant Level of Greenhouse Gas Emissions***

GHG emissions generated by the Proposed Action can be divided into those emitted during construction and those emitted during Proposed Action operations. The Proposed Action would not be affected by climate change conditions. In fact, the increased flexibility in water supply for the San Joaquin Valley may help limit the effects of climate change on agricultural in the valley.

**Project Construction**

GHG emissions from construction activities are primarily the result of fuel use by construction equipment and worker trips. Table 3.4-2 indicates that construction of the Proposed Action would generate 488 metric tons of GHG emissions. The emissions are equivalent to adding approximately 325 typical passenger cars to the road during the construction period (EPA 2009). These emissions are minuscule compared to state, national, and federal GHG emissions and would cease once construction activities are complete.

**Project Operations**

Operational GHG emissions would be emitted from electricity required to pump and convey the well water. GHG emissions associated with electricity usage are presented in Table 3.4-3. Additional details on the calculation methods may be found in Appendix A.

**Table 3.4-3.** GHG Emissions from Well Operations under the Proposed Action (metric tons per year)

CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total GHG (CO <sub>2</sub> e)
1,270	0.06	0.02	1,276

CH<sub>4</sub> = methane  
N<sub>2</sub>O = nitrous oxide.  
See Appendix A for additional modeling information.

Based on Table 3.4-3, operation of the Proposed Action would generate 1,276 metric tons of GHG emissions per year. This quantity is equivalent to adding approximately 851 typical passenger cars to the road (EPA 2009). Unlike criteria air pollutants, GHG emissions from Proposed Action operations tend to accumulate in the atmosphere because of their relatively long lifespan. As a result, their effect on climate change is more appropriately evaluated on a regional, state, or even national scale rather than on an individual project level. Further, it is unlikely that the GHGs emitted as part of the Proposed Action would have an individually discernable effect on global climate change. The Proposed Action would not result in significant effects on climate change. Please refer to the following section, Cumulative Effects, for additional discussion on operational GHG emissions.

### ***Cumulative Effects***

The cumulative analysis for air quality and climate change is quantitative for the cumulative emissions of the Proposed Action combined with Regions 1, 2, and 4. Other projects, including current operations, in the area likely would generate emissions, but they could not be quantified because of insufficient data.

### ***Criteria Pollutants***

Construction emissions would be short-term. As cumulative impacts, by definition, are long-term in nature, construction emissions are not anticipated to result in a cumulatively considerable impact on air quality. Because operational criteria pollutants would be minimal, they are not expected to result in cumulatively considerable emissions.

### ***Greenhouse Gases***

Because of their relatively long life span, GHG emissions tend to accumulate in the atmosphere and combine with other gasses emitted from projects in the region and state. While scientific consensus is that the cause of global climate change is the increased production of GHGs, emissions produced by the 49 proposed new

wells are minuscule compared to those emitted by complex land use or development projects. Moreover, because this and the other regional analyses assume the wells would be operating at full capacity, the estimated emissions would be produced only in extreme drought years. In other words, the analyses likely overestimate the wells' contribution to global climate change.

To date, specific thresholds to evaluate significant effects pertaining to GHG emissions have not been established by local decision-making agencies, the state, or the federal government (see Section 3.4.1). The CEQ has proposed a reference point of 25,000 tons to identify projects that warrant additional consideration in terms of their potential to contribute to global climate change. While 25,000 tons is not proposed as a threshold, it is a useful benchmark for considering possible effects of the Proposed Action.

Based on the analysis presented above for the Proposed Action and in the EAs for Regions 1, 2, and 4, the operation of all 49 proposed new wells would generate 3,881 metric tons of GHGs, which is a fraction of 25,000 tons. Considering that these emissions would be produced in about half of the drought years, the intensity of the Proposed Action is considered minor. Combined with emissions from other development projects in the region, the wells' contribution to global climate change therefore would be negligible. There is no significant cumulative effect.

### 3.5 Cultural Resources

*Cultural resources* is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. The National Historic Preservation Act (NHPA) of 1966 is the primary federal legislation that outlines the federal Government's responsibility to cultural resources. Section 106 of the NHPA requires the federal Government to take into consideration the effects of an undertaking on cultural resources listed on or eligible for inclusion in the National Register of Historic Places (NRHP). Those resources that are on or eligible for inclusion in the NRHP are referred to as historic properties.

The Section 106 process is outlined in the federal regulations at 36 CFR 800. These regulations describe the process that the federal agency (Reclamation) takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties. In summary, Reclamation must first determine if the action is the type of action that has the potential to affect historic properties. If the action is the type of action to affect historic properties, Reclamation must identify the area of potential effects (APE), determine if historic properties are present within that APE, determine the effect that the undertaking will have on historic properties, and consult with the State Historic Preservation Officer (SHPO), to seek concurrence on Reclamation's findings. In addition, Reclamation is required through the Section 106 process to consult with Indian Tribes

concerning the identification of sites of religious or cultural significance, and consult with individuals or groups who are entitled to be consulting parties or have requested to be consulting parties. Reclamation utilizes the Section 106 process to assess and analyze effects to cultural resources.

### **3.5.1 Affected Environment**

The San Joaquin Valley is rich in historical and pre-historic cultural resources. Cultural resources in this area would be generally prehistoric in nature and include remnants of native human populations that existed before European settlement. Prior to the 18<sup>th</sup> Century, many Native American tribes inhabited the Central Valley. It is possible that cultural resources lie undiscovered across the San Joaquin Valley. The lands affected by the Proposed Action consist of lands that have been historically farmed for many years. Any archaeological resources that may be present have likely been impacted by the agricultural practices.

Cultural resource surveys of the Proposed Action area resulted in 36 cultural resources being identified. All of these resources are features of the built environment with no evidence of archaeological resources within the Proposed Action area. All the resources identified within the Proposed Action area were either determined eligible or were assumed eligible for inclusion in the NRHP.

### **3.5.2 Environmental Consequences**

#### ***No Action Alternative***

Under this alternative, south-of-Delta CVP contractors would continue to use existing water supplies to meet demand. The No Action Alternative would not rise to the level of an undertaking as defined by Section 301(7) of the NHPA; therefore Reclamation would not initiate the Section 106 process. Existing conditions would prevail and effects on cultural resources would remain the same. Reclamation's decision to implement the No Action Alternative would result in no impacts on cultural resources.

#### ***Proposed Action***

Under the Proposed Action, Reclamation has an undertaking pursuant to Section 301(7) of the NHPA. As a result, Reclamation has initiated Section 106 consultation with the SHPO seeking their concurrence on a finding that the proposed action would have no adverse effect to historic properties, real or assumed, within the Proposed Action area. Following concurrence by the SHPO on Reclamation's finding, Reclamation will conclude the Section 106 process. Because resources would not adversely be affected pursuant to 36 CFR 800.5(b),

the preferred alternative would result in no impacts to cultural resources as evaluated through the Section 106 process.

## 3.6 Noise

This section describes the environmental setting for noise, the noise impacts that could result from the Proposed Action, and any necessary mitigation measures that would reduce potentially significant impacts.

### 3.6.1 Affected Environment

#### **Noise Terminology**

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called *A-weighting* (dBA). In general, human sound perception is such that a change in sound level of three dB is just noticeable, a change of five dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level ( $L_{eq}$ ), the minimum and maximum sound levels ( $L_{min}$  and  $L_{max}$ ), percentile-exceeded sound levels ( $L_{xx}$ ), the day-night sound level ( $L_{dn}$ ), and the community noise equivalent level (CNEL). Below are brief definitions of these measurements and other terminology used in this chapter:

- **Sound.** A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Ambient Noise.** The composite of noise from all sources near and far in a given environment exclusive of particular noise sources to be measured.

- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Sound Level ( $L_{eq}$ ).** The average of sound energy occurring over a specified period. In effect,  $L_{eq}$  is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
- **Exceedance Sound Level ( $L_{xx}$ ).** The sound level exceeded XX percent of the time during a sound level measurement period. For example  $L_{90}$  is the sound level exceeded 90 percent of the time and  $L_{10}$  is the sound level exceeded 10 percent of the time.
- **Maximum and Minimum Sound Levels ( $L_{max}$  and  $L_{min}$ ).** The maximum and minimum sound levels measured during a measurement period.
- **Day-Night Level ( $L_{dn}$ ).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period with five dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

$L_{dn}$  and CNEL values rarely differ by more than one dB. As a matter of practice,  $L_{dn}$  and CNEL values are considered to be equivalent and are treated as such in this assessment.

## ***Regulatory Setting***

### ***Federal Regulations***

#### **Noise Control Act of 1972**

The federal Noise Control Act of 1972 (Public Law 92-574) established a requirement that all federal agencies administer their programs to promote an environment free of noise that would jeopardize public health or welfare. The EPA was given the responsibility for:

- providing information to the public regarding identifiable effects of noise on public health and welfare.

- publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety.
- coordinating federal research and activities related to noise control.
- establishing federal noise emission standards for selected products distributed in interstate commerce.

### **U.S. Environmental Protection Agency**

In 1974, in response to the requirements of the federal Noise Control Act, EPA identified indoor and outdoor noise limits to protect public health and welfare (communication disruption, sleep disturbance, and hearing damage). Outdoor  $L_{dn}$  limits of 55 dB and indoor  $L_{dn}$  limits of 45 dB are identified as desirable to protect against speech interference and sleep disturbance for residential, educational, and healthcare areas. Sound-level criteria to protect against hearing damage in commercial and industrial areas are identified as 24-hour  $L_{eq}$  values of 70 dB (both outdoors and indoors).

