RECLAMATION
Managing Water in the West

Draft
Environmental Assessment

American Recovery and Reinvestment Act of 2009 New Wells Project—Region 1

SAN JOAQUIN, STANISLAUS, AND MERCED COUNTIES

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 1

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

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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_2e	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_2	nitrogen dioxide
NO_X	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_2	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, as 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 32 wells in the Upper Delta-Mendota Canal (DMC) area of the CVP, referred to for the purposes of this analysis as Region 1. The purpose of these wells is to supplement the water districts' 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 32 new wells in Region 1.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 Infrastructure
- 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 32 proposed wells would supplement agricultural water supplies in drought years. As such, 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 the construction of the proposed new wells.

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 for wells.

Chapter 2 Alternatives

2.1 Alternatives

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. Byron-Bethany Irrigation District (BBID) and West Stanislaus Irrigation District (WSID) have river diversions, but these also are limited during drought conditions. 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 Recovery and Reinvestment 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, and no new wells would be constructed.

2.3 Proposed Action

2.3.1 Well Locations and Facilities

Region 1 and its associated proposed new wells are shown in Figure 2-1. A total of up to 32 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:

- BBID: installation of one new well.
- WSID: installation of 10 new wells.
- Del Puerto Water District (DPWD): installation of 21 new wells.

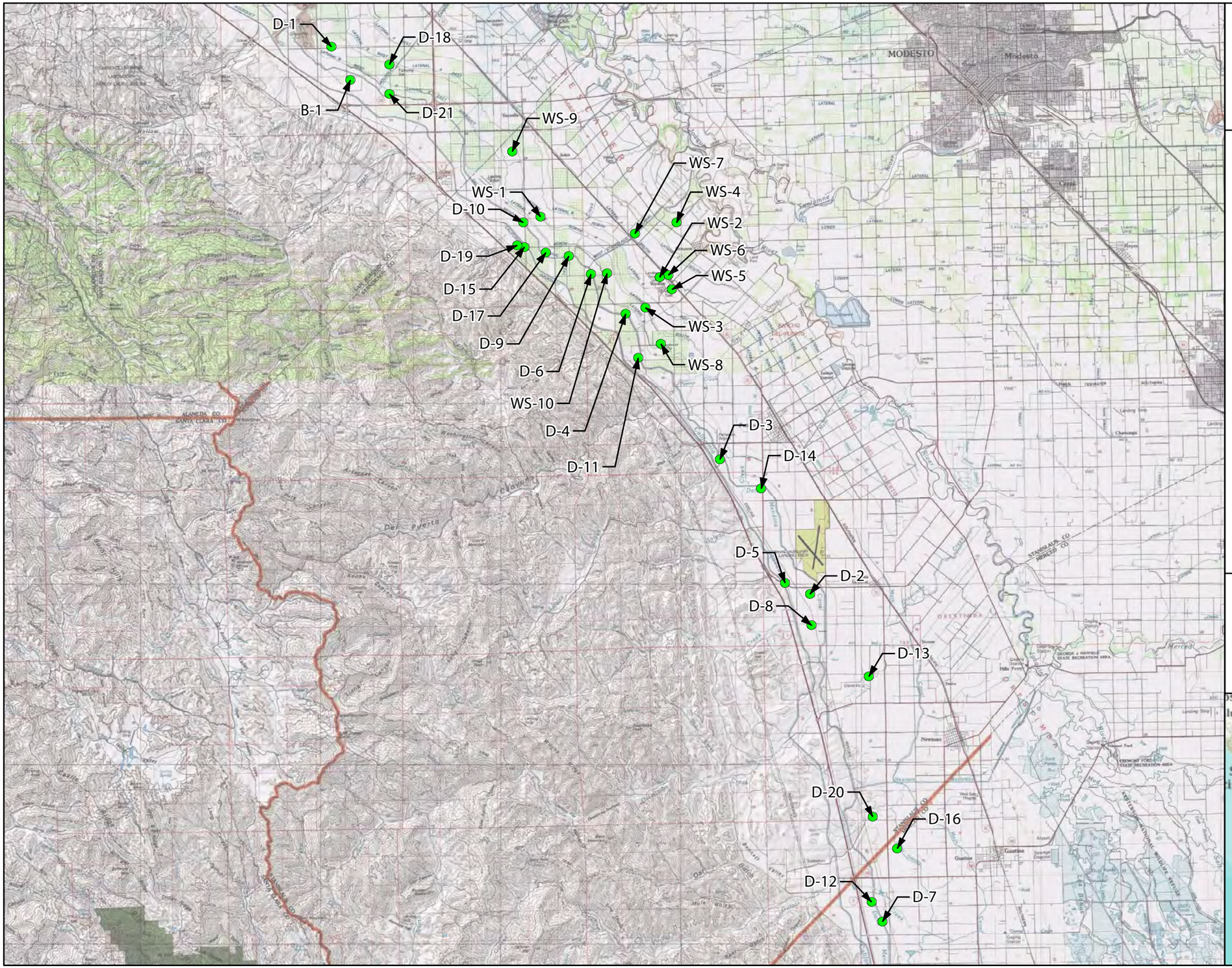
The aboveground facilities at each well site would occupy an area of up to 30 feet by 30 feet (well pad), with the actual footprint likely much less. The features of each well would include:

- A new 14- 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 32 proposed new wells and their specific characteristics. Appendix A (Figures A-1 to A-32) provides 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.

The connections from the new wells to the water delivery or irrigation system would be slightly different for each well, depending on the anticipated use for the water. Wells that would supply individual farms would connect to the existing farm irrigation system (generally underground pipelines). Other wells would be operated as district wells and would be connected with an aboveground or belowground pipeline discharging into the district canal for use within or outside the district. Some wells would discharge to other canals. For those with levee roads, the pipeline would be trenched under the road and refilled.

Figure 2-1
Proposed Well Locations
Region 1: Upper Delta Mendota Canal



Legend

Well Location

Label Key

Water District - Well Number
B= Byron-Bethany Irrigation District
D = Del Puerto Water District
WS = West Stanislaus Water District

0 1 2 4 Miles

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

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			
B-1	BBID	750	16	Below	750	Almonds	320	150	¼ mile	10
WS-1	WSID	500	16	Above	1,260	Trees	2,000	125	½ mile	19
WS-2	WSID	600	16	Below	200	Almonds	55	150	20 feet	2
WS-3	WSID	750	18	Below	1,260	Trees	300	175	20 feet	2
WS-4	WSID	750	18	Below	1,260	Trees	2,940	175	¼ mile	10
WS-5	WSID	750	18	Below	1,260	Peaches	2,940	175	50 feet	2
WS-6	WSID	750	18	Below	1,260	Peaches	2,940	175	½ mile	19
WS-7	WSID	500	18	Below	1,260	Almonds	2,500	125	20 feet	2
WS-8	WSID	600	16	Below	500	Apricots	150	150	100 feet	2
WS-9	WSID	600	16	Below	600	Almonds	150	150	20 feet	2
WS-10	WSID	600	16	Above	550	Almonds	117	150	50 feet	2
D-1	DPWD	500	16	Above	500	Row	440	100	½ mile	19
D-2	DPWD	500	16	Above	340	Tomatoes	148	100	½ mile	19
D-3	DPWD	300	14	Above	270	Apricots	117	60	700 feet	6
D-4	DPWD	600	18	Above	430	Apricots	187	150	350 feet (across canal)	4
D-5	DPWD	500	16	Above	425	Row	184	75	¼–½ mile	19
D-6	DPWD	400	14	Above	225	Almonds	98	100	40 feet	2
D-7	DPWD	450	16	Above	80	Almonds	36	50	100 feet	2
D-8	DPWD	600	16	Above	500	Almonds	214	125	160 feet	3
D-9	DPWD	550	14	Above	450	Almonds	194	125	150 feet	2
D-10	DPWD	600	16	Above	360	Trees	156	175	50-100 feet	2

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			
D-11	DPWD	480	16	Above	400	Trees	175	150	70 feet	2
D-12	DPWD	200	14	Above	317	Almonds	138	25	450 feet	4
D-13	DPWD	500	16	Above	345	Trees	150	100	40 feet	2
D-14	DPWD	600	14	Above	460	Trees	200	150	50 feet	2
D-15	DPWD	600	14	Above	350	Almonds	152	75	350 feet	4
D-16	DPWD	300	16	Above	230	Almonds	100	50	120 feet	2
D-17	DPWD	600	14	Above	172	Almonds	75	150	20 feet	2
D-18	DPWD	600	14	Above	230	Almonds	100	250	100 feet	2
D-19	DPWD	600	14	Above	290	Trees	125	75	200 feet	3
D-20	DPWD	300	16	Above	700	Almonds	300	60	500 feet	5
D-21	DPWD	600	16	Above	450	Tomatoes	195	175	100 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 and 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 (USFWS1999a). 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 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 land surface of Region 1 generally slopes easterly or northeasterly from the base of the Coast Ranges towards the San Joaquin River to the east. Several small ephemeral streams flow from the Coast Range typically trending northeasterly toward the San Joaquin River. The DMC forms the western boundary for irrigation in this Region and the San Joaquin River is the eastern boundary of this Region. Average annual precipitation on the valley floor portion of Region 1 is nine to 16 inches (DWR 2006).

The irrigated land surfaces within Region 1 slope toward the San Joaquin River to the east. The DMC elevation is about 150 feet above mean sea level (msl) at the north end of the Region and about 125 feet at the southern end of the Region. The San Joaquin River elevation is about 50 feet at the mouth of the Merced River, near the southern end of Region 1, and drops to about five feet at Vernalis, near the north end of Region 1.

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. The DMC also supplies surface water to agricultural users along the upper DMC, including SLDMWA member agencies BBID, DPWD, and WSID. Table 3.1-1 presents the irrigated land area and water supply (acre-feet per year) available for each of these water districts.

Table 3.1-1. Region 1 Water Districts and Water Supplies (Upper Delta-Mendota Canal)

District	Area Irrigated (acres)	San Joaquin River water	CVP Agricultural Contract (AF/yr)	Groundwater Pumping Capacity	New Wells
BBID	1,850	Yes	20,600	None	1
DPWD	45,000	No	140,210	None	21
WSID	20,000	Yes	50,000	Yes	10
AF/yr = acre-feet per year.					

The water supply for these districts is obtained from surface water diverted from the Delta and conveyed in the DMC, surface water diverted from the San Joaquin River, or pumped groundwater. During drought conditions, supplies from the DMC and San Joaquin River 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 (Boyle 2007).

The groundwater pumping in Region 1 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

San Joaquin County

San Joaquin County adopted a groundwater management ordinance in 1996 and an amendment in 2000 regarding extraction and exportation of groundwater from San Joaquin County. The ordinance requires that a permit be obtained for use of extracted groundwater outside the County boundaries. Under the Ordinance, the County seeks to foster prudent water management practices to avoid significant adverse overdraft and related environmental, social, and economic impacts.

The *San Joaquin County Water Management Plan*, which was adopted in 2002, addresses overdraft conditions, prevents further degradations of groundwater quality as a result of saline water intrusion, increases water supply reliability, meets the projected 2030 county water demand, identifies viable water supply and recharge options, and identifies the institutional structure to implement the options (Camp Dresser and McKee 2001).

Regional Groundwater Management Plan

Assembly Bill 3030 (AB 3030), signed in 1992, established procedures for existing local agencies to develop and implement groundwater management plans. The SLDMWA prepared a groundwater management plan in 1996, which has recently been updated (Boyle 2007), and includes all of the Region 1 wells.

The management plan includes several general objectives and guidelines, which the Proposed Project wells would follow. These groundwater management provisions 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).

Water Quality Regulations

Section 402 of the Clean Water Act (CWA) provides for regulation of discharges to surface waters through National Pollutant Discharge Elimination System (NPDES) permits. 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, and each well is not part of a larger plan, therefore Section 402 is not applicable.

Hydrogeology and Aquifers

The Project wells would be located in a small southern portion of the Tracy groundwater subbasin and through much of the Delta-Mendota groundwater subbasin (of the San Joaquin Valley Groundwater Basin). Groundwater in these subbasins occurs in the Upper Zone and Lower Zone (DWR 2005), which are separated by the Corcoran Clay. The Upper Zone contains semiconfined and unconfined water in an upper section of the Tulare Formation and younger deposits above the Corcoran Clay. Although there are some regions where the Upper Zone is semiconfined, the Upper Zone is commonly referred to here and elsewhere as the unconfined aquifer. The Tulare Formation and Corcoran Clay dip eastward from the Coast Range toward the trough of the valley. The Corcoran Clay occurs near the top of the Tulare Formation at depths ranging from about 100 to 500 feet (DWR 2003).

The unconsolidated sediments taper toward the Coast Ranges, and the Corcoran Clay becomes discontinuous along the west margin of the valley. A layer of older alluvium 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 and, where saturated, yield significant quantities of water to wells. The thickness of the younger alluvium near Tracy is less than 100 feet (DWR 2006).

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 ranges from a few hundred feet near the Coast Range foothills west of the DMC to about 3,000 feet along the trough of the valley below 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 at about -1,000 feet elevation. The lower layers of the Tulare Formation often have very high salinity. The base of freshwater is often less than 1,000 feet below the Corcoran Clay.

Shallow groundwater (less than 25 feet depth) is present over much of Region 1. This shallow groundwater is primarily drainage from agriculture, and some precipitation, and may be perched above local clay layers and separated from the regional unconfined Upper Zone aquifer. Portions of Region 1 have tile drainage systems (i.e., Banta-Carbona ID) because poor drainage of the perched shallow (high salinity) groundwater interferes with crop production. Tile drains are a network of subsurface pipes with openings that collect excess water, often of poor quality, below irrigated farm land. The tile drain water is usually discharged to surface water.

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 new ARRA 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

32 new wells proposed for Region 1 represent less than one percent of the historical volume of additional water pumped during dry years for the San Joaquin Valley groundwater basin (approximately 4,000 wells assuming one taf per well) and about eight percent of the historical volume of additional water pumped during 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 the Corcoran Clay, the groundwater elevations may differ considerably from the top of the aquifer.

In the groundwater model, Layer 3 represents the semiconfined 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).

Annual water levels in several wells in the unconfined Upper Zone along the DMC were reviewed (data from DWR 2010) to describe historical water elevations in Region 1. Figure 3.1-2 presents information for two wells along the DMC in Region 1.

Groundwater levels were generally at their lowest levels in the early 1950s, prior to importation of surface water. Water elevations reached a minimum of about 40 feet msl in a monitoring well along the DMC at Highway 132 west of Modesto in the north section of Region 1 (Figure 3.1-2). The water reached an elevation of about 85 feet in 1960 and increased to about 90 feet by 1970 (after 15 years of DMC deliveries). Water elevations were drawn down rapidly from about 90 feet to 50 feet during the 1987–1992 drought and have fluctuated between 60 feet and 80 feet since then.

A second monitoring well farther south along the DMC west of Patterson had water elevation that reached a low of about 10 feet in the early 1950s, increased to about 110 feet by 1970, and was drawn down from about 110 feet to 80 feet during the 1987–1992 drought (Figure 3.1-2). This well declined again after 2005 to about 60 feet.

Groundwater level data from each of the particular monitoring wells along the DMC indicate that the groundwater elevations have fluctuated over a range of

50 feet to 100 feet since 1950. With an assumed specific yield of about 10 percent, this would represent a conjunctive use drawdown in storage of about five feet to ten feet of water.

The groundwater elevation contours for the Delta-Mendota subbasin (Figure 3.1-1) suggest that groundwater elevations generally slope from the Coast Ranges towards the San Joaquin River, and along the trough of the valley, the groundwater elevations slope downward along the downstream direction of the San Joaquin River. The San Joaquin River elevation is about 50 feet at the southern end of Region 1 (east of Los Banos) and about 5 feet at the northern end of Region 1 (at Vernalis). Drainage from the perched shallow groundwater together with water from the Upper Zone aquifer provides a constant seepage flow into the San Joaquin River.

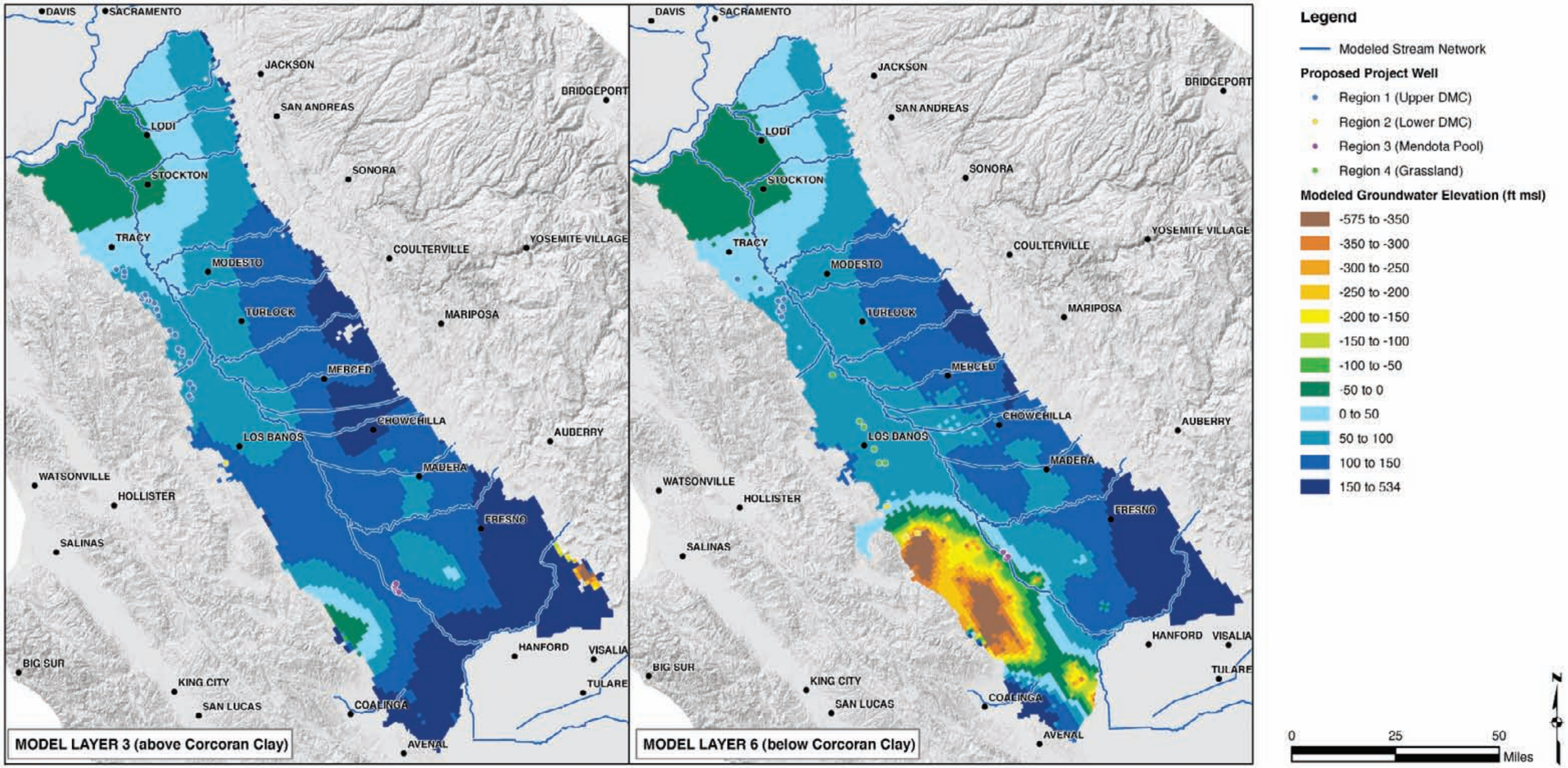
The Lower Zone (confined aquifer below the Corcoran Clay) has a similar groundwater elevation gradient that is 50 to100 feet below the Upper Zone unconfined groundwater elevation. Therefore, some amount of water movement from the upper aquifer to the lower aquifer occurs.

The rate of recharge from shallow (perched) drainage zones to the Upper Zone aquifer is not known but is assumed to be the major source of recharge to the upper aquifer in Region 1. Some Upper Zone recharge also occurs from precipitation and during the winter from the alluvial fans along streams emerging from the Coast Ranges (Faunt et al. 2009).

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.

Although land subsidence from historical pumping in the San Joaquin Valley is well documented, little land subsidence has been reported for Region 1 (Faunt et al. 2009). The historical minimum groundwater elevation in the early 1950s was generally above sea level (drawdown of less than 100 feet), and apparently did not extend into inelastic clay zones like the Corcoran Clay which is thought to result in the greatest subsidence. Therefore, subsidence is not expected to be a major concern in Region 1.