The Noise Control Act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations. Although the EPA was given a major role in disseminating information to the public and coordinating federal agencies, each federal agency retains authority to adopt noise regulations pertaining to agency programs. The EPA can, however, require other federal agencies to justify their noise regulations in terms of Noise Control Act policy requirements. Key federal agencies that have adopted noise regulations and standards are:

- Housing and Urban Development (HUD): Noise standards for federally funded housing projects.
- Federal Aviation Administration (FAA): Noise standards for aircraft noise.
- Federal Highway Administration (FHWA): Noise standards for federally funded highway projects.
- Federal Transit Administration (FTA): Noise standards for federally funded transit projects.
- Federal Railroad Administration (FRA): Noise standards for federally funded rail projects.

### **Federal Highway Administration**

The FHWA has developed methods for evaluating construction noise. FHWA methods are discussed in the document entitled *Roadway Noise Construction Model User's Guide* (FHWA 2006). FHWA does not recommend specific noise level criteria for construction-type activities.

## Federal Transit Administration

The FTA has developed methods for evaluating construction noise. FTA methods are discussed in the document entitled *Transit Noise and Vibration Impact Assessment* (FTA 2006). In addition, FTA (2006) recommends noise criteria for residential uses exposed to construction noise (Table 3.6-1).

**Table 3.6-1.** FTA Recommended Construction Noise Criteria for Residential Uses

<b>1-hour <math>L_{eq}</math> (day)</b>	<b>1-hour <math>L_{eq}</math> (night)</b>	<b>8-hour <math>L_{eq}</math> (day)</b>	<b>8-hour <math>L_{eq}</math> (night)</b>	<b><math>L_{dn}</math> (30-day average)</b>
90	80	80	70	75
Note: All values are A-weighted decibels. Day: 7:00 a.m. to 10:00 p.m. Night: 10:00 p.m. to 7:00 a.m.				

## State Regulations

California requires each local government to implement a noise element as part of its general plan. California Administrative Code, Title 4, has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. Table 3.6-2 lists the state land use compatibility guidelines for land uses that apply to the proposed alternatives.



**Table 3.6-2.** State Land Use Compatibility Standards for Community Noise Environment

Land Use Category	Community Noise Exposure—Ldn or CNEL (dB)													
	50		55		60		65		70		75		80	
Residential—Low-Density Single Family, Duplex, Mobile Homes														
Industrial, Manufacturing, Utilities, Agriculture														
	Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.													
	Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, normally will suffice.													
	Normally Unacceptable: New construction or development generally should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.													
	Clearly Unacceptable: New construction or development generally should not be undertaken.													
Source: California Governor’s Office of Planning and Research, November 1998.														

### *Local Regulations*

#### **Fresno County Noise Ordinance**

Construction-related activities are exempt in Fresno County (Section 8.40.060C of Fresno County Code) provided such activities do not take place before 6:00 a.m. or after 9:00 p.m. on weekdays, or before 7:00 a.m. or after 5:00 p.m. on Saturday and Sunday.

#### **Fresno County General Plan Noise Element**

Fresno County Noise Element standards are shown below in Table 3.6-3.

**Table 3.6-3.** Fresno County Noise Element Standards

<b>Receiving Land Use</b>	<b>Noise Level Standard Descriptor</b>	<b>Daytime (7:00 a.m.–10:00 p.m.)</b>	<b>Nighttime (10:00 p.m.–7:00 a.m.)</b>
Residential	Hourly Average ( $L_{eq}$ )	50	45
Residential	Maximum Level ( $L_{max}$ )	70	65

### ***Existing Noise Conditions***

Primary noise sources in the Proposed Action area are cars and trucks on roads and freeways and noise from agricultural activity.

### ***Noise-Sensitive Land Uses***

Noise-sensitive land uses generally are defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, guest lodging, libraries, and certain types of recreational uses.

The Proposed Action area is primarily agricultural land with rural residences scattered throughout. The main noise-sensitive land uses in the Proposed Action area are rural residences. Most of the wells in Region 3 are well over 1,500 feet away from any residences, but wells T-2, J-1, and J-3 are located within 1,500 of rural residences.

### **3.6.2 Environmental Consequences**

#### ***Assessment Methods***

The following impact discussion analyzes construction activity that could take place near various wells throughout Fresno County. Operational impacts are discussed qualitatively. As discussed in Chapter 2, the Proposed Action would require the construction of new wells, conveyance tie-ins, and associated well facilities.

The noise from potential construction activities was evaluated using methodology developed by the FTA (2006) and the FHWA (2006). Operational impacts from pump noise are discussed quantitatively. The noise from potential pump activity was evaluated using methodology developed by Hoover and Keith (Hoover and Keith 2000).

#### ***No Action Alternative***

Under the No Action Alternative, no new wells would be constructed, and no construction or operational noise would be generated. The No Action Alternative therefore would result in no changes in noise.

#### ***Proposed Action***

##### ***Impact NOI-1: Exposure of Noise-Sensitive Land Uses to Temporary Construction Noise***

Construction activity would include well construction and connection, soil excavation and trenching, grading, stockpiling, and spreading of excavated material, installation of well and pipeline facilities, construction of temporary percolation ponds, and backfilling materials into excavated areas.

Construction noise was analyzed based on typical construction equipment that is anticipated to be used. Typical noise levels (dBA) from construction equipment pieces are shown in Table 3.6-4. To evaluate a reasonable worst-case scenario, noise from the three loudest pieces of equipment likely to operate at the same time has been evaluated. The three loudest pieces of equipment likely to be used are a truck, a backhoe, and a welder. Noise levels for these pieces of equipment were entered into a spreadsheet model based on FHWA 2006 guidelines to generate noise levels at nearby receptors.

**Table 3.6-4.** Construction Equipment Noise

<b>Equipment</b>	<b>Typical Noise Level (dBA) 50 Feet from Source</b>
Auger drill rig	84
Truck	88
Backhoe	87
Welder	74
Source: FHWA 2006.	

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance and shielding between construction noise sources and noise-sensitive areas. Individual types of construction equipment are expected to generate noise levels ranging from 74 to 88 dBA at a distance of 50 feet. Combined noise from the three loudest pieces of equipment likely to be used could reach 92 dB,  $L_{eq}$  at 50 feet.

Construction noise levels attenuate at a rate of about six dBA per doubling of distance between the source and receptor. In addition, ground effect attenuation reduces noise levels by about two dBA per doubling of distance. Shielding by buildings or terrain often results in much lower construction noise levels at distant receptors. Table 3.6-5 shows the calculated maximum ( $L_{max}$ ) and  $L_{eq}$  sound levels that would result from project construction at graduated distances and at the nearest residences. As stated above, drilling would occur seven days a week, 24 hours a day. Therefore drilling was analyzed separately from other construction activity because the drilling would occur at night. Noise levels from drilling are shown in Table 3.6-6.

**Table 3.6-5.** Calculated Construction Noise Levels

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated $L_{\max}$ Sound Level (dBA)	Calculated $L_{eq}$ Sound Level (dBA)
50	0	0	82	77
100	-6	-2	74	69
200	-12	-4	66	61
300	-16	-5	62	57
400	-18	-6	59	53
500	-20	-6	56	51
520	-20	-6	56	50
600	-22	-7	54	49
700	-23	-7	52	47
800	-24	-7	51	46
850	-25	-8	50	45
900	-25	-8	49	44
1000	-26	-8	48	43
2000	-32	-10	40	35
3000	-36	-11	36	31
4000	-38	-12	32	27
5000	-40	-12	30	25
6000	-42	-13	28	23

**Table 3.6-6.** Calculated Construction Noise Levels from Auger Drill Rig

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated $L_{\max}$ Sound Level (dBA)	Calculated $L_{eq}$ Sound Level (dBA)
50	0	0	84	84
100	-6	-2	76	76
200	-12	-4	68	68
300	-16	-5	64	64
400	-18	-6	60	60
500	-20	-6	58	58
600	-22	-7	56	56
800	-24	-7	52	52
900	-25	-8	51	51
1,000	-26	-8	50	50
1,500	-30	-9	45	45
2,000	-32	-10	42	42
3,000	-36	-11	37	37
4,000	-38	-12	34	34
5,000	-40	-12	32	32
6,000	-42	-13	30	30

As shown in Table 3.6-5, noise could reach 50 dB,  $L_{eq}$  within 520 feet of project construction, and could reach 45 dB,  $L_{eq}$  within 1,300 feet of project construction. As shown in Table 3.6-6, noise from an auger drill rig could reach 50 dB,  $L_{eq}$  within 1,000 feet of drilling activity and 45 dB,  $L_{eq}$  within 1,500 feet of drilling activity.

Noise levels anticipated to occur from construction and drilling activity from the wells nearest to residences are shown in Table 3.6-7.

**Table 3.6-7. Nearest Noise-Sensitive Land Uses**

Well ID Number	County	Noise-Sensitive Land Use	Distance (feet)	Construction Noise (dB, $L_{eq}$ )	Drilling Noise (dB, $L_{eq}$ )
T-2	Fresno	Rural Residence	371	54	61
		Rural Residence	670	49	56
		Rural Residence	906	48	55
J-1	Fresno	Rural Residence	586	44	51
J-3	Fresno	Rural Residence	1175	41	48

Table 3.6-5 indicates that, under the reasonable worst-case construction noise assumption, construction noise could exceed the Fresno County noise standard of 50 dBA,  $L_{eq}$  (daytime) within about 520 feet of an active construction site. Table 3.6-6 indicates that well drilling noise could exceed Fresno County residential noise standards of 40 dBA (nighttime) within about 1,500 feet of drilling. As shown in Table 3.6.7, wells T-2, J-1, and J-3 are within about 1,500 feet of residences. Mitigation Measure NOI-1 would reduce this effect to a less-than-significant level.

### **Mitigation Measure NOI-1: Employ Noise-Reducing Construction Practices**

Reclamation will ensure that its contractor employs noise-reducing construction practices so that construction noise does not exceed 50 dBA  $L_{eq}$  between the hours of 7:00 p.m. and 10:00 p.m., or 40 dBA  $L_{eq}$  between the hours of 10:00 p.m. and 7:00 a.m. (excluding drilling). A noise reduction plan will be approved by Reclamation prior to construction.