Notes

1. Color-coded areas encompass the groundwater subbasins of the San Joaquin Valley Groundwater Basin that are within 20 miles of a Proposed Project Well.
2. 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 September 1992 Groundwater Elevations Above and Below the Corcoran Clay

ARRA Drought Relief Project

Figure 3.1-1

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

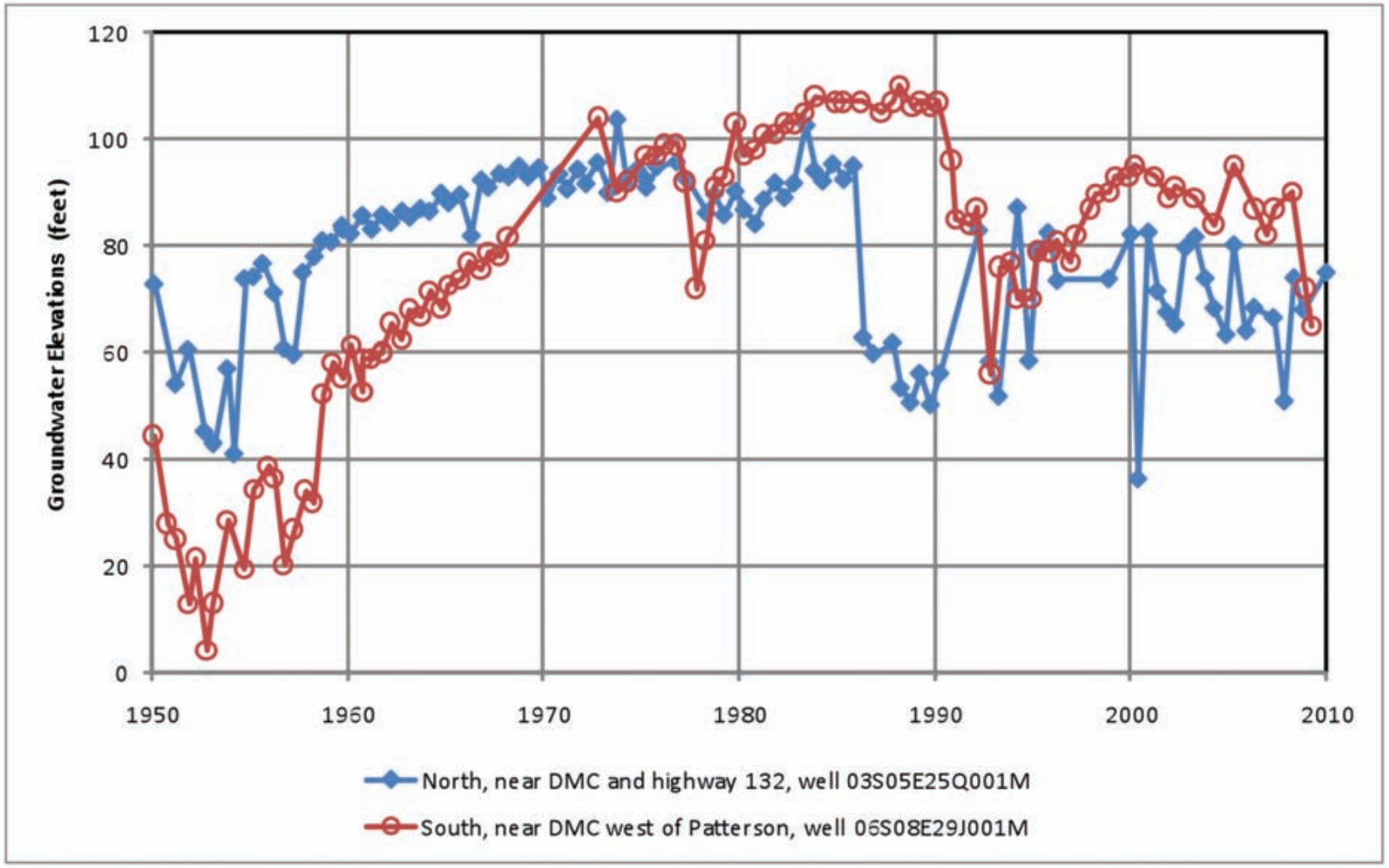


Figure 3.1-2
Groundwater Elevations Measured in Two Region 1 Wells

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 because selenium concentration in agricultural runoff has been high enough to harm waterfowl and the buildup of salinity in the soil has rendered some land unsuitable for agriculture. Salinity is expressed as total dissolved solids (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 useable water in the confined aquifer is uncertain in Region 1 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.

The USGS analyzed water samples from 44 wells in the northern part of the western San Joaquin Valley (Dubrovsky et al. 1991). Their results indicate a relatively better quality of water in the confined Lower Zone than in the unconfined Upper Zone. The Upper Zone TDS ranged from 750 to 2,500 milligrams per liter (mg/l), whereas the Lower Zone TDS ranged from 500 to 1,500 mg/l. Boron concentrations ranged from 0.5 to 3.0 mg/l in both zones. These results illustrate that groundwater quality is highly variable.

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. No new wells would be installed, and the current use of groundwater would continue into the future.

Proposed Action

Under the Proposed Action, 32 wells would be constructed in Region 1 that would each be capable of pumping about 1,000 acre-feet during the 8-month extended irrigation season (April–October). In addition to temporary and localized construction impacts, increased groundwater pumping during drought conditions could cause the following impacts in the water districts:

- hydraulic interference (e.g., increased depth to water table) at 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 the construction of 32 new wells and the addition of 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 project 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 water table 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 3) and the groundwater elevations in the aquifer below the Corcoran Clay (i.e., model Layer 6) have been compared for the historical pumping (no new wells) and the Proposed Action pumping (with 32 new wells in Region 1). 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 32 new wells. Because there are two distinct aquifers in Region 1, the changes in water elevations are shown for above the Corcoran Clay (Layer 3) and below the Corcoran Clay (Layer 6). Twenty-three wells would be screened above the Corcoran Clay, and nine wells would be screened below the Corcoran Clay. In the unconfined aquifer, the simulated groundwater elevations were lowered by one to five feet (for September 1992) throughout most of Region 1, but the lowering in the unconfined aquifer was less than 10 feet for all of Region 1 (Figure 3.1-3). Because the existing wells 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 Region 1. There were about 25 cells with a simulated reduction in groundwater elevation of more than 10 feet in the vicinity of the nine new wells located below the Corcoran Clay. This was the simulated effect of pumping more groundwater with the new wells for irrigation within the districts. However, this simulated change in groundwater

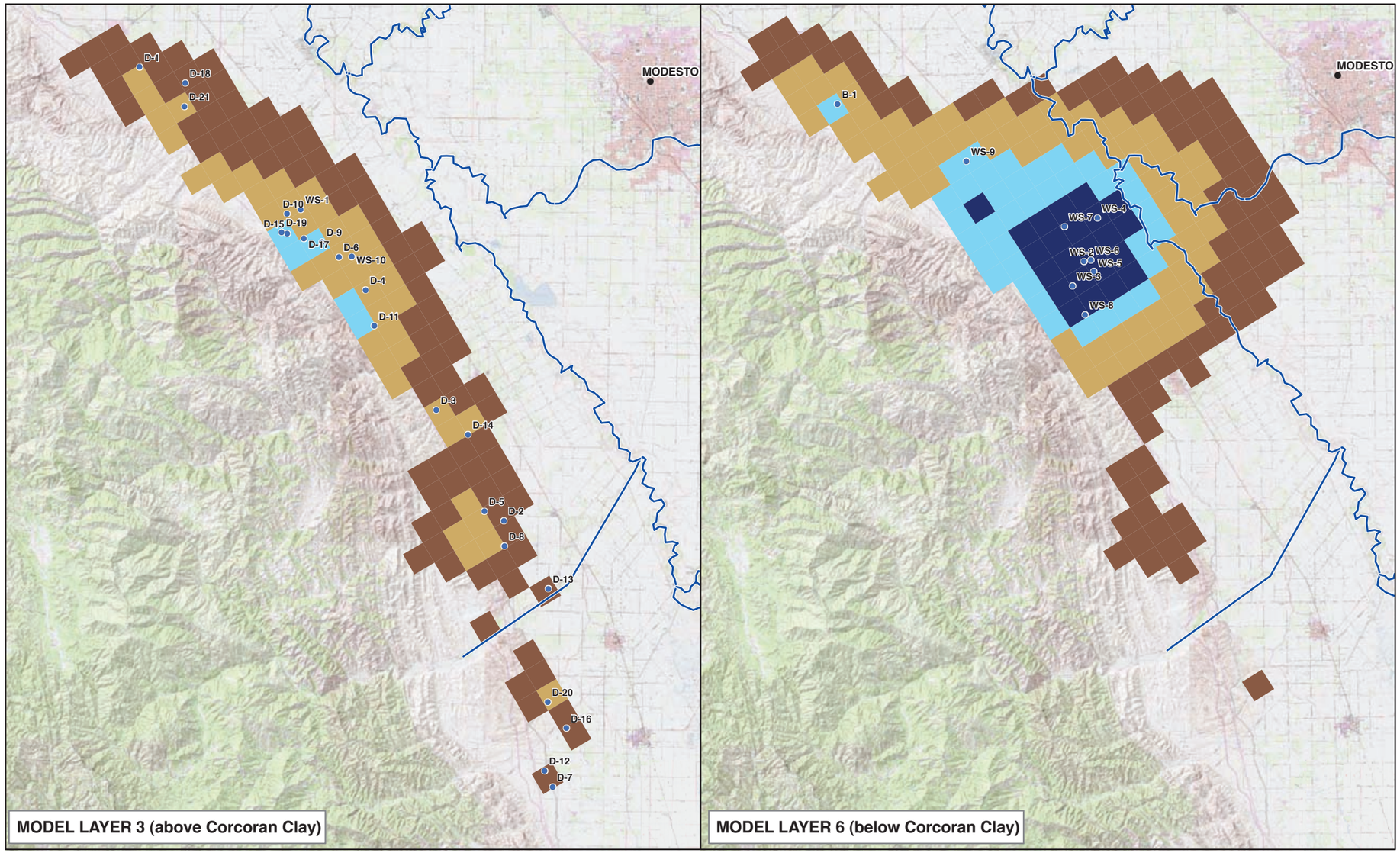
elevations at other existing wells was less than five feet across the San Joaquin River and decreased to less than two feet toward Modesto.

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 of 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 1. Figure 3.1-4 shows representative simulated groundwater elevation time-series hydrographs for the unconfined aquifer and the confined aquifer in Region 1 for some of the model grid cells most affected by the new wells.

The top graph shows the simulated groundwater elevations with historical pumping and with project pumping from the model grid cell with the greatest simulated project-related reduction in groundwater elevations (cell with new wells D-15 and D-19) The historical groundwater elevations varied from about 60 feet msl in 1992 to a maximum of about 75 feet msl in the early 1970s and the late 1990s (wet periods). Judging from this moderate range of water table elevations, the historical pumping from the unconfined aquifer in Region 1 is relatively low. The 23 new wells above the Corcoran Clay would reduce the groundwater



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.

Legend

- Modeled Stream Network

Proposed Project Well

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

Modeled Region 1 Water-level Lowering (ft)

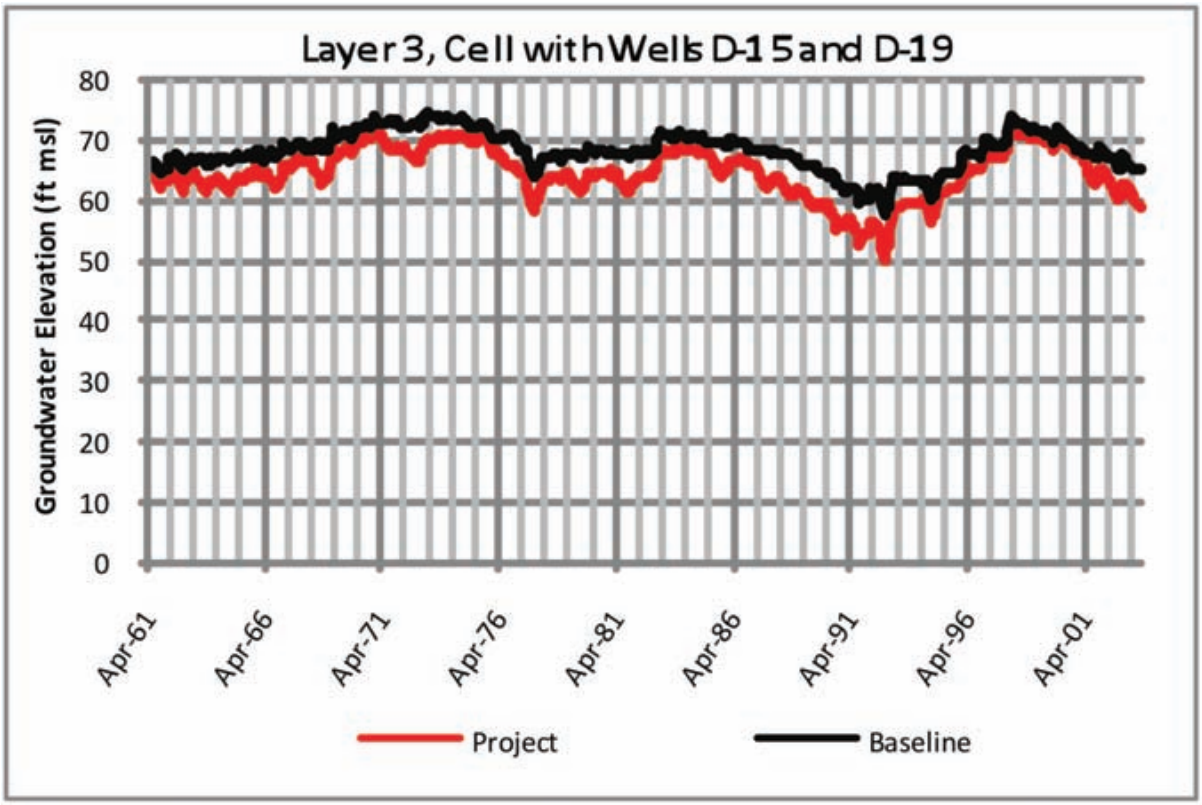
- 1 to 2
- 2 to 5
- 5 to 10
- > 10

0 5 10 Miles

N

Modeled Incremental Water-level Lowering Due to Implementation of Region 1 Proposed Project
ARRA Drought Relief Project

Figure 3.1-3
Simulated Effect of Project on Region 1 Groundwater Levels during September 1992 above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay



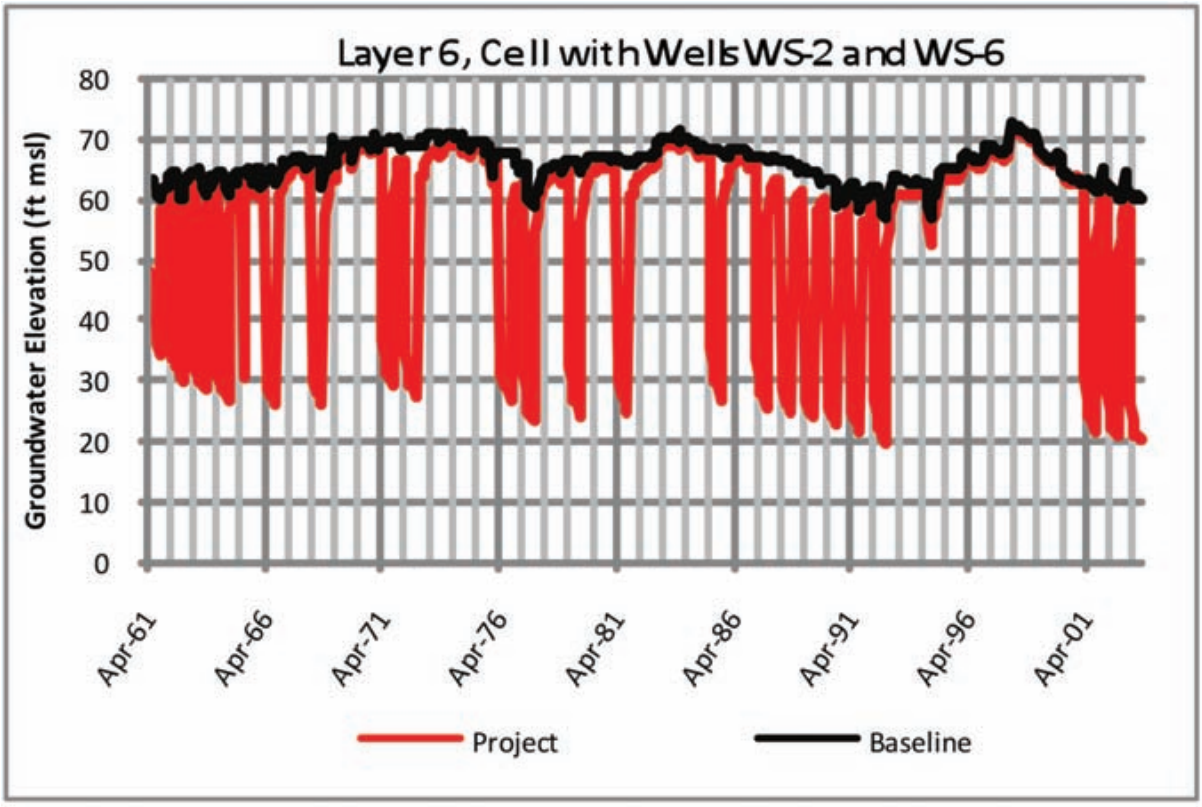


Figure 3.1-4
Simulated Effect of Project on Selected Groundwater Elevations above (Model Layer 3) and below (Model Layer 6) the Corcoran Clay

elevation therein by about 10 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 shows the simulated groundwater elevations in the confined aquifer with historical pumping and with the nine new wells from the model cell with the greatest simulated project-related reductions in groundwater elevations (cell with new wells WS-2 and WS-6). The historical groundwater elevations varied from about 60 feet msl in 1992 to a maximum of about 70 feet msl in the early 1970s and the late 1990s (wet periods). The simulated reduction in groundwater elevation from the two wells simulated in this cell was about 40 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 nine new wells screened in the confined aquifer. The recovery of the simulated groundwater elevations in both the upper and lower aquifers indicates 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 project impact because historical subsidence was not a large problem in Region 1. 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 if water elevations remain within the historical range (DWR 2003), this impact would not be significant.

Impact Water-5: Increased Pumping Increases Salinity of Applied 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 to 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 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 project 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 water table elevations are not expected to be close enough to the land surface to cause effects on wetlands, and no wetlands were observed during field surveys of the well locations. Near the San Joaquin River the groundwater elevations are close to the river elevations and interaction between groundwater and the river are possible. However, the simulated reduction

in the aquifer above the Corcoran Clay (model Layer 3) did not extend to the San Joaquin River, so this impact would not be 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 17 wells proposed by Reclamation for Regions 2, 3, 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. The Proposed Action could contribute slightly to these potential problems.

This slight contribution may be overstated because some of these wells could be constructed in the absence of funding provided by Reclamation. However, it was assumed that no wells would be constructed under the No Action Alternative because it is difficult to determine how many wells would be constructed in the future, and where they would be constructed. 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 49 ARRA new wells (32 within Region 1) 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.

The modeling results for all 49 of the proposed ARRA wells are shown to indicate potential future changes in groundwater conditions in the San Joaquin Valley beyond existing conditions. 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 wells above the Corcoran Clay (shown on left-side map) and a total of 21 wells below the Corcoran Clay (shown on right-side map). 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 incremental cumulative effects from these 49 new wells.