Measures that can be used to limit noise include but are not limited to:

- prohibiting noise-generating construction activity between the hours of 9:00 p.m. and 6:00 a.m.
- locating equipment as far a practical from noise sensitive uses;
- requiring that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation;
- prohibiting gasoline or diesel engines from having unmuffled exhaust;
- selecting haul routes that affect the fewest number of people;
- using noise-reducing enclosures around noise-generating equipment; and
- constructing barriers between noise sources and noise sensitive land uses or taking advantage of existing barrier features (terrain, structures) to block sound transmission.

*Impact NOI-2: Exposure of Noise-Sensitive Land Uses to Noise from Proposed Action Operations*

As described in Chapter 2, each well would include an electric pump that would operate the well. The pumps would range in size from 25 HP to 75 HP. Pump noise at 50 feet was calculated using methodology from Hoover and Keith (2000). Noise levels for the pumps at 50 feet were entered into the spreadsheet model based on FHWA (2006) guidelines to generate noise levels at graduated distances and nearby receptors.

**Table 3.6-8.** Calculated Construction Noise Levels from Operational Pumps

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated $L_{\max}$ Sound Level (dBA)	Calculated $L_{eq}$ Sound Level (dBA)
50	0	0	71	64
100	-6	-2	63	56
160	-10	-3	57	50
200	-12	-4	55	48
250	-14	-4	52	45
350	-17	-5	49	42
400	-18	-6	47	40
500	-20	-6	44	37
600	-22	-7	42	35
700	-23	-7	41	34
800	-24	-7	39	32
900	-25	-8	38	31
1,000	-26	-8	37	30
2,000	-32	-10	29	22
3,000	-36	-11	24	17
4,000	-38	-12	21	14
5,000	-40	-12	18	11
6,000	-42	-13	16	9

As shown in Table 3.6-8, noise from operational pumps could reach 50 dBA,  $L_{eq}$  at about 160 feet, and 45 dBA,  $L_{eq}$  at about 250 feet. Noise from operational pumps at these wells could exceed Fresno County noise standards (50 dBA  $L_{eq}$  during daytime hours and 45 dBA  $L_{eq}$  during nighttime hours). None of the new wells are proposed within 250 of any sensitive receptor and this impact is less than significant.



### ***Cumulative Effects***

Noise generated during construction of the wells would be short-term. Because construction activity at each well site would be temporary and localized, noise from these activities is not expected to result in any significant cumulative noise conditions. Likewise, operational pumps would not exceed thresholds and no other projects are anticipated to generate a cumulative effect when combined with the Proposed Action as noise effects are localized.

## **3.7 Indian Trust Assets**

This section describes the existing environmental conditions and the consequences of constructing and operating the Proposed Actions on Indian Trust Assets (ITAs).

ITAs are legal interests in property held in trust by the United States for federally recognized Indian tribes or individual Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include land, minerals, federally reserved hunting and fishing rights, federally reserved water rights, and instream flows associated with trust land. Beneficiaries of the Indian trust relationship are federally recognized Indian tribes with trust land; the United States is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States. The characterization and application of the United States trust relationship have been defined by case law that interprets Congressional acts, executive orders, and historical treaty provisions.

Reclamation's ITA policy and NEPA-implementing procedures provide for the protection of ITAs from adverse impacts resulting from federal programs and activities.

### **3.7.1 Affected Environment**

The nearest ITA to the Proposed Action in Region 3 is the Santa Rosa Rancheria, located approximately 32 miles southeast of the Proposed Action location.

### **3.7.2 Environmental Consequences**

An assessment of effects on ITAs was conducted by evaluating the effects described in the various preceding resource sections and determining whether any would directly or indirectly affect the Santa Rosa Rancheria or other ITAs.

### ***Regulatory Setting***

Consistent with President William J. Clinton’s 1994 memorandum, “Government-to-Government Relations with Native American Tribal Governments,” Reclamation assesses the effect of its programs on tribal trust resources and federally recognized tribal governments. Reclamation is tasked with actively engaging federally recognized tribal governments and consulting with such tribes on a government-to-government level (59 FR 1994) when its actions affect ITAs.

The U.S. Department of the Interior (DOI) Departmental Manual Part 512.2 ascribes the responsibility for ensuring protection of ITAs to the heads of bureaus and offices (DOI 1995). Part 512, Chapter 2 of the Departmental Manual states that it is the policy of the DOI to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Indian tribes and tribal members. All bureaus are responsible for, among other things, identifying any impact of their plans, projects, programs or activities on ITAs; ensuring that potential impacts are explicitly addressed in planning, decision, and operational documents; and consulting with recognized tribes who may be affected by proposed activities.

Consistent with this, Reclamation’s Indian trust policy states that Reclamation will carry out its activities in a manner that protects ITAs and avoids adverse impacts when possible, or provides appropriate mitigation or compensation when it is not. To carry out this policy, Reclamation incorporated procedures into its NEPA compliance procedures to require evaluation of the potential effects of its proposed actions on trust assets (Reclamation July 2, 1996). Reclamation is responsible for assessing whether the Proposed Action has the potential to affect ITAs. Reclamation will comply with procedures contained in Departmental Manual Part 512.2, guidelines, which protect ITAs.

Reclamation’s ITA policy states that Reclamation will carry out its activities in a manner that protects ITAs and avoids adverse impacts when possible. When Reclamation cannot avoid adverse impacts, it will provide appropriate mitigation or compensation.

### ***No Action Alternative***

Potential impacts on ITAs resulting from the No Action Alternative have been reviewed, and no significant effects on ITAs would occur.

### ***Proposed Action***

Potential impacts on ITAs resulting from implementation of the Proposed Action have been reviewed, and no significant effects on ITAs would occur as a result of

the Proposed Action. The nearest ITA is more than 32 miles away and the Proposed Action would not affect the Rancheria.

## **3.8 Utilities and Infrastructure**

This section describes the existing environmental conditions and the consequences of constructing and operating the Proposed Actions on utilities and infrastructure. These resources include water conveyance, natural gas, electricity, and stormwater drainage.

### **3.8.1 Affected Environment**

#### ***Water Conveyance***

Water is supplied in the Proposed Action area through FSWD, JID, and TID. The primary facilities used to convey water are the DMC and miles of canals and ditches that distribute irrigation water to farmlands in Fresno County.

#### ***Electricity***

PG&E is the primary provider of electricity in Region 3 (CEC 2010b). PG&E transmission lines in the region are primarily of a lower kilovolt (kV), consisting of 60–92 kV and smaller lines. Two 220–287 kV lines run east to west south of the town of San Joaquin, but no wells would be located near this line.

#### ***Natural Gas***

PG&E owns and operates natural gas pipelines that run along the western side of the Proposed Action area, parallel to Interstate 5 (CEC 2010a). These pipelines consist of one 19- to 26-inch pipe, one 33- to 42-inch pipe, and several smaller 2- to 12-inch pipes that branch from the main pipelines. Chevron and TOSCO own petroleum pipelines that run parallel to Interstate 5.

#### ***Stormwater Drainage***

Flooding is a normal occurrence in the San Joaquin Valley because it is a natural drainage basin for the Sierra and Diablo foothill and mountain lands. The San Joaquin Valley is also the floodplain of the San Joaquin and Merced Rivers. Drainage facilities consist primarily of roadside ditches and private ponds. Localized flooding or ponding occurs more frequently in these rural areas, where drainage facilities are inadequate. Impervious surfaces in the Proposed Action area are limited to roads, other small sections of pavement, and areas covered by rural residential or agricultural structures. Local drainage is dictated largely by an

extensive system of agricultural ditches and drains. Several culverts have been constructed to allow drainage from between the California Aqueduct and the DMC to enter surrounding areas, but because there are few impervious surfaces, stormwater drainage is similar to natural conditions (Merced County 2007).

### **3.8.2 Environmental Consequences**

This section qualitatively describes the effects related to utilities and infrastructure from the implementation of the alternatives.

#### ***No Action Alternative***

Under the No Action Alternative, no new wells would be constructed, and supplemental water would not be made available during dry periods. Agricultural production in the water district would continue to rely on existing surface water and groundwater supplies during dry periods. There would be no new facilities constructed or operated and no construction or operation effects on utilities and infrastructure.

#### ***Proposed Action***

Under the Proposed Action, seven wells with conveyance connections and appurtenant structures would be constructed. Electricity to power the submersible pumps would be provided from adjacent overhead power lines, and discharge pipes would connect the wells to existing adjacent irrigation systems for use within or outside the water district. For wells with levee roads, including the DMC, the pipeline would be trenched under the road and refilled.

#### ***Impact UTL-1: Disruption to Transmission Lines during Well Construction***

The Proposed Action would involve tying into existing utility lines to connect seven well pumps to a power source. Localized planned temporary electrical outages would be necessary to tie into the electrical line, which would result in short-term loss of power for utility users in the area of the wells. The pumps would tie into lower kV lines to minimize the reach of the electrical outages and affect as few users as possible. Few users would be affected as the area is largely rural, and only seven wells would need to be connected. PG&E would coordinate the outages and notify users about the temporary loss of electricity. Given the factors that would minimize the outages, this impact is not significant.

*Impact UTL-2: Increased Electricity Use*

The Proposed Action would increase the kWh of electricity used in Fresno County to run the seven groundwater pumps. Table 3.8-1 shows the total electricity required to run the pumps compared to the most recent county consumption total (2007), and the percentage increase in consumption.

**Table 3.8-1.** Increase in Electricity Use

County	Number of Pumps	kWh Required	Current County Use (kWh)	Percentage Increase
Fresno	7	7,345,222	6,950,631,810	0.106%

Source: Energy Consumption Data Management System 2008.