Groundwater Overdraft

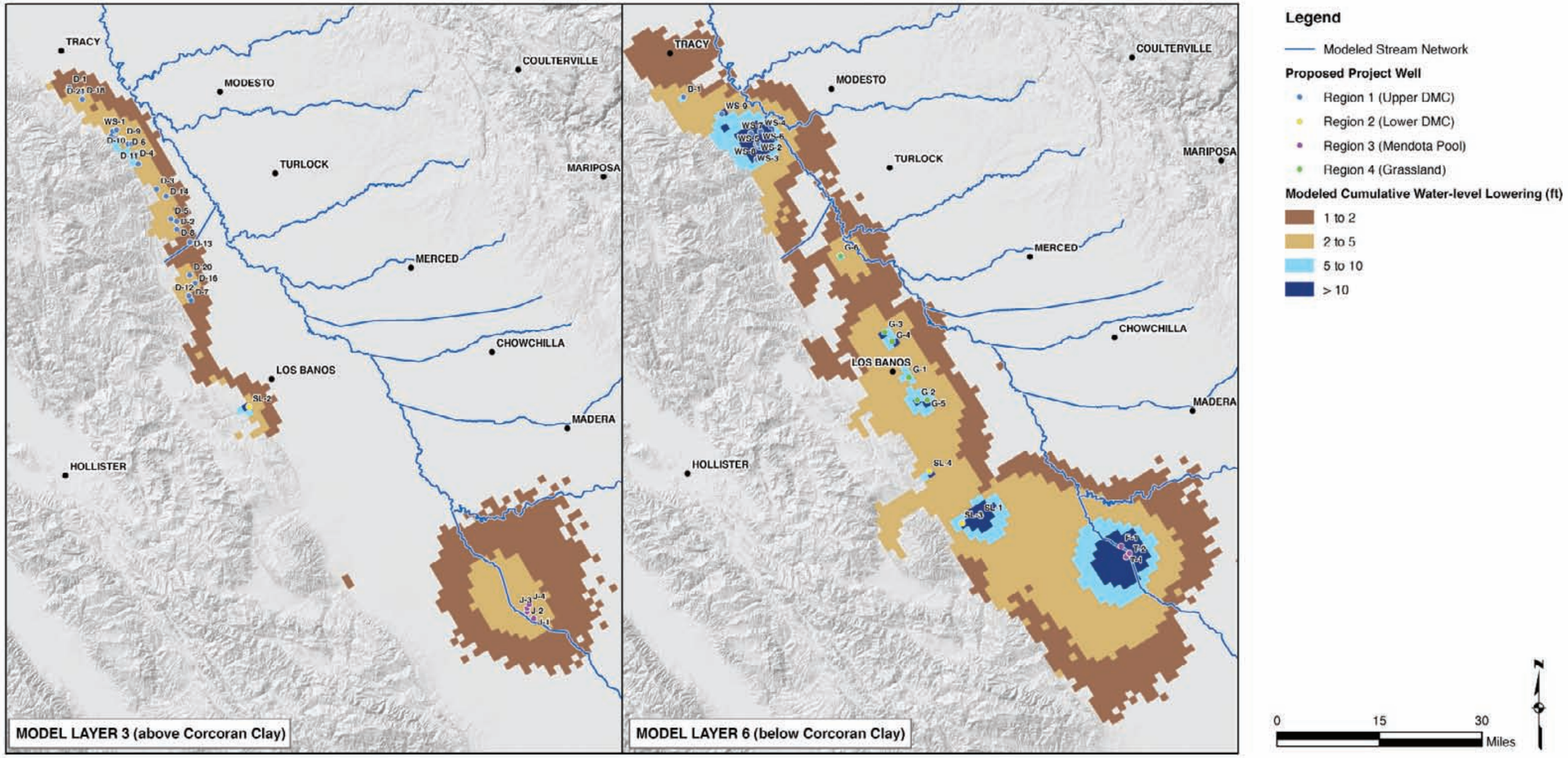
Groundwater overdraft is unlikely because these new wells would be part of a groundwater management program (Boyle 2007; AECOM 2009) for conjunctive drought water supply (i.e., during most years irrigation with surface water supplies would be augmenting the aquifer recharge). Each water district would 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 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 moderate increase (8 percent of the total amount of dry year conjunctive pumping in the vicinity of the new ARRA wells) and the wells would be used in only about half of the years. The majority of the applied water in Region 1 is from surface water with a much lower salinity. In addition, the shallow groundwater in Region 1 drains to the San Joaquin River, so the accumulation of additional salt in the shallow groundwater is limited in Region 1. This cumulative shallow



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 the Cumulative Proposed Project
ARRA Drought Relief Project

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

groundwater salinity impact would not be substantially increased by the Proposed Action.

3.2 Land Use

3.2.1 Affected Environment

Region 1 is located in the San Joaquin Valley of California, in the counties of San Joaquin, Stanislaus, and Merced. As part of the Proposed Action, four wells would be constructed in San Joaquin County, 25 in Stanislaus County, and three in Merced County.

Environmental Setting

San Joaquin County

The vast majority of San Joaquin County acreage is used for agricultural purposes. Of the approximately 822,000 acres of unincorporated land in the county, about 686,109 acres, approximately 83.2 percent, are used for agriculture (San Joaquin County 2009a). The largest category of agricultural lands is irrigated row crops, covering 310,814 acres, followed by orchards and vineyards, which cover 209,800 acres. Because of the large amount of acreage dedicated to agriculture, agricultural lands are considered one of the most important economic resources for the county. San Joaquin County has approximately 620,070 acres of important farmland (CDC 2006a). 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. San Joaquin County Land Characteristics

Well No.	Zoning	Farmland Designation	Williamson Act Contract	Water District
B-1	Agriculture	Prime Farmland	Yes	BBID
D-1	Agriculture	Prime Farmland	Yes	DPWD
D-18	Agriculture	Prime Farmland	Yes	DPWD
D-21	Agriculture	Prime Farmland	Yes	DPWD
Sources: San Joaquin County 2010; CDC 2006a, CDC 2007.				

Stanislaus County

Land use in Stanislaus County is devoted largely to agriculture, primarily because of the favorable climate and the flat, fertile soils that compose a large portion of the county. The principal use for agricultural land is for field crops and fruit and nut crops, which account for 689,305 acres and 186,000, respectively (Stanislaus County 2009). Stanislaus County has approximately 395,678 acres of important farmland (CDC 2006b). Well WS-4 would be located within the boundaries of the San Joaquin River National Wildlife Refuge, which is managed by the U.S. Fish and Wildlife Service but is privately owned. Table 3.2-2 provides land use information for each well, including the county zoning designation, the CDC farmland mapping designation, whether the proposed well would be constructed on a property under Williamson Act contract, and the water district of which the well is a part.

Table 3.2-2. Stanislaus County Land Characteristics

Well No.	Zoning	Farmland Designation	Williamson Act Contract	Water District
WS-1	Agriculture	Prime Farmland	Yes	WSID
WS-2	Agriculture	Prime Farmland	No	WSID
WS-3	Agriculture	Prime Farmland	No	WSID
WS-4	Agriculture	Prime Farmland	No	WSID
WS-5	Agriculture	Prime Farmland	No	WSID
WS-6	Agriculture	Prime Farmland	No	WSID
WS-7	Agriculture	Prime Farmland	No	WSID
WS-8	Agriculture	Prime Farmland	Yes	WSID
WS-9	Agriculture	Prime Farmland	Yes	WSID
WS-10	Agriculture	Prime Farmland	Yes	WSID
D-2	Agriculture	Prime Farmland	Yes	DPWD
D-3	Agriculture	Prime Farmland	No	DPWD
D-4	Agriculture	Farmland of Statewide Importance	No	DPWD
D-5	Agriculture	Prime Farmland	No	DPWD
D-6	Agriculture	Prime Farmland	Yes	DPWD
D-8	Agriculture	Prime Farmland	Yes	DPWD
D-9	Agriculture	Farmland of Statewide Importance	Yes	DPWD
D-10	Agriculture	Prime Farmland	No	DPWD
D-11	Agriculture	Prime Farmland	Yes	DPWD
D-13	Agriculture	Prime Farmland	Yes	DPWD
D-14	Agriculture	Prime Farmland	Yes	DPWD

Well No.	Zoning	Farmland Designation	Williamson Act Contract	Water District
D-15	Agriculture	Prime Farmland	Yes	DPWD
D-17	Agriculture	Prime Farmland	No	DPWD
D-19	Agriculture	Prime Farmland	No	DPWD
D-20	Agriculture	Prime Farmland	Yes	DPWD
Sources: Stanislaus County 2007; CDC 2006b, 2007.				

Merced County

Agriculture is the dominant land use in Merced County, totaling just over one million acres of the 1.2 million acres, 81.2 percent, of unincorporated land in the county (Merced County 2007). Agricultural uses include row crops, orchards, grazing, poultry, and dairies, which are generally located in the central and northern sections of the county. Three project wells would be constructed in Merced County, which has a total of 593,494 acres of important farmland (CDC 2008). Table 3.2-3 provides land use information for each well, including the county zoning designation, the CDC farmland mapping designation, whether the proposed well would be constructed on a property under Williamson Act contract, and the water district of which the well is a part.

Table 3.2-3. Merced County Land Characteristics

Well No.	Zoning	Farmland Designation	Williamson Act Contract	Water District
D-7	General Agriculture	Prime Farmland	No	DPWD
D-12	General Agriculture	Farmland of Statewide Importance	No	DPWD
D-16	General Agriculture	Farmland of Statewide Importance	Yes	DPWD
Sources: Merced County 2008; CDC 2008, 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, or grazing land. Farmland in any of these categories is referred to in this section as *important farmland*.

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 1 are located on properties under Williamson Act contracts. However, the wells would be used to maintain the agricultural and open space uses and therefore would have no potential to adversely affect Williamson Act contracts.

San Joaquin County General Plan

The San Joaquin County General Plan agricultural lands section contains policies to protect agricultural lands needed for the continuation of commercial agricultural operations and to minimize conflicts between agriculture and urban land uses by limiting development of incompatible uses in agricultural areas.

Stanislaus County General Plan Agricultural Element

The Stanislaus County General Plan contains policies to restrict uses on agricultural land to compatible uses in order to sustain a healthy agricultural economy and conserve agricultural land. The three main goals of the Agricultural Element are to:

- strengthen the agricultural sector of the economy.
- conserve agricultural lands for agricultural uses.

- protect the natural resources that sustain agriculture in Stanislaus County.

Merced County General Plan

The Merced County General Plan has an Agricultural Element that contains goals and policies for maintaining the use of agricultural land. These goals include measures to protect productive agriculture from conversion to other uses, and support measures that protect and improve water quality and supply.

3.2.2 Environmental Consequences

This section quantitatively describes the land use effects of constructing and operating the 32 groundwater wells in the BBID, WSID, and the DPWD.

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 32 wells would be constructed in areas that are considered important farmland. Each well site would permanently occupy an area approximately 30 feet by 30 feet, which would mean a total permanent loss of approximately 0.66 acre of important farmland for the 32 wells. The 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. The Proposed Action would not result in significant impacts to land use due to the permanent conversion of important farmland.

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 compared to the total amount of important farmland in each county. Additionally,

the disturbance area would be only temporary, and the area would be returned to agricultural use following the completion of construction activities. The Proposed Action would not result in significant impacts to land use due to the temporary loss of important farmland.

Impact LU-3: Incompatibility with County Land Use Designations

The wells would be located in areas that are zoned agricultural. Constructing and operating the 32 wells would be consistent with the agricultural land use designations of the San Joaquin, Stanislaus, and Merced General Plans and therefore would not result in significant impacts.

Impact LU-4: Incompatibility with Adjacent Land Uses

The 32 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. The Proposed Action would not result in significant impacts to adjacent land uses.

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, 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 project 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 Project Area

Irrigation or Water District	Well ID #	Well	Water Tie-In	Power Tie-In	Habitat	Sensitive Resources
BBID	B-1		X		Orchard; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-1	X		X	Orchard; ruderal grassland	SJKF/BUOW/AMBA active raptor nest 800 feet south
DPWD	D-2			X	Orchard; ruderal grassland	SJKF/BUOW/AMBA nesting swallows on canal bridge
DPWD	D-3	X	X	X	Orchard; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-4		X	X	Orchard; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-5				Agricultural fields; graded-disturbed	None
DPWD	D-6		X	X	Orchard; ruderal grassland	SJKF/BUOW/AMBA nesting swallows on canal bridge
DPWD	D-7				Orchard	None
DPWD	D-8				Orchard	None
DPWD	D-9			X	Orchard; ruderal grassland; riparian	SJKF/BUOW/AMBA
DPWD	D-10		X		Orchard; ruderal grassland	SJKF/BUOW/AMBA nesting swallows on canal bridge
DPWD	D-11			X	Orchard; ruderal; grassland	SJKF/BUOW/AMBA nesting swallows on canal bridge
DPWD	D-12		X		Orchard; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-13		X		Disked field; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-14			X	Orchard; ruderal grassland	SJKF/OWL/nesting swallows on canal bridge
DPWD	D-15				Orchard	None
DPWD	D-16		X	X	Orchard; ruderal grassland	SJKF/BUOW/AMBA
DPWD	D-17	X	X	X	Orchard; ruderal grassland	SJKF/BUOW/AMBA

Irrigation or Water District	Well ID #	Well	Water Tie-In	Power Tie-In	Habitat	Sensitive Resources
DPWD	D-18				Orchard	None
DPWD	D-19				Orchard	None
DPWD	D-20				Orchard	None
DPWD	D-21	X	X	X	Ruderal grassland	SJKF/BUOW/AMBA nesting swallows on canal bridge
WSID	WS-1	X	X	X	Orchard; disked	SJKF/BUOW/AMBA
WSID	WS-2				Orchard	None
WSID	WS-3				Orchard	None
WSID	WS-4				Orchard	None
WSID	WS-5				Orchard	None
WSID	WS-6				Orchard	None
WSID	WS-7				Developed	None
WSID	WS-8				Orchard	None
WSID	WS-9				Orchard	None
WSID	WS-10				Orchard	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) 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 project 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 (CNDDB) records search for the action area (Appendix C). (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 Howard Ranch, Crows Landing, Patterson, Newman, Westley, Vernalis, Tracy, and Solyo USGS 7.5-minute quadrangles (Appendix C; USFWS 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 project 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, 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 irrigation ditch 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* spp. *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 (*Dittrichia 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 cyanus*), 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 rodent. (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 and Canals

The Proposed Action area contains a variety of agricultural irrigation ditches and large water conveyance systems such as the DMC. These canals and irrigation ditches 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 with the exception of Well D-9. Well D-9 water and power lines would cross a deeply incised seasonal ditch that supports disturbed riparian scrub (dominated by sandbar willow [*Salix exigua*], tree tobacco [*Nicotiana glauca*], and weedy species. Riparian scrub associated with this drainage would be not be affected by the Proposed Action because it will be bored under and avoided.

Open water portions of drainages and canals provide foraging habitat for aquatic bird species such as double-crested cormorant (*Phalacrocorax auritus*) and grebes (Podicepedidae), 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 regulations (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 federal 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 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-three special-status wildlife species are known or have the potential to occur in the project 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 23 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 the existing amount in the surrounding area. Therefore, there would be no significant effects on special-status birds' 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 (e.g., red-tailed hawks). 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 state-listed and one federal/state-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, CNDDB, CNPS Inventory of Rare and Endangered

Vascular Plants of California), biologists determined that the 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 action area. In addition, no special-status plants have been recorded on or near the well sites (CNDDB 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.

Table 3.3-2. Special-Status Wildlife and their Potential to Occur in the Region 1 Study Area

Species Name	Status[1] Fed/State	Distribution	Habitat	Potential to Occur in Study Area
Invertebrates				
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	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 *Branchinecta conservatio*	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 *Branchinecta longiantenna*	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 *Branchinecta lynchi*	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 *Lepidurus packardi*	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 *Ambystoma californiense*	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 *Rana draytonii*	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[1] Fed/State	Distribution	Habitat	Potential to Occur in Study Area
Western spadefoot *Scaphiopus hammondii*	–/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
Reptiles				
Western pond turtle *Actinemys marmorata*	–/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 would not be affected by the Proposed Action
Coast (California) horned lizard *Phrynosoma coronatum* (*frontale* 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—grassland in study area is low quality.
Giant garter snake *Thamnophis gigas*	T/T	Central Valley from the vicinity of Burrel 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.	Would not occur—no suitable habitat in the study area (canals in the action area are fast-flowing and are either concrete lined and/or do not provide emergent, herbaceous wetland vegetation required for cover).
San Joaquin whipsnake *Masticophia flagellum ruddocki*	–/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—grassland in study area is low quality.

Species Name	Status[1] Fed/State	Distribution	Habitat	Potential to Occur in Study Area
Birds				
Northern harrier *Circus cyaneus*	–/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 *Aquila chrysaetos*	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 *Buteo swainsoni*	–/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 *Elanus leucurus*	–/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.	Known to occur in study area—suitable nesting and foraging habitat is present in study area. Loss of small amount of foraging habitat would not be a significant effect.
Western burrowing owl *Athene cunicularia hypugea*	–/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.

Species Name	Status[1] Fed/State	Distribution	Habitat	Potential to Occur in Study Area
Loggerhead shrike *Lanius ludovicianus*	–/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.	Known to 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 *Agelaius tricolor*	–/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.	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.
Mammals				
Pallid bat *Antrozous pallidus*	–/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 and may forage in study area but would not be affected by the Proposed Action.
Western mastiff bat *Eumops perotis californicus*	–/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 *Vulpes macrotis mutica*	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.

Species Name	Status[1] Fed/State	Distribution	Habitat	Potential to Occur in Study Area
American badger *Taxidea taxus*	–/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.

Notes:

Species listed in table are generated from the UUSFWS species list (2010) and CNDDB records (2010).

[1] Status:

Federal

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.

State

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 Identified as Having the Potential to Occur in the Region 1 Study Area

Common and Scientific Name	Legal Status[a] Federal/State	Geographic Distribution/Floristic Province	Habitat Requirements	Blooming Period	Potential to Occur in Study Area
Large-flowered fiddleneck *Amsinckia grandiflora*	E/E	Historically known from Mt. Diablo foothills in Alameda, Contra Costa, and San Joaquin Counties; currently known from three natural occurrences	Cismontane woodland, valley and foothill grassland; 902–1,804 feet (275–550 meters)	April–May	None. Study area substantially lower than elevational range of species
Tracy's eriatrum *Eriastum tracyi*	–/R	Colusa, Glenn, Santa Clara, Tehama, and Trinity Counties	Chaparral, cismontane woodland, on gravelly shale or clay soils, often in open areas, 1,000-2,500 feet (315–760 meters)	Jun-Jul	None. Study area is lower than species elevational range and habitat requirements are not present.
Delta button-celery *Eryngium racemosum*	–/E	Northern San Joaquin Valley, adjacent Sierra Nevada foothills	Riparian scrub in vernally mesic clay depressions; 10–98 feet (3–30 meters)	June–September	None. Riparian habitat found at Well D-9 is heavily disturbed and does not provide suitable habitat for this species.

Notes:

[a] Status explanations:

Federal

E = listed as endangered under ESA.

– = no listing.

State

E = listed as endangered under CESA.

R = listed as rare under the California Native Plant Protection Act (this category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation)

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.[1] *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.

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 the 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 an MOU with USFWS.

[1] 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.

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 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.

Executive Order 13112: Prevention and Control of Invasive Species

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 within 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 and therefore, no wetlands would be impacted 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.
- No fill or dredged material would be directly placed within any waters of the United States.
- 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).
- 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 19, assuming three square feet per pole that would be a range from 0.0004 to 0.004 acre per well).
- Construction of the wells is proposed to begin in September 2010 and is expected to last approximately six to 24 months. Each well will take approximately two months to construct.
- 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).

No Action Alternative

The No Action Alternative would consist of the continuation of the existing conditions and no new wells would be constructed. There would be no impacts on biological resources resulting from implementation of the No Action Alternative.

Proposed Action

Appendix C includes the CNDDB and USFWS Database Species Occurrence Information. Using these data combined with the field surveys and reviewed literature, it was determined that the following effects on biological resources associated with the Proposed Action apply to 16 well sites (including water and power locations). The affected wells are shown in Table 3.3-1. There are no biological resources associated with the remaining well sites.

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 0.10 acres total in Region 1 (0.02 acre per well site) of suitable foraging and denning (ruderal annual grassland) habitat for San Joaquin kit fox and American badger at Wells D-1, D-3, D-17, D-21, and WS-1. The amount of habitat affected is a very small portion of the total amount of annual grassland in the project region. The permanent loss of a small amount of suitable foraging and denning habitat would not significantly impact 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 project. 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 burrowing owl. This species has been observed in the study area in the past, and there are known records in the project 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 0.10 acre of suitable foraging or burrow habitat for this species at the same sites noted for San Joaquin kit fox and badger above. 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 project 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 surveys 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 permissible, 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.

If work extends into the wintering season (September 1 through January 31) and 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 project 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 17 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 acre 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 No Action and 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 project 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 (PM2.5 and PM10)[2] (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 PM2.5 standard, and a serious maintenance area for the federal PM10 standard (EPA 2010). The California Air Resources Board (CARB) has classified the SJVAB as a

[2] PM10 refers to particulate matter less than 10 microns in diameter and PM2.5 refers to particulate matter less than 2.5 microns in diameter.

nonattainment area for the state ozone, PM2.5, and PM10 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_2), particulate matter, and sulfur dioxide (SO_2). 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.

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

			Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria	
Pollutant	**Symbol**	**Average Time**	**California**	**National**	**California**	**National**	**California**	**National**
Ozone*	O_3	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_2	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_2	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_2S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA
Vinyl chloride	C_2H_3Cl	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 98th percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO_4	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 25ºC and 1 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.

The CAAA requires that all federally funded projects conform to the appropriate State Implementation Plan (SIP) so that the project 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 PM2.5 standards, and a maintenance area for the federal PM10 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_X]), PM10, and PM2.5 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 PM10, and 100 tons per year for PM2.5 emissions (40 CFR 51.853).
- emissions are regionally insignificant (total emissions are less than 10 percent of the area's total emissions inventory for that pollutant).

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 B.

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 preformed.

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 B.

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_X, CO, PM10, PM2.5, 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 four wells in the region. Additional details on the modeling methods may be found in Appendix B.

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

	ROG	NO_X	CO[a]	Total PM10[b]	Total PM2.5[b]	CO_2e[a, c]
Proposed Action	2.22	19.36	8.69	1.00	0.91	2,231
de minimis Threshold	50	50	-	100	100	-
10% Regional Emissions[d]	13,476	20,663	-	10,939	3,843	-
Significant?	No	No	-	No	No	-

[a] Region in attainment; no conformity analysis required.