The increase in electricity consumption related to the Proposed Action for Fresno County would be relatively low. Given the relatively low energy use for this primarily agricultural county, these increases are negligible and would not raise usage to a level that would adversely affect utilities in Fresno County. This impact is not significant.

***Cumulative Effects***

When combined with other projects that could occur simultaneously, the impacts on utilities and infrastructure that would result from the Proposed Actions would be minimal and likely would not exceed the impacts described for the Proposed Action. No other projects are expected to result in outages that would affect the same users at the same time. For any other projects that may require planned outages, the outages would be scheduled so they would not overlap and increase the amount of users affected. Additionally, the Proposed Action would increase electricity usage a negligible amount, and would not represent a significant increase even when combined with increased energy demands from other projects in the area.

### **3.9 Socioeconomic Resources**

This section describes the socioeconomic conditions in the Region 3 study area and potential effects that could occur if the proposed groundwater wells are constructed and placed in operation. For purposes of this assessment, the Region 3 study area is composed of Fresno County. This section describes the population, employment and income, and value of agricultural production in Fresno County. Short-term socioeconomic effects would occur during construction of the wells. Long-term socioeconomic effects would occur once the wells are placed in operation.

### **3.9.1 Affected Environment**

#### ***Population***

Population in Fresno County was estimated to total 954,000 persons in January 2010 (California Department of Finance [CDF] 2010a). This represents an increase of 18 percent from 2000. Approximately 85 percent of Fresno County's population resides in the city of Fresno followed by approximately 10 percent living in Clovis (CDF 2010a, 2010b). Approximately 30 percent of Fresno County's population is 18 years old or younger and 10 percent is 65 or older (U.S. Department of Commerce, Bureau of the Census 2010a).

Of persons residing in Fresno County, approximately 81 percent report their ethnicity as white, 9 percent as Asian, 6 percent as black, and 2 percent as American Indian. Just over 48 percent of Fresno County's residents identify themselves as being of Hispanic or Latino origin (U.S. Department of Commerce, Bureau of the Census 2010a).

#### ***Employment and Income***

Full and part-time employment in Fresno County totaled approximately 333,800 jobs in 2009, an increase of approximately 2 percent from 2000. Between 2000 and 2009, employment in Fresno County peaked at 354,500 jobs. Nonfarm employment represented approximately 86 percent of total employment in 2009, and farm employment represented the remaining 14 percent. The unemployment rate in 2009 was approximately 15 percent (California Employment Development Department 2010a).

Personal income totaled approximately \$28 billion in Fresno County in 2008 (U.S. Department of Commerce, Bureau of Economic Analysis 2010a). Per capita personal income totaled approximately \$31,000 in 2008 (U.S. Department of Commerce, Bureau of Economic Analysis 2010b). This is substantially less than the statewide average of approximately \$44,000.

#### ***Agricultural Production***

The total value of crops produced in Fresno County was approximately \$5.7 billion in 2008 and represents an increase of approximately \$2.3 billion from the 2000 total of \$3.4 billion (County of Fresno, Department of Agriculture 2000 and 2008). In 2008, grapes were the most valuable crop at approximately \$723 million, followed by almonds at \$592 million and poultry at \$556 million (County of Fresno, Department of Agriculture 2008).



### **3.9.2 Environmental Consequences**

This section qualitatively describes the socioeconomic effects of constructing and operating the seven wells in the TIDID, FSWD, and the JID.

#### ***No Action Alternative***

Under the No Action Alternative, no wells would be constructed and supplemental water would not be made available during dry periods. Agriculture production in the water district would continue to rely on existing surface water and groundwater supplies during dry periods. Adverse effects on agricultural production and employment and income would be expected to continue during water shortages.

#### ***Proposed Action***

##### ***Impact SOC-1: Short-Term Change in Employment and Income***

Constructing and placing into operation the seven wells in Region 3 would increase employment and income as a result of expenditures made to drill and place the wells into operation and to design and construct pumps, pipes, and controls. Although beneficial, the change in employment and income is not expected to be substantial compared to the overall economic activity occurring in Fresno County because only seven wells would be installed and construction would be completed within a few months.

##### ***Impact SOC-2: Long-Term Change in Employment and Income***

Operating the seven wells in Region 3 would enhance the supply of water used for agricultural purposes within and potentially outside of the TID, FSWD, and JID. Because water produced by the wells is considered a supplemental water supply, it would benefit employment and income generated in the agriculture sector and the sectors that supply goods and services to the agriculture sector by helping ensure that agricultural lands remain in production during water shortages. Keeping agricultural lands in production would help maintain, but not substantially increase, agriculture-related economic activity in Fresno County.

## **3.10 Environmental Justice**

This section describes the existing environmental conditions and the consequences of constructing and operating the Proposed Action on environmental justice. The EPA defines environmental justice as the fair treatment of all people regardless of race, color, nation of origin, or income with

respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EO 12898, signed into law by President Clinton on February 11, 1994, requires federal agencies to incorporate environmental justice into their agency missions to ensure that their actions do not disproportionately affect minority and low-income populations. Section 101 of EO 12898 calls on all federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

### **3.10.1 Affected Environment**

#### ***Sources of Information***

The following key source of information was used in the preparation of this section:

- U.S. Department of Commerce, Census Bureau, American Community Surveys, 2006–2008.

#### ***Demographics***

The Proposed Action is located in Fresno County. The percentage of minorities residing in the Fresno County is 38.6. For the state of California, 39.1 percent of the population is considered to be a minority race. Table 3.10-1 illustrates the percentage of races residing in the counties. Percentages for the state of California are included for comparison.

**Table 3.10-1.** Race/Origin Characteristics, American Community Survey 2006–2008

	<b>Fresno County</b>	<b>State of California (%)</b>
<b>Race</b>		
White	61.3	60.9
Black or African American	5.1	6.2
American Indian or Alaska Native	1.1	0.8
Asian	8.7	12.3
Native Hawaiian and Other Pacific Islander	0.1	0.4
Some other race	20.0	16.0
Two or more races	3.6	3.4
<b>Origin</b>		
Hispanic	48.2	36.1

Source: U.S. Department of Commerce, Census Bureau, American Community Survey, 2006–2008.

Percentages may total more than 100% because individuals may report more than one race. Hispanic is considered an origin by the U.S. Census Bureau; therefore, those of Hispanic origin are also counted in one of the race categories.

As shown in Table 3.10-2, the percentage of households determined to have an income below the poverty level was 16.5 in Fresno County. In the state of California, 9.6 percent of the population is determined to have an income below the poverty level.

**Table 3.10-2.** Race/Origin Characteristics, American Community Survey 2006–2008

	<b>Fresno County</b>	<b>State of California</b>
Percent of households below poverty level	16.5	9.6

Source: U.S. Department of Commerce, Census Bureau, American Community Survey, 2006–2008.

## 3.10.2 Environmental Consequences

### **Methods**

The following methodology is based on the EPA’s Environmental Justice Guidelines (EPA 1998), which states that a two-step screening process should be incorporated to determine potential impacts in the Proposed Action area (EPA 1998). The screening analysis consists of examining two questions:

1. Does the potentially affected community include minority or low-income populations (that exceed 50 percent of the population)?
2. Are the environmental impacts likely to fall disproportionately on minority and/or low-income members of the community and/or tribal resources?

When asking the above questions, the EPA provides guidance on classifying minority populations. Minority populations are those considered to be more than 50 percent of the affected area. Additionally, a minority population may be present if “the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.” (EPA 1998.)

Based on the above guidance, demographic data for Fresno County were compared to data for the state of California, which was the next highest unit of analysis, to determine whether these areas had meaningfully greater minority or low-income populations. The data examined were from the U.S. Census Bureau’s 2006–2008 American Community Surveys, and the key population characteristics analyzed were percentage of:

- minority population (black or African American, American Indian or Alaskan Native, Asian Native Hawaiian or other Pacific Islander, some other race, and two or more races);
- persons of Hispanic origin; and
- the population below the poverty level.

The above data indicate that Fresno County has a higher percentage of some minority populations, persons of Hispanic origin, and populations living below the poverty level than the state of California.

### ***No Action Alternative***

Under the No Action Alternative, it is assumed that south-of-Delta CVP contractors would continue to use existing water supplies to meet demand. There would be no change in factors affecting minority or low income populations, and there would be no impact on these populations.

### ***Proposed Action***

#### ***Impact EJ-1: Short-Term Impacts on Minority and Low-Income Populations***

The Proposed Action for Region 3 would involve the construction and operation of seven new wells, with conveyance connections and appurtenant structures. Potential impacts on minority and low-income populations resulting from implementation of the Proposed Action have been reviewed, and no population, including minority or low-income populations, would bear a disproportionate environmental or human-health effect as a result of the Proposed Action. Therefore, there would be no environmental justice effects resulting from the Proposed Action.

#### ***Impact EJ-2: Long-Term Change on Minority and Low-Income Populations***

The Proposed Action for Region 3 would involve the construction and operation of seven new wells, with conveyance connections and appurtenant structures. Potential impacts on minority and low-income populations resulting from implementation of the Proposed Action have been reviewed, and no population, including minority or low-income populations, would bear a disproportionate environmental or human-health effect as a result of the Proposed Action. Therefore, there would be no environmental justice effects resulting from the Proposed Action.



## Chapter 4 Consultation and Coordination

This chapter describes the consultation and coordination associated with the Proposed Action.

Reclamation is required to comply with various federal laws and executive orders as part of the construction of the new wells. Water districts and landowners would be responsible for operation of the wells and additional non-federal approvals and permits may be required. Table 4-1 summarizes the status of consultation and other requirements that must be met by Reclamation before the project can be completed.