[b] Includes emissions from dust and exhaust.

[c] Refers to carbon dioxide equivalents, in which all GHGs are normalized on a scale that recasts total emissions in terms of carbon dioxide (CO_2). Please see Appendix B for more information. Emissions are presented in metric tons.

[d] CARB 2009c.

Based on 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 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 CARB, 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 project 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. The Proposed Action would not result in a significant effect on sensitive receptors from DPM.

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 project 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 2,231 metric tons of GHG emissions. The emissions are equivalent to adding approximately 1,487 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. Moreover, GHG emissions are evaluated more appropriately on a regional, state, or even national scale rather than on an individual project level. Consequently, the Proposed Action would not result in significant GHG emissions.

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 B.

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

	CO_2	CH_4	N_2O	Total GHG (CO_2e)
Proposed Action Emissions	1,489	0.07	0.02	1,496
CH_4 = methane N_2O = nitrous oxide. Please refer to Appendix B for additional modeling information.				

Based on Table 3.4-3, operation of the Proposed Action would generate 1,496 metric tons of GHG emissions per year. This quantity is equivalent to adding approximately 998 typical passenger cars to the road (EPA 2009).

Unlike criteria air pollutants, GHG emissions from project 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 2, 3, and 4. Other projects, including current operations, in the area likely would generate emissions, but they could not be quantified due to 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 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 3, the operation of all 49 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 project 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 an 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 18th 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 project 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 project area. All the resources identified within the project 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 to 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 Alternative, 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 will have no adverse effect to historic properties, real or assumed, within the project area. Following concurrence by the SHPO on Reclamation's finding, Reclamation will conclude the Section 106 process. Because resources will not adversely be affected pursuant to 36 CFR 800.5(b), the preferred alternative will 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 effects that could result from the alternatives, and any necessary mitigation measures that would reduce potentially significant effects.

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

1-hour L_{eq} (day)	1-hour L_{eq} (night)	8-hour L_{eq} (day)	8-hour L_{eq} (night)	L_{dn} (30-day average)
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

San Joaquin County Noise Ordinance

San Joaquin County Municipal Code Chapter 9-1025.9 sets standards for exterior and interior noise for various land uses. Noise for outdoor activity areas should not exceed 65 dB L_{dn} at any land use, and noise for interior spaces should not exceed 45 dB L_{dn} at any land use. The acceptable L_{eq} is 50 dB for outdoor areas and 45 dB for indoor areas and the L_{max} is 70 dB for outdoor activity areas and 65 dB for indoor activity areas.

The San Joaquin County Municipal Code also states that construction noise is exempt between the hours of 6:00 a.m. and 9:00 p.m. on any day.

San Joaquin County General Plan

The San Joaquin County General Plan is being updated. The following policies describe noise level standards set forth in the 1992 General Plan.

Policy 1a. The maximum allowable noise exposure level from transportation noise sources at outdoor activity areas of noise-sensitive uses shall be 65 dB L_{dn}/CNEL.

Policy 1b. The maximum allowable noise exposure level from transportation noise sources within noise-sensitive spaces shall be 45 dB L_{dn}/CNEL.

Policy 1c. The maximum allowable noise exposure level from non-transportation (stationary) noise sources at outdoor activity areas of noise-sensitive uses shall be 50 dB Hourly L_{eq} during the daytime (7 a.m.–10 p.m.) and 45 dB Hourly L_{eq} during the nighttime (10 p.m.–7 a.m.).

Policy 1d. The maximum allowable noise exposure level from non-transportation noise sources at outdoor activity areas of noise-sensitive uses shall be 70 dB L_{max} and 65 dB L_{max} during the daytime and nighttime hours, respectively.

Stanislaus County Noise Ordinance

The Stanislaus County Municipal Code restricts noise levels to the standards shown in Table 3.6-3.

Table 3.6-3. Stanislaus County Noise Ordinance Exterior Noise Level Standards

	Maximum A-Weighted Sound Levels as Measured on a Sound Meter (L_{max})	
Designated Noise Zone	**7:00 a.m. to 9:59 p.m.**	**10:00 p.m. to 6:59 a.m.**
Noise-sensitive	45	45
Residential	50	45
Commercial	60	55
Industrial	75	75

Noise zones defined:

1. Noise-sensitive: Any public or private school, hospital, church, convalescent home, cemetery, sensitive wildlife habitat, or public library regardless of its location within any land use zoning district.

2. Residential: All parcels located within a residential land use zoning district.

3. Commercial: All parcels located within a commercial or highway frontage land use zoning district.

4. Industrial: All parcels located within an industrial land use zoning district.

Stanislaus County General Plan Noise Element

According to the Stanislaus County General Plan Noise Element, areas in Stanislaus County will be designated as noise-impacted if exposed to existing or projected future noise levels exterior to buildings exceeding the standards in Table 3.6-2, or the performance standards described in Table 3.6-4.

Table 3.6-4. Stanislaus County Maximum Allowable Noise Exposure—Stationary Sources

	Daytime (7:00 a.m.–10:00 p.m.)	**Nighttime (10:00 p.m.–7:00 a.m.)**
Hourly L_{eq}, dBA	55	45
Maximum Level, dBA	75	65

Merced County General Plan Noise Element

Policy 9 of the Merced County Year 2000 General Plan states that existing residential areas exposed to 65 dBA are considered “noise impacted.”

Merced County Noise Ordinance

Merced County’s Municipal Code, Section 10.60.030, states that no person shall create any sound level that exceeds the background sound level by at least 10 dBA during daytime hours (7 a.m. to 10 p.m.) or by at least five dBA during nighttime hours (10 p.m. to 7 a.m.) when measured at or within the real property

line of the receiving property. If the background sound level cannot be determined, the absolute sound level limits are as set forth in Table 3.6-5.

Table 3.6-5. Merced County Maximum Permissible Sound Levels

Residential	Nonresidential
65 dBA, L_{dn} or 75 dBA, L_{max}	70 dBA, L_{dn} or 80 dBA, L_{max}

Construction noise is exempt in Merced County between the hours of 7:00 a.m. and 6:00 p.m., provided that equipment is properly muffled and maintained.

Existing Noise Conditions

Primary noise sources in the project area are cars and trucks on roads and freeways, and 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 project area is primarily agricultural land with rural residences scattered throughout. The main noise-sensitive land uses in the project area are scattered rural residences. A majority of the wells, including all of the wells located in San Joaquin and Merced Counties, are located well over 1,000 feet from any nearby residences. However, there are several residences, all in Stanislaus County, that are located within 1,000 feet of proposed wells WS-2, WS-5, WS-6, D-3, and D-13.

3.6.2 Environmental Consequences

Assessment Methods

The following impact discussion analyzes construction activity that could take place near various wells throughout San Joaquin, Stanislaus, and Merced Counties. 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 (2000).

No Action Alternative

Under the No Action Alternative, no new wells would be constructed, and there would be no noise impacts from implementing the No Action Alternative.

Proposed Action

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

The Region 1 wells located in San Joaquin and Merced Counties would be located more than 1,000 feet from noise-sensitive land uses. Therefore, the following impact discussion focuses on the wells in Stanislaus County and compares construction noise to Stanislaus County noise standards. Because the action area is located in land zoned for agriculture, the noise ordinance standards do not apply and are not used in the impact analysis below. Instead, noise impacts are compared to the standards set forth in the Stanislaus County General Plan Noise Element.

Construction noise was analyzed based on construction equipment that is anticipated to be used. Typical noise levels (dBA) from construction equipment pieces are shown in Table 3.6-6. 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. Well drilling also would generate noise during project construction, and would occur seven days a week, 24 hours a day for two weeks.

Table 3.6-6. Construction Equipment Noise

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Auger drill rig	84
Truck	88
Backhoe	78
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. Shielding is not included in this analysis to provide a conservative estimated of potential construction noise levels. Table 3.6-7 shows the calculated maximum (L_{max}) and L_{eq} sound levels that would result from project construction at graduated distances. Construction noise from an auger drill rig was analyzed separately. 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 3.6-8.

Table 3.6-7. 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
350	-17	-5	60	55
400	-18	-6	59	53
500	-20	-6	56	51
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 3.6-8. 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
650	-22	-7	55	55
800	-24	-7	52	52
900	-25	-8	51	51
1000	-26	-8	50	50
1500	-30	-9	45	45
2000	-32	-10	42	42
3000	-36	-11	37	37
4000	-38	-12	34	34
5000	-40	-12	32	32
6000	-42	-13	30	30

As shown in Table 3.6-7, noise could reach 55 dB, L_{eq} within 350 feet of project construction, and could reach 45 dB, L_{eq} within 850 feet of project construction. As shown in Table 3.6-8, noise from an auger drill rig could reach 55 dB, L_{eq} within 650 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, all in Stanislaus County, are shown in Table 3.6-9.

Table 3.6-9. 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})
WS-2	Stanislaus	Rural Residence	143	65	72
		Residential Subdivision	597	61	67
WS-6	Stanislaus	Rural Residence	215	51	58
		Residential Subdivision	497	49	56
WS-5	Stanislaus	Residential Subdivision	712	47	54
D-3	Stanislaus	Rural Residence	1,300	40	47
D-13	Stanislaus	Rural Residence	240	59	66

Table 3.6-7 indicates that, under the reasonable worst-case construction noise assumption, construction noise could exceed the Stanislaus County residential noise standard of 55 dBA (daytime) within about 600 feet of an active construction site. Table 3.6-8 indicates that well drilling noise could exceed Stanislaus County residential noise standards of 45 dBA (nighttime) within about 1,500 feet of drilling. As shown in Table 3.6-9, wells WS-2, WS-5, WS-6, D-3, and D-13 are within 1,500 feet of residences.

Mitigation Measure NOI-1 would reduce this effect at wells WS-2, WS-5, WS-6, D-3, and D-13 to less-than-significant levels.

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 55 dBA L_{eq} between the hours of 7:00 p.m. and 10:00 p.m., or 45 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.
- 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 Project Operations

As described in Chapter 2, each well would include a submersible, electric pump that would operate the well. The pump motor would sit on the well pad adjacent to the well casing. 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 then entered into the spreadsheet model based on FHWA (2006) guidelines to generate noise levels at graduated distances and nearby receptors. The wells located in San Joaquin and Merced Counties would be located more than 1,000 feet from noise-sensitive land uses. Therefore, the following impact discussion focuses on the wells in Stanislaus County and compares operational noise to Stanislaus County noise standards.