**Table 4-1.** Summary of Environmental Compliance the New Wells Project, Region 3

Requirement	Status of Compliance
National Environmental Policy Act	Ongoing as part of this Environmental Assessment.
Federal Endangered Species Act	Concurrent with the preparation of this EA for the project, Reclamation coordinated with USFWS on San Joaquin kit fox and will request a no effect determination.
Fish and Wildlife Coordination Act	Reclamation will comply with the provisions of the Fish and Wildlife Coordination Act.
Migratory Bird Treaty Act	Reclamation will comply with the provisions of the MBTA. Constructing and operating the wells will not result in an effect on migratory birds.
National Historic Preservation Act	Reclamation is consulting with the SHPO. Constructing and operating the wells will not result in an adverse effect on historic properties within the study area.
Clean Air Act	Reclamation performed a conformity analysis and concluded that the project would not result in adverse air quality effects.
Clean Water Act	The project would not result in placing fill or discharge to waters of the United States
Executive Order 11988 – Floodplain Management	The project elements would not adversely affect flood channel capacity or risk to infrastructure from flooding
Executive Order 11990 – Protection of Wetlands	The project elements would not be located in or discharge to wetlands.





## Chapter 5 References Cited

- AECOM. 2009. Groundwater management plan for the southern agencies in the Delta-Mendota Canal service area. Draft.
- Ayers, R. S., and D. W. Westcot. 1985. *Water quality for agriculture*. Food and Agriculture Organization of the United Nations—Irrigation and drainage paper No. 29, Rev. 1. Rome.
- Bertoldi, G. L., R. H. Johnston, and K. D. Evenson. 1991. *Ground water in the Central Valley, California—A summary report*. U.S. Geological Survey professional paper 1401-A, 44 p.
- Boyle Engineering. 2007. Groundwater management plan for the northern agencies in the Delta-Mendota Canal service area and a portion of San Joaquin County.
- Bull, W. B. 1975. Land subsidence due to ground-water withdrawal in the Los Banos–Kettleman City area, California, Part 2. *Subsidence and compaction of deposits*. (Professional Paper 437-F.) U.S. Geological Survey. Washington, DC.
- Bull, W. B., and J. F. Poland. 1975. Land subsidence due to ground-water withdrawal in the Los Banos–Kettleman City area, California, Part 3. *Interrelations of water-level change, change in aquifer-system thickness, and subsidence*. (Professional Paper 437-G.) U.S. Geological Survey. Washington, DC.
- Bull, W. B., and R. E. Miller. 1975. Land subsidence due to ground-water withdrawal in the Los Banos–Kettleman City area, California, Part 1. *Changes in the hydrologic environment conducive to subsidence*. (Professional Paper 437-E.) U.S. Geological Survey. Washington, DC.
- California Air Resources Board. 2009a. *ARB databases: aerometric data analysis and management system (ADAM)*. Last Revised June 8, 2009. Available: <<http://www.arb.ca.gov/html/databases.htm>>. Accessed: April 20, 2010.
- California Air Resources Board. 2009b. *2006 State area designations*. Last Revised: February 9, 2009. Available <<http://www.arb.ca.gov/desig/adm/adm.htm>> Accessed: April 19, 2010.
- California Air Resources Board. 2009c. *2009 Almanac emissions projection data*. Available: <<http://www.arb.ca.gov/app/emsinv/emssumcat.php>>. Accessed: April 19, 2010.

- California Air Resources Board. 2010. *Ambient air quality standards*. Last Revised: January 27, 2010. Available: <<http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>>. Accessed: February 3, 2010.
- California Climate Action Registry. 2009. Climate Action Registry General Reporting Protocol Version 3.1. January. Available: <[http://www.climateregistry.org/resources/docs/protocols/grp/GRP\\_3.1\\_January2009.pdf](http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf)>. Accessed: April 19, 2010.
- California Department of Conservation. 2006a. *San Joaquin County important farmland*. Last updated: 2006. Available: <<ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/sjq06.pdf>>. Accessed: May 3, 2010.
- California Department of Conservation. 2006b. *Stanislaus County important farmland*. Last updated: 2006. Available: <[ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/sta06\\_so.pdf](ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/sta06_so.pdf)>. Accessed: May 4, 2010.
- California Department of Conservation. 2007. *Williamson Act Program*. Available: <<http://www.conservation.ca.gov/dlrp/lca/Pages/Index.aspx>>. Accessed: May 5, 2010.
- California Department of Conservation. 2008. *Merced County important farmland*. Last updated: 2008. Available: <[ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2008/mer08\\_so.pdf](ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2008/mer08_so.pdf)>. Accessed: April 30, 2010.
- California Department of Finance. 2010. Table E-1: City/County Population Estimates with Annual Percent Change, January 1, 2009, and 2010.
- California Department of Fish and Game. 1995. *Staff report on burrowing owl mitigation*. Sacramento, CA
- California Department of Fish and Game. 2010. Special Animals List. May. Available: <<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPANimals.pdf>>. Accessed: May 2010.
- California Department of Water Resources. 2003. California's groundwater update. Department of Water Resources Bulletin 118.
- California Department of Water Resources. 2005. California water plan. Department of Water Resources Bulletin 160-05, December.

- California Department of Water Resources. 2006. Online description of groundwater basins. Last updated January 2006. Available: <[http://www.water.ca.gov/groundwater/bulletin118/gwbasin\\_maps\\_descriptions.cfm](http://www.water.ca.gov/groundwater/bulletin118/gwbasin_maps_descriptions.cfm)>. Accessed May 14, 2010.
- California Department of Water Resources. 2010. Well elevation data from <<http://www.water.ca.gov/waterdatalibrary>> and <<http://www.water.ca.gov/iwris>>. Accessed by CH2MHill Spring 2010
- California Employment Development Department. 2010a. San Joaquin County industry employment and labor force, April 16, 2010. Available: <<http://www.calmis.ca.gov/htmlfile/county/fresno.htm>>. Accessed: June 2010.
- California Employment Development Department. 2010b. Merced County industry employment and labor force, April 16, 2010. Available: <<http://www.calmis.ca.gov/htmlfile/county/merced.htm>>. Accessed: June 2010.
- California Employment Development Department. 2010c. Stanislaus County industry employment and labor force, April 16, 2010. Available: <<http://www.calmis.ca.gov/htmlfile/county/merced.htm>>. Accessed: June 2010.
- California Energy Commission. 2006. *Refining estimates of water-related energy use in California*. (CEC-500-2006-118). December. Available: <<http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF>>. Accessed: April 19, 2010.
- California Energy Commission. 2010a. *California natural gas pipelines*. January. Last revised: January 11, 2010. Available: <[http://www.energy.ca.gov/maps/natural\\_gas.html](http://www.energy.ca.gov/maps/natural_gas.html)>. Accessed: May 14, 2010.
- California Energy Commission. 2010b. *California electric utility service areas*. May. Last revised: April 23, 2010. Available: <[http://www.energy.ca.gov/maps/utility\\_service\\_areas.html](http://www.energy.ca.gov/maps/utility_service_areas.html)>. Accessed: May 12, 2010.
- California Native Plant Society. 2010. Inventory of Rare and Endangered Plants of California. Available: <<http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>>. Accessed: April 2010.
- California Natural Diversity Database. 2010. RareFind 3, Version 3.1 March 2010 update Sacramento, California: California Department of Fish and Game

- Camp Dresser and McKee. 2001. San Joaquin County Flood Control and Water Conservation District Water Management Plan. Report Prepared for San Joaquin County.
- County of Fresno, Department of Agriculture. 2000. 2000 Agricultural crop and livestock report. Fresno, CA.
- County of Merced, Department of Agriculture. 2004. Merced County 2004 annual report on agriculture. Merced, CA.
- County of Merced, Department of Agriculture. 2008. Merced County 2008 annual report on agriculture. Merced, CA.
- County of San Joaquin, Agricultural Commissioner's Office. 2000. 2000 Agricultural report. Stockton, CA.
- County of San Joaquin, Agricultural Commissioner's Office. 2008. 2008 Agricultural report. Stockton, CA.
- County of Stanislaus, Department of Agriculture. 2000. Stanislaus County Agricultural Crop Report 2000.
- County of Stanislaus, Department of Agriculture. 2008. Stanislaus County agricultural crop report 2008.
- Delta Stewardship Council. 2010. Science News, April 2010. Measuring the depletion of groundwater resources worldwide. Last revised: April 2010. Available:  
<[http://www.science.calwater.ca.gov/publications/sci\\_news\\_0410\\_grace.html](http://www.science.calwater.ca.gov/publications/sci_news_0410_grace.html)>. Accessed April 23, 2010
- Dubrovsky, N. M., J. M. Neil, M. C. Welker, and K. D. Evenson. 1991. Geotechnical relation and distribution of selected trace elements in groundwater of northern part of the western San Joaquin Valley, California. United States Geological Survey Open File Report 90-108.
- Energy Consumption Data Management System. 2008. *Electricity consumption by county*. Available: <<http://ecdms.energy.ca.gov/elecbycounty.aspx>>. Accessed: May 21, 2010.
- Entrix. 2007. Groundwater pumping/water transfer project for 25 consecutive years. Environmental Assessment/Initial Study SCH #2007072012. Prepared for: Bureau of Reclamation and San Joaquin River Exchange Contractors Water Authority.
- Exchange Contractors. 1997. AB 3030 Groundwater Management Plan. Los Banos, CA.