As shown in Table 3.6-10, noise from operational pumps could reach 55 dBA L_{eq} at about 200 feet, and 45 dBA L_{eq} at about 490 feet. Noise from operational pumps at these wells could exceed Stanislaus County noise standards (55 dBA L_{eq} during daytime hours and 45 dBA L_{eq} during nighttime hours). As shown in Table 3.6-9, wells WS-2 and WS-6 are within 490 feet of residences. Mitigation Measure NOI-2 would reduce this effect to levels that are not considered significant.

Table 3.6-10. 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	71
100	-6	-2	63	63
110	-7	-2	62	62
200	-12	-4	55	55
250	-14	-4	52	52
350	-17	-5	49	49
400	-18	-6	47	47
490	-20	-6	45	45
600	-22	-7	42	42
700	-23	-7	41	41
800	-24	-7	39	39
900	-25	-8	38	38
1000	-26	-8	37	37
2000	-32	-10	29	29
3000	-36	-11	24	24
4000	-38	-12	21	21
5000	-40	-12	18	18
6000	-42	-13	16	16

Mitigation Measure NOI-2: Enclose Operational Pumps

Reclamation will design noise reducing structures to meet sound ordinances when the wells are within 200 feet of residences so that operational noise does not exceed 55 dBA L_{eq} during daytime hours, or 45 dBA L_{eq} during nighttime hours.

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. Additionally, Mitigation Measure NOI-2 as proposed for the Proposed Action reduces this effect.

3.7 Indian Trust Assets

This section describes the existing environmental conditions and the consequences of constructing and operating the Proposed Action alternatives 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 1 is the Santa Rosa Rancheria, located approximately 100 miles southeast of the project location.

3.7.2 Environmental Consequences

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 adverse effects on ITAs would occur as a result of the Proposed Action. The nearest ITA is more than 100 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 Action alternatives 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 project area through BBID, DPWD, and WSID. The primary facilities used to convey water are the DMC, and in San Joaquin, Stanislaus, and Merced Counties many miles of canals and ditches that distribute irrigation water to farmlands.

Electricity

PG&E is the primary provider of electricity in the project area, with a small area in Stanislaus County receiving electricity from the Turlock Irrigation District (CEC 2010b). PG&E transmission lines in the region are concentrated near the Interstate 5 corridor, with several areas branching off to areas just east of the interstate, near Highway 33. The transmission lines that run along Interstate 5 consist of two 110–161 kilovolt (kV) lines, two 220–287 kV lines, and two 345–500kV lines. These lines cross Interstate 5 several times as they run south from Tracy, but lie mostly on the western side of the interstate. A 60–92 kV line follows Highway 33 from Vernalis to Patterson before splitting into several directions near the border of Stanislaus and Merced Counties.

Natural Gas

PG&E owns and operates natural gas pipelines that run along the western side of the project 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. Kinder Morgan has a petroleum pipeline that runs south from Tracy through Patterson along Highway 33 before turning east toward Turlock. 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. The portion of the project area that overlaps San Joaquin County is not a part of any stormwater district. 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 project 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 implementation of the alternatives.

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. No new wells would be constructed, and no additional demand on utilities would result. Implementation of the No Action Alternative would have no impacts.

Proposed Action

Under the Proposed Action, 32 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 irrigation and water districts. For wells with distribution systems that need to cross levee roads, 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 provide a connection to a power source for each of the 32 well pumps. 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 in order to minimize the reach of the electrical outages and affect as few users as possible. However, well D-15 would hook into one of the 110–161 kV lines for power. Few users would be affected as the area is largely rural with scattered homes and agricultural users. PG&E would coordinate the outages and notify users of 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 each county to run the 32 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
Merced	3	129,933	4,102,716,003	0.003%
San Joaquin	4	854,512	5,697,418,243	0.015%
Stanislaus	25	6,350,861	5,090,412,581	0.125%
Source: Energy Consumption Data Management System 2008.				

The increase in electricity consumption related to the Proposed Action for each county would be relatively low. Given the relatively low energy use for these primarily agricultural counties, these increases are negligible and would not raise usage to a level that would adversely affect utilities in the counties listed above. 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 project alternatives 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 project 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 1 study area and potential effects that could occur if the 32 proposed groundwater wells are constructed and placed in operation. For purposes of this assessment, the Region 1 study area consists of San Joaquin, Stanislaus, and Merced Counties. This section describes the population, employment and income, and value of agricultural production in both counties. 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

The combined population of San Joaquin, Stanislaus and Merced Counties was estimated to total 1.5 million in January 2010 (California Department of Finance [CDF] 2010a). This represents an increase of approximately 20 percent from 2000. Major communities in the three counties are Stockton, Modesto, and Merced with a combined population of 585,000 (CDF 2010a, 2010b). The age characteristics of the population in the three counties are similar. Approximately 30 percent of each 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, 2010b, 2010c).

In San Joaquin County, approximately 73 percent report their ethnicity as white, 14 percent as Asian, 8 percent as black, and 2 percent as American Indian. In Merced County, approximately 85 percent report their ethnicity as white, 7 percent as Asian, 4 percent as black, and 2 percent as American Indian. The ethnicity of Stanislaus County residents is similar to Merced County. Approximately 48 percent of San Joaquin County's residents, 40 percent of Stanislaus County's residents, and 53 percent of Merced County's residents identify themselves as being of Hispanic or Latino origin. (U.S. Department of Commerce, Bureau of the Census 2010a, 2010b, 2010c.)

Employment and Income

Full and part-time employment in San Joaquin, Stanislaus, and Merced Counties totaled approximately 469,000 in 2009. Employment in the three counties peaked at 469,000 jobs in 2007. Nonfarm employment represented approximately 90 percent of total employment in San Joaquin and Stanislaus Counties in 2009. Farm employment represented approximately 20 percent of employment in Merced County in 2009. The 2009 unemployment rate ranged from 17 percent in Merced County to 15 percent in San Joaquin County. (California Employment Development Department 2010a, 2010b, 2010c.)

Personal income totaled approximately $21 billion in San Joaquin County, $16 billion in Stanislaus County, and $7 billion in Merced County in 2008 (U.S. Department of Commerce, Bureau of Economic Analysis 2010a). Per capita personal income ranged from a high of approximately $31,500 in San Joaquin County to a low of $27,900 in Merced County (U.S. Department of Commerce, Bureau of Economic Analysis 2010b). The per capita personal income in San

Joaquin, Stanislaus, and Merced Counties is substantially less than the statewide average of approximately $44,000.

Agricultural Production

The total value of crops produced in San Joaquin County was approximately $2.1 billion in 2008 and represents an increase of approximately $0.7 billion from the 2000 total of $1.4 billion (County of San Joaquin, Agricultural Commissioner's Office 2000, 2008). In 2008, milk was the most valuable commodity at approximately $413 million, followed by grapes at $222 million and walnuts at $179 million (County of San Joaquin, Agricultural Commissioner's Office 2008).

The total value of crops produced in Merced County was approximately $3.0 billion in 2008 and represents an increase of approximately $0.6 billion from the 2004 total of $2.4 billion (County of Merced, Department of Agriculture 2004, 2008). In 2008, milk was the most valuable commodity at approximately $994 million, followed by chickens at $322 million and almonds at $255 million (County of Merced, Department of Agriculture 2008).

The total value of crops produced in Stanislaus County was approximately $2.5 billion in 2008 and represents an increase of approximately $1.3 billion from the 2004 total of $1.2 billion (County of Stanislaus, Department of Agriculture 2000, 2008). In 2008, milk was the most valuable commodity at approximately $689 million, followed by almonds at $424 million and chickens at $230 million (County of Stanislaus, Department of Agriculture 2008).

3.9.2 Environmental Consequences

This section qualitatively describes the socioeconomic effects of constructing and operating the 32 groundwater wells in the BBID, WSID, and the DPWD.

No Action Alternative

Under the No Action Alternative, no new wells would be constructed. Farmers would continue to operate as they do today, with a less reliable water supply. Implementation of the No Action Alternative would have no benefits for employment or income and would result in no impact.

Proposed Action

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

Constructing and placing into operation the 32 groundwater wells in Region 1 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 control equipment. Although beneficial, the change in employment and income is not expected to be substantial compared to the overall economic activity occurring in Merced, San Joaquin, and Stanislaus Counties because the 32 wells would be installed within a few months. There would be a slight short-term benefit to employment during construction activities.

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

Operating the 32 wells in Region 1 would enhance the supply of water used for agricultural purposes within and potentially outside of the BBID, WSID, and DPWP. Because the 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 periods of water shortage. Keeping agricultural lands in production would help maintain, but not substantially increase, agriculture-related economic activity in Merced, San Joaquin, and Stanislaus Counties during dry periods. There would be a slight beneficial effect on employment and income.

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 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 the counties of San Joaquin, Stanislaus, and Merced. The percentage of minorities residing in the counties is 40.1 in San Joaquin County; 25.4 in Stanislaus County; and 37.9 in Merced County. 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

	San Joaquin County (%)	Stanislaus County (%)	Merced County (%)	State of California (%)
Race				
White	59.9	74.6	62.2	60.9
Black or African American	7.4	2.9	3.7	6.2
American Indian or Alaska Native	0.9	0.9	1.1	0.8
Asian	13.8	5.0	6.8	12.3
Native Hawaiian and Other Pacific Islander	0.5	0.5	0.3	0.4
Some other race	12.8	12.5	22.7	16.0
Two or more races	4.7	3.6	3.3	3.4
Origin				
Hispanic	36.4	38.9	52.4	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, 11.8 percent of households in San Joaquin County were determined to have an income below the poverty level, 10.7 percent in

Stanislaus County, and 17.7 percent in Merced 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

	San Joaquin County	Stanislaus County	Merced County	State of California
Percent of households below poverty level	11.8	10.7	17.7	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 San Joaquin, Stanislaus, and Merced Counties 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.
- the population below the poverty level.

The above data indicate that San Joaquin, Stanislaus, and Merced Counties have higher percentages of some minority populations, persons of Hispanic origin, and populations living below the poverty level in their respective counties 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 1 would involve the construction and operation of 32 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

As noted in the section on Socioeconomic Resources, operating the 32 new wells in Region 1 would enhance water supply for agricultural purposes and would benefit employment and income generated in the agricultural sector, and other sectors that supply goods and services to the agricultural sector, by helping to maintain agriculture-related economic activity. Maintaining agriculture-related economic activity would be expected to be beneficial to minority and low-income populations employed in the agriculture sector in San Joaquin, Stanislaus, and Merced Counties.

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 1

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.

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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).

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6.4 ICF International

Name	Expertise	Project Role
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