- Faunt, C. C., ed. 2009. Groundwater availability of the Central Valley aquifer, California. U.S. Geological Survey Professional Paper 1766, 225 pp.
- Federal Highway Administration. 1995. Highway Traffic Noise Analysis and Abatement Policy and Guidance. June. Office of Environment and Planning, Noise and Air Quality Branch, Washington DC. 71 pages.
- Federal Highway Administration. 2006. *FHWA roadway construction noise model user's guide*. Washington, DC.
- Federal Transit Administration. 2006. *Transit noise and vibration impact assessment*. Washington, DC.
- Fresno County. 2000. *Fresno County General Plan background document*. January. Last revised: October 3, 2000. Available: <<http://www.co.fresno.ca.us/>>. Accessed: May 14, 2010.
- Fresno County. 2000. *Fresno County General Plan Update*. January, 2000. Available: <<http://www.co.fresno.ca.us/departmentspage.aspx?id=19705>>. Accessed: May 6, 2010.
- Fresno County. 2008. *Agricultural Crop and Livestock Report*. Available: <[http://www.co.fresno.ca.us/uploadedFiles/Departments/Agricultural\\_Commissioner/PDF/2008%20Crop%20Report%20All.pdf](http://www.co.fresno.ca.us/uploadedFiles/Departments/Agricultural_Commissioner/PDF/2008%20Crop%20Report%20All.pdf)>. Accessed: May 6, 2010.
- Galloway and Riley. 1999. United States Geological Survey. *Land subsidence in the United States*. U.S. Geological Survey Circular 1182.
- Grassland Water District. 2001. Land use and economics study, Grassland Ecological Area, Merced County, California. Prepared by Thomas Reid Associates, Palo Alto, CA and Strong Associates, Oakland, CA.
- Hart, J. D. 1978. *A Companion to California*. New York: Oxford Press.
- Hemker, C.J. and V.E.A. Post, 2009. MLU for Windows: Well Flow Modeling in Multi Layer Aquifer Systems. Available: <<http://www.microfem.nl/products/mlu.html>>. Accessed May 26, 2010.
- Hickman, J. C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.
- Hoover, R. M., and R. H. Keith. 2000. Noise control for buildings, manufacturing plants, equipment, and products. Lecture notes, first published 1981. Houston, TX: Hoover & Keith Inc.

- ICF International. 2010. Cultural resources inventory report for the Drought Relief Program, ARRA Groundwater Wells Project, San Joaquin, Stanislaus, Merced, and Fresno Counties, California. ARR # 10-SCAO-021. Prepared for the U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Division, Sacramento, CA.
- Intergovernmental Panel on Climate Change. 1996. 1995: Science of Climate Change. (Second Assessment Report). Cambridge University Press. Cambridge, U.K.
- Kenneth D. Schmidt and Associates. 2008. *Groundwater conditions beneath district owned lands in the Westlands Water District*. Draft Report prepared for Westlands Water District.
- Kroeber, A.L. 1976. *Handbook of the Indians of California*. Reprinted. Dover Publications, New York. Originally published in 1925, Bulletin No. 78, Bureau of American Ethnology, Smithsonian Institution, Washington, DC.
- Malone, T. E. 1965. The California irrigation crisis of 1886: origins of the Wright Act. Ann Arbor, Michigan: University Microfilms, Inc.
- Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. October. California Department of Forestry and Fire Protection. Sacramento, CA.
- Merced County. 2007. *Merced County General Plan Draft background report*. June. Last revised: June 21, 2007. Available:  
<[http://www.co.merced.ca.us/documents/Planning\\_and\\_Community\\_Development/General\\_Plan/Documents\\_Maps/background\\_report2.PDF](http://www.co.merced.ca.us/documents/Planning_and_Community_Development/General_Plan/Documents_Maps/background_report2.PDF)>. Accessed: May 11, 2010.
- Mintier & Associates. 2007. Merced County General Plan background report. June. Available:  
<[http://www.co.merced.ca.us/documents/Planning\\_and\\_Community\\_Development/General\\_Plan/Documents\\_Maps/background\\_report2.PDF](http://www.co.merced.ca.us/documents/Planning_and_Community_Development/General_Plan/Documents_Maps/background_report2.PDF)>. Accessed: June 2010.
- Miyamoto, Steve. California Department of Fish and Game, Los Banos Wildlife Area & North Grasslands Wildlife Management Area. May 18 and June 1, 2010 telephone conversation 559-826-0463 and meeting May 21, 2010 at well site G-1 and G-6. Williamson, A. K., D. E. Prudic, and L.A. Swain. 1989. Ground-water flow in the Central Valley, California: U.S. Geological Survey Professional Paper 1401-D, 127 p.
- Moratto, M. 1984. *California Archaeology*. San Diego: Academic Press.



- National Invasive Species Council. 2008. 2008–2012 National Invasive Species Management Plan. August. Washington, DC. 35 pp.
- National Park Service 1997. *How to Apply the National Register criteria for evaluation*. National Register Bulletin 15. National Park Service, Washington, DC.
- Olsen, W. H., and L. A. Payen. 1969. *Archaeology of the Grayson Site, Merced County, California*. Archaeological Report No. 12. Department of Parks and Recreation, California State Resources Agency, Sacramento.
- Pacific Gas and Electric Company. 2007. Annual emissions report.  
Available: <<https://www.climateregistry.org/CARROT/Reports/CREntityEmissionReport.aspx>>. Accessed: June 26, 2009. (Air)
- Planert, M., and J. S. Williams. 2010. United States Geological Survey (USGS). Online groundwater atlas—Segment 1, California Nevada. Available: <<http://ca.water.usgs.gov/groundwater/gwatlas/valley/index.html>>. Accessed May 6, 2010.
- Poland, J. F., and B. E. Lofgren. 1984. Case history No. 9.13. San Joaquin Valley, California, USA. Pages 263–277 in J. F. Poland (ed.), *Guidebook to studies of land subsidence due to ground-water withdrawal*. United National Educational, Scientific, and Cultural Organization. Paris, France.
- Quinn, N. W. T., W. M. Hanna, J. S. Hanlon, J. R. Burns, C. M. Taylor, D. Marciochi, S. Lower, V. Woodruff, D. Wright, and T. Poole. 2004. Real-time water quality management in the Grassland Water District. Lawrence Berkeley National Laboratory. eScholarship, open access publishing for the University of California. Last revised: November 15, 2004. Available: <<http://www.escholarship.org/uc/item/7vh9w3sw>> Accessed May 11, 2004
- San Joaquin County. 2009a. *San Joaquin County General Plan Background Report*. Public Review Draft. July 2, 2009. Available: <[http://www.sjcgpu.com/pdf/backgroundreport/prd\\_br\\_00s.pdf](http://www.sjcgpu.com/pdf/backgroundreport/prd_br_00s.pdf)>. Accessed: April 27, 2010.
- San Joaquin County. 2009b. *District Viewer*. Available: <<http://www.sjmap.org/DistrictViewer/Viewer.asp>>. Accessed: April 27.
- Stanislaus County. 2005. *Circulation support documentation*. December. Available: <<http://www.stancounty.com/planning/pl/gp/gp-sd-chapter2.pdf>>. Accessed: May 11, 2010.
- Stanislaus County. 2007. *Zoning Districts*. February 17, 2007. Available: <<http://www.stancounty.com/planning/pl/misc/zoning-map.pdf>>. Accessed: April 30, 2010.

- Stanislaus County. 2009. *Stanislaus County Agricultural Crop Report 2008*. July 1, 2009. Available: <<http://www.stanag.org/ag/croprpts/croppdf/2008-crop-report.pdf>>. Accessed: May 5, 2010.
- Sutley, N. H. 2010. Memorandum for heads of federal departments and agencies. Draft NEPA guidance on consideration of the effects of climate change and greenhouse gas emissions. February 18, 2010. Available: <[http://ceq.hss.doe.gov/nepa/regs/Consideration\\_of\\_Effects\\_of\\_GHG\\_Draft\\_NEPA\\_Guidance\\_FINAL\\_02182010.pdf](http://ceq.hss.doe.gov/nepa/regs/Consideration_of_Effects_of_GHG_Draft_NEPA_Guidance_FINAL_02182010.pdf)>. Accessed: March 29, 2010.
- Tinkham, G. H. 1923. History of San Joaquin County, California, with biographical sketches of the leading men and women of the county who have been identified with its growth and development from the early days to the present. Los Angeles: Historic Record Company.
- Tranquility Irrigation District. 2005. Water Management Plan.
- U.S. Department of Commerce, Bureau of Economic Analysis. 2010a. Table CA1-3. California personal income. Available: <<http://www.bea.gov/regional/reis/drill.cfm>>. Accessed: June 2010.
- U.S. Department of Commerce, Bureau of Economic Analysis. 2010b. Table CA1-3. California per capita income. Available: <<http://www.bea.gov/regional/reis/drill.cfm>>. Accessed: June 2010.
- U.S. Department of Commerce, Bureau of the Census. 2010a. Merced County quick facts. Available: <<http://quickfacts.census.gov>>. Accessed: June 2010.
- U.S. Department of Commerce, Bureau of the Census. 2010b. San Joaquin County quick facts. Available: <<http://quickfacts.census.gov>>. Accessed: June 2010.
- U.S. Department of Commerce, Bureau of the Census. 2010b. Stanislaus County quick facts. Available: <<http://quickfacts.census.gov>>. Accessed: June 2010.
- U.S. Department of Commerce, Census Bureau. 2006–2008. American Community Surveys, 2006–2008.
- U.S. Department of the Interior, Bureau of Reclamation. 1996. National Environmental Policy Act: Implementing Procedures (516 DM 6, Appendix 9). July 2. Available: <<http://www.epa.gov/fedrgstr/EPA-IMPACT/1996/July/Day-02/pr-16701.html>>.
- U.S. Department of the Interior, Bureau of Reclamation. 1998. Directives and standards: cultural resources management. No. LND 02-01.

- U.S. Department of the Interior, Bureau of Reclamation. 2009. Draft Environmental Assessment. Approval of one-year temporary Warren Act contracts for the conveyance of Non-CVP Water in the Delta-Mendota Canal. EA-08-98.
- U.S. Department of the Interior, Bureau of Reclamation. 2009a. Final environmental assessment. Tranquillity Irrigation District/San Luis Water District Groundwater Exchange Program—2009 through 2011. EA-09-99.
- U.S. Department of the Interior, Bureau of Reclamation. 2009b. Draft Environmental Assessment. Two-year exchange agreements and/or Warren Act contracts for conveyance of non-Central Valley Project (groundwater) in the Delta-Mendota Canal—water year 2010 through water year 2011. EA-09-169.
- U.S. Department of the Interior, Bureau of Reclamation. 2009c. Draft Environmental Assessment. Approval of one-year temporary Warren Act contracts for the conveyance of Non-CVP Water in the Delta-Mendota Canal. EA-08-98.
- U.S. Department of the Interior, Bureau of Reclamation. 2010. Central Valley Project. Available:  
<[http://www.usbr.gov/projects/Project.jsp?proj\\_Name=Central+Valley+Project](http://www.usbr.gov/projects/Project.jsp?proj_Name=Central+Valley+Project)>. Website accessed May 18, 2010.
- U.S. Department of the Interior. 1995. Departmental Responsibilities for Indian Trust Assets (512 DM 2). December 1.
- U.S. Environmental Protection Agency. 1998. Final guidance for incorporating environmental justice concerns in EPA's NEPA compliance analyses. April.
- U.S. Environmental Protection Agency. 2009. *Emission facts. Greenhouse gas emissions from a typical passenger car*. Last Revised: November 24, 2009. Available: <<http://www.epa.gov/OMS/climate/420f05004.htm>>. Accessed: January 13, 2010.
- U.S. Environmental Protection Agency. 2010. Compliance and Enforcement. Environmental Justice. Last revised: May 7, 2010. Available:  
<<http://www.epa.gov/compliance/environmentaljustice/>>. Accessed May 13, 2010.
- U.S. Environmental Protection Agency. 2010. *The greenbook nonattainment areas for criteria pollutants*. Last Revised: January 6, 2010. Available  
<<http://www.epa.gov/oar/oaqps/greenbk/>> Accessed: April 19, 2010.

- U.S. Fish and Wildlife Service. 1996a. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants. September 23. Sacramento, CA. 3-24
- U.S. Fish and Wildlife Service. 1996a. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants. September 23. Sacramento, CA 3-21
- U.S. Fish and Wildlife Service. 1999. U.S. Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance. Sacramento, CA.
- U.S. Fish and Wildlife Service. 2010. *Grassland Wildlife Management Area*. Available: <<http://www.fws.gov/refuges/profiles/index.cfm?id=81653>>. Accessed: May 3, 2010.
- U.S. Fish and Wildlife Service. 2010. List of endangered, threatened, and candidate plant species for the Howard Ranch, Crows Landing, Patterson, Newman, Westley, Vernalis, Tracy, and Solyo USGS 7.5-minute quadrangles. May 14, 2010.
- Wallace, W.J.. 1978. Northern Valley Yokuts. In California, edited by R. F. Heizer, pp. 462–470. *Handbook of North American Indians*, vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution. Washington, DC.
- Westlands Water District. 1996. Water Management Plan.
- Westlands Water District. 2009. *Deep groundwater conditions report, 2008*. Westlands Water District. March.
- Williams, D. F. 1986. Mammalian species of special concern in California. (Wildlife Management Division Administrative Report 86-1.) California Department of Fish and Game. Sacramento, CA.
- Zeiner, D. C., W. F. Laudenslayer, Jr., and K. E. Mayer (eds.). 1988. *California's wildlife*. Volume 1: Amphibians and reptiles. California statewide wildlife habitat relationships system. Sacramento, CA: California Department of Fish and Game.
- Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White. 1990. Mammals. Volume III in *California's Wildlife*. April. Sacramento, CA: California Department of Fish and Game.

# Chapter 6 List of Preparers

## 6.1 Introduction

Following is a list of persons who contributed to preparation of this EA. This list is consistent with the requirements set forth in NEPA (Sec. 1502.17).

## 6.2 U.S. Department of the Interior, Bureau of Reclamation

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Russell W. Grimes	Environmental Regulatory Compliance	Senior Review
Adam Nickels	Archaeology and Cultural Resources	Review

## 6.3 CH2M HILL

Name	Expertise	Project Role
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## 6.4 ICF International

Name	Expertise	Project Role
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Jennifer Pierre	Environmental regulatory compliance, NEPA compliance, document preparation	Project Manager, Indian Trust Assets, Cumulative
Stefanie Lyster	Community affairs	Project Coordinator, Environmental Justice
Russ Brown, PhD	Hydrology	Water Resources
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Andrew Humphrey	Water resource planning	Land Use, Utilities
Stephanie Myers	Wildlife biology	Biological Resources
Sue Bushnell-Bergfalk	Botany	Biological Resources
Karen Crawford	Archaeology	Cultural Resources
Laura Smith	Air quality/climate change	Air Quality/Climate Change
Lindsay Christensen	Noise	Noise
Matt Ewalt	Geographic information systems	GIS Support
Alan Barnard	Graphic arts	Graphic Design and Web Publication
Darle Tilly	Technical writing and editing	Lead Editor
Carol-Anne Hicks	Publications	Document Coordination and Publication

## **Appendix A Air Quality Technical Information**





# Appendix A Air Quality Technical Information

The purpose of this technical appendix is to describe the modeling techniques used to estimate criteria pollutant and greenhouse gas (GHG) emissions associated with construction and operation of the Proposed Action.

## A.1 Project Construction

### A.1.1 Criteria Air Pollutants

Construction of the Proposed Action would generate short-term emissions of reactive organic gases (ROG), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), particulate matter 10 microns in diameter or less (PM<sub>10</sub>), and particulate matter 2.5 microns in diameter or less (PM<sub>2.5</sub>). These emissions were estimated using the URBEMIS2007, Version 9.2.4 model. It was assumed that construction of each well would begin in June 2010 and last approximately 2 months.<sup>1</sup>

Construction is expected to occur in four phases, and none would occur concurrently. Each phase has the following estimated duration:

- Site Preparation—1 day
- Well Drilling—14 days
- Well Consturction—30 days
- Pump Installation—7 days

Based on the information summarized in the project description, the following assumptions were made for the emissions modeling:

- Each well would disturb an area of approximately 0.23 acres (100 feet by 100 feet)
- A daily maximum of 0.06 acres would be disturbed (a default assumption of one-quarter the total acreage; this ensures a conservative analysis of a worst-case scenario).

Table A-1 summarizes the pieces of diesel-powered construction equipment assumed in the emissions modeling. URBEMIS default values were used for equipment horsepower and load factors.

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<sup>1</sup> While construction of each individual well will require approximately 2 months, not all 32 wells will be built concurrently. Rather, construction of the proposed wells will occur over a 6–24 month period.

**Table A-1.** Diesel-Powered Construction Equipment

Equipment	Number	Hours/day	Horsepower	Load Factor
<b>Site Preparation</b>				
Backhoe	1	12	108	0.55
<b>Well Drilling</b>				
Drill Rig	1	24	291	0.75
<b>Well Construction</b>				
Crane	1	4	339	0.43
Backhoe	1	4	108	0.55
Pump	1	24	53	0.74
Water Truck	1	8 <sup>a</sup>	189	0.5
<b>Pump Installation</b>				
Backhoe	1	8	108	0.55
Crane	1	8	339	0.43
Other Equipment	1	8	190	0.62
Water Truck	1	8 <sup>a</sup>	189	0.50
<sup>a</sup> URBEMIS default.				

In addition to the diesel-powered construction equipment summarized in Table A-1, one light-duty gasoline-powered truck will travel one mile onsite per day during all construction phases. Emissions associated with this vehicle were quantified using URBEMIS.

Emissions from on-road workforce traffic and off-road diesel-powered delivery trucks were estimated using the number of workers per phase and the estimated delivery truck vehicle miles traveled (VMT). It was assumed that each phase would require 5 employees and that each employee would make 2 trips per day to the construction site (total of 10 trips per day). During the well construction and installation phases, it was assumed that one diesel-powered delivery truck would travel 40 miles offsite per day.

Because 7 wells would be construction in Region 3, the emissions estimated by URBEMIS for the construction of a single well were multiplied by 7 to obtain total emissions.

### **A.1.2 GHG Emissions**

GHG emissions from construction activities are primarily the result of fuel use by construction equipment and worker trips. The primary GHG emissions generated

by construction activities are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxides (N<sub>2</sub>O).

CO<sub>2</sub> emissions were estimated using URBEMIS2007 and the assumptions described above. URBEMIS does not quantify CH<sub>4</sub> and N<sub>2</sub>O emissions from off-road equipment or worker commutes. Emissions of CH<sub>4</sub> and N<sub>2</sub>O from diesel equipment were determined by scaling the construction CO<sub>2</sub> emissions predicted by URBEMIS by the ratio of CH<sub>4</sub>/CO<sub>2</sub> and N<sub>2</sub>O/CO<sub>2</sub> emissions expected per gallon of diesel fuel according to the California Climate Action Registry (CCAR) (CCAR 2009). GHG emissions from worker and vendor commutes were determined by dividing the annual CO<sub>2</sub> emissions from construction worker and vendor commutes by 0.95. This statistic is based on the U.S. environmental Protection Agency's (EPA's) recommendation that CH<sub>4</sub>, N<sub>2</sub>O, and other GHG emissions account for 5% of on-road emissions (EPA 2009).

In order to simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the "global warming potential" (GWP) methodology defined in the Intergovernmental Panel on Climate Change (IPCC) reference documents (IPCC 1996, 2001). The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO<sub>2</sub> equivalents (CO<sub>2</sub>e), which compares the gas in question to that of the same mass of CO<sub>2</sub> (CO<sub>2</sub> has a GWP of 1 by definition).

Calculated emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O were converted to CO<sub>2</sub>e and multiplied by 7 to obtain total construction emissions.

## **A.2 Project Operations**

### **A.2.1 Criteria Air Pollutants**

Given the limited nature and extent of maintenance activities, criteria pollutant emissions associated with operation of the Proposed Action were assumed to be minimal and were not quantified.

### **A.2.2 GHG Emissions**

Operational-GHG emissions would be produced by electricity usage required for well pumping. The water-related energy proxy for the San Joaquin River (California Energy Commission 2006) was used to estimate annual electricity usage for each well based on their yearly production capacity (Table A-2).

**Table A-2.** Yearly Production Capacity and Estimated Annual Electricity Usage for Region 3 Wells

Well ID	Production (AF/Yr)	Electricity (MW/Yr)
105a	5,500	1,606
105b	5,500	1,606
107	1,200	350
112.1	720	210
112. 2	720	210
112.3	720	210
112.4	720	210
<b>Total</b>		<b>4,403</b>

Because the project would receive electricity generated by Pacific Gas and Electric Company (PG&E), the PG&E CO<sub>2</sub> emission factor was used to calculate CO<sub>2</sub> emissions (PG&E 2007). State-specific emission factors for CH<sub>4</sub> and N<sub>2</sub>O were obtained from CCAR as PG&E currently does not calculate these emission factors (CCAR 2009). Table A-3 summarizes the GHG emission factors used in this analysis.

**Table A-3.** GHG Emission Factors for Electricity Consumption

Greenhouse Gas	Emission Factor (pounds per mega-hour)
Carbon Dioxide	635.67
Methane	0.0302
Nitrous Oxide	0.0081
Sources: PG&E 2007; CCAR 2009.	

The emissions calculated for each well were converted to CO<sub>2</sub>e and summed to obtain total operational emissions.

## A.3 References

- California Climate Action Registry. 2009. Climate Action Registry General Reporting Protocol Version 3.1. January. Available: <[http://www.climateregistry.org/resources/docs/protocols/grp/GRP\\_3.1\\_January2009.pdf](http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf)>. Accessed: April 19, 2010.
- California Energy Commission. 2006. *Refining Estimates of Water-Related Energy Use in California*. (CEC-500-2006-118). December. Available: <<http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF>>. Accessed: April 19, 2010.
- Intergovernmental Panel on Climate Change. 1996. 1995: Science of Climate Change. (Second Assessment Report). Cambridge University Press. Cambridge, U.K
- Intergovernmental Panel on Climate Change. 2001. Atmospheric Chemistry and Greenhouse Gases. In: *Climate Change 2001: Working Group I: The Scientific Basis*. Available: <http://www.ipcc.ch/ipccreports/tar/wg1/pdf/TAR-04.PDF>. Accessed: September 22, 2009.
- Pacific Gas and Electric Company, The. 2007. Annual Emissions Report. Accessed: June 26, 2009.
- U.S. Environmental Protection Agency. 2009. *Emission Facts. Greenhouse Gas Emissions from a Typical Passenger Car*. Last Revised: November 24, 2009. Available: <<http://www.epa.gov/OMS/climate/420f05004.htm>>. Accessed: January 13, 2010.



## **Appendix B USFWS and CNDDB Special-Status Species Lists**





**U.S. Fish & Wildlife Service**  
**Sacramento Fish & Wildlife Office**  
**Federal Endangered and Threatened Species that Occur in**  
**or may be Affected by Projects in the Counties and/or**  
**U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 100514032505

Database Last Updated: April 29, 2010

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Quad Lists

Listed Species

Invertebrates

*Branchinecta conservatio*

Conservancy fairy shrimp (E)

*Branchinecta lynchi*

vernal pool fairy shrimp (T)

*Desmocerus californicus dimorphus*

valley elderberry longhorn beetle (T)

*Lepidurus packardii*

vernal pool tadpole shrimp (E)

Fish

*Acipenser medirostris*

green sturgeon (T) (NMFS)

*Hypomesus transpacificus*

Critical habitat, delta smelt (X)

delta smelt (T)

*Oncorhynchus mykiss*

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

*Ambystoma californiense*

California tiger salamander, central population (T)

*Rana draytonii*

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Reptiles

*Gambelia (=Crotaphytus) sila*

blunt-nosed leopard lizard (E)

*Thamnophis gigas*

giant garter snake (T)

Birds

*Vireo bellii pusillus*

Least Bell's vireo (E)

## Mammals

*Dipodomys nitratoide exilis*

Fresno kangaroo rat (E)

*Neotoma fuscipes riparia*

riparian (San Joaquin Valley) woodrat (E)

*Sylvilagus bachmani riparius*

riparian brush rabbit (E)

*Vulpes macrotis mutica*

San Joaquin kit fox (E)

## Plants

*Amsinckia grandiflora*

large-flowered fiddleneck (E)

## Proposed Species

## Amphibians

*Rana draytonii*

Critical habitat, California red-legged frog (PX)

## Quads Containing Listed, Proposed or Candidate Species:

HOWARD RANCH (404A)

CROWS LANDING (424A)

PATTERSON (424B)

NEWMAN (424D)

WESTLEY (443C)

VERNALIS (444A)

TRACY (444B)

SOLYO (444D)

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## County Lists

No county species lists requested.

## Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.

*Critical Habitat* - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

## Important Information About Your Species List

## How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

## Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

## Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The

Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

## Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

## Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

## Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

## Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be August 12, 2010.

California Department of Fish and Game  
Natural Diversity Database  
Selected Elements by Scientific Name - Portrait  
ARRA Wells Region 1, 5/14/2010

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
2 Agelaius tricolor tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3 Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	unknown code...	G2G3	S2S3	SC
4 Amsinckia grandiflora large-flowered fiddleneck	PDBOR01050	Endangered	Endangered	G1	S1	1B.1
5 Anthicus sacramento Sacramento anthicid beetle	IICOL49010			G1	S1	
6 Antrozous pallidus pallid bat	AMACC10010			G5	S3	SC
7 Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2
8 Athene cunicularia burrowing owl	ABNSB10010			G4	S2	SC
9 Atriplex cordulata heartscale	PDCHE040B0			G2?	S2.2?	1B.2
10 Atriplex minuscula lesser saltscale	PDCHE042M0			G1	S1.1	1B.1
11 Atriplex persistens vernal pool smallscale	PDCHE042P0			G2	S2.2	1B.2
12 Blepharizonia plumosa big tarplant	PDAST1C011			G1	S1.1	1B.1
13 Branta hutchinsii leucopareia cackling (=Aleutian Canada) goose	ABNJB05035	Delisted		G5T4	S2	
14 Buteo swainsoni Swainson's hawk	ABNKC19070		Threatened	G5	S2	
15 California macrophylla round-leaved filaree	PDGER01070			G3	S3.1	1B.1
16 Caulanthus coulteri var. lemmonii Lemmon's jewel-flower	PDBRA0M0E0			G4T2	S2.2	1B.2
17 Ceratochrysis menkei Menke's cuckoo wasp	IIHYM71050			G1	S1	
18 Cirsium crassicaule slough thistle	PDAST2E0U0			G2	S2.2	1B.1
19 Coastal and Valley Freshwater Marsh	CTT52410CA			G3	S2.1	
20 Coccozyus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T3Q	S1	
21 Coreopsis hamiltonii Mt. Hamilton coreopsis	PDAST2L0C0			G2	S2.2	1B.2
22 Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
23 Eremophila alpestris actia California horned lark	ABPAT02011			G5T3Q	S3	

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Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24 Eriastrum tracyi Tracy's eriastrum	PDPLM030C0		Rare	G1Q	S1.1	1B.2
25 Eryngium racemosum Delta button-celery	PDAP10Z0S0		Endangered	G2Q	S2.1	1B.1
26 Eschscholzia rhombipetala diamond-petaled California poppy	PDPAP0A0D0			G1	S1.1	1B.1
27 Eumops perotis californicus western mastiff bat	AMACD02011			G5T4	S3?	SC
28 Falco columbarius merlin	ABNKD06030			G5	S3	
29 Falco mexicanus prairie falcon	ABNKD06090			G5	S3	
30 Great Valley Cottonwood Riparian Forest	CTT61410CA			G2	S2.1	
31 Great Valley Valley Oak Riparian Forest	CTT61430CA			G1	S1.1	
32 Lanius ludovicianus loggerhead shrike	ABPBR01030			G4	S4	SC
33 Lasiurus cinereus hoary bat	AMACC05030			G5	S4?	
34 Lytta moesta moestan blister beetle	IICOL4C020			G2	S2	
35 Madia radiata showy golden madia	PDAST650E0			G2	S2.1	1B.1
36 Malacothamnus hallii Hall's bush-mallow	PDMAL0Q0F0			G1Q	S1.2	1B.2
37 Masticophis flagellum ruddocki San Joaquin whipsnake	ARADB21021			G5T2T3	S2?	SC
38 Neotoma fuscipes riparia riparian (=San Joaquin Valley) woodrat	AMAFF08081	Endangered		G5T1Q	S1	SC
39 Perognathus inornatus inornatus San Joaquin pocket mouse	AMAFD01061			G4T2T3	S2S3	
40 Phacelia phacelioides Mt. Diablo phacelia	PDHYD0C3Q0			G1	S1.2	1B.2
41 Phrynosoma blainvillii coast horned lizard	ARACF12100			G4G5	S3S4	SC
42 Pogonichthys macrolepidotus Sacramento splittail	AFCJB34020			G2	S2	SC
43 Rana boylei foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
44 Rana draytonii California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
45 Spea hammondi western spadefoot	AAABF02020			G3	S3	SC
46 Sycamore Alluvial Woodland	CTT62100CA			G1	S1.1	
47 Sylvilagus bachmani riparius riparian brush rabbit	AMAEB01021	Endangered	Endangered	G5T1	S1	

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Selected Elements by Scientific Name - Portrait  
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Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
48 Symphyotrichum lentum Suisun Marsh aster	PDASTE8470			G2	S2	1B.2
49 Taxidea taxus American badger	AMAJF04010			G5	S4	SC
50 Tropidocarpum capparideum caper-fruited tropidocarpum	PDBRA2R010			G1	S1.1	1B.1
51 Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	



