RECLAMATION
Managing Water in the West

FINDING OF NO SIGNIFICANT IMPACT

Five Year Groundwater Exchange Program - Tranquillity Irrigation District to San Luis Water District

FONSI-14-009

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U.S. Department of the Interior
Bureau of Reclamation
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Introduction

In accordance with section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as amended, the South-Central California Area Office of the Bureau of Reclamation (Reclamation), has determined that an environmental impact statement (EIS) is not required for a series of annual exchanges at the Mendota Pool for up to 7,500 acre-feet (AF) of groundwater pumped from Tranquillity Irrigation District's (TQID's) well field. This Finding of No Significant Impact (FONSI) is supported by Reclamation's Environmental Assessment (EA)-14-009, *Five Year Groundwater Exchange Program - Tranquillity Irrigation District to San Luis Water District*, and is hereby incorporated by reference.

Reclamation provided the public with an opportunity to comment on the Draft FONSI and Draft EA between June 16th and June 20th. No comments were received.

Background

TQID and San Luis Water District (SLWD) have requested approval from Reclamation for a continuation of a series of annual exchanges at the Mendota Pool for up to 7,500 AF of groundwater pumped from TQID's well field. The request is for Contract Years[1] 2014 through 2018.

Similar exchanges have occurred in the past, the most recent of which was approved in 2011 and analyzed in EA-10-092 (Reclamation 2011). EA-10-092 analyzed the exchange at the Mendota Pool of up to 15,000 AF (not to exceed 7,500 AF in a given year) of groundwater pumped from TQID's well field over Contract Years 2011 through 2013. Under this previous exchange program, groundwater was used by Reclamation to meet Central Valley Project (CVP) needs at the Mendota Pool. In exchange, a like amount of CVP water was delivered to SLWD via the San Luis Canal (SLC). Reclamation determined that the previous exchange program would not significantly affect the quality of the human environment and a FONSI was executed on March 11, 2011. FONSI/EA-10-092 is incorporated by reference into EA-14-009. A total of 13,144 AF was exchanged under this previous program.

Proposed Action

Reclamation proposes to approve a series of annual exchanges at the Mendota Pool of up to 7,500 AF of groundwater pumped from TQID's well field between Contract Years 2014 through 2018 (ending February 28, 2019).

Under the Proposed Action, TQID would pump groundwater into their distribution systems connected to either the Fresno Slough Main Canal or the Tranquillity Main Canal (see Figure 2-1 in EA-14-009). Groundwater would then be diverted to spill into the neighboring Fresno Slough which flows into the backwaters of the Mendota Pool. Groundwater introduced into Mendota Pool, less 5 percent for losses, would be used by Reclamation to meet CVP demands at the Pool. In exchange, a like amount of CVP water would either be directly delivered to SLWD via the SLC or made available in San Luis Reservoir for later delivery to SLWD.

[1] A Contract Year is from March 1 through February 28/29 of the following year.

All deliveries to, or storage of, exchange water to SLWD would occur on a schedule approved by Reclamation. The San Luis Delta-Mendota Water Authority (SLDMWA) would account for groundwater introduced into Mendota Pool for exchange as well as any water directly delivered to SLWD or stored in San Luis Reservoir for later delivery.

Environmental Commitments

Reclamation, TQID, and SLWD would implement the environmental protection measures listed in Table 2-1 of EA-14-009 to reduce or avoid environmental consequences associated with the Proposed Action. Environmental consequences for resource areas assume the measures specified would be fully implemented.

Reclamation's finding that implementation of the Proposed Action will result in no significant impact to the quality of the human environment is supported by the following findings:

Findings

Water Resources

Under the Proposed Action, TQID would pump up to 7,500 AF per year of groundwater from its well field for exchange with Reclamation for a like amount, less losses, of CVP water delivered to SLWD via the SLC or stored in San Luis Reservoir for later delivery to SLWD. Similar to the No Action Alternative, TQID intends to pump additional groundwater in order to meet in-district demands due to current hydrologic conditions. This pumping would be in addition to the up to 7,500 AF it is proposing to pump to benefit SLWD under the Proposed Action. Increased groundwater pumping would reduce water levels further and could increase rates of subsidence in an area that has subsided 0.45 and 0.6 feet in 2012 (see Figure 3-2 in EA-14-009). Specific environmental commitments have been included in the Proposed Action (see Table 2-1 in EA-14-009) in order to minimize impacts to groundwater levels. Following these commitments would minimize potential adverse impacts to the groundwater basin.

In addition, environmental commitments to protect water quality in the Mendota Pool have been incorporated into the Proposed Action as outlined in Table 2-1 of EA-14-009. These commitments would ensure that no adverse impacts to water quality would occur.

TQID's pumped groundwater would be used by Reclamation to meet demands at the Mendota Pool. CVP water would be exchanged for this water and conveyed to SLWD as a supplemental surface water supply to meet existing irrigation demands. This would beneficial effect SLWD's water supply during water short years. In addition, the delivery of up to 7,500 AF per year of exchanged water would reduce the need for those landowners that have access to groundwater in SLWD to pump a like amount of groundwater to meet demands. This would have beneficial impacts to groundwater levels within the SLWD service area.

Land Use

TQID and SLWD would not change historic land and water management practices under the Proposed Action. TQID's overall water supply would not change and irrigated acreages and crop mixes would remain the same. CVP water would move through existing facilities for

delivery to lands within SLWD for use on existing crops. The water would not be used to place untilled or new lands into production, or to convert undeveloped land to other uses.

Biological Resources

Most of the habitat types required by species protected by the Endangered Species Act do not occur in the Action area (see Table 3-5 in EA-14-009). The Proposed Action would not involve the conversion of any land fallowed and untilled for three or more years. In addition, the Proposed Action would not change the land use patterns of the cultivated or fallowed fields that do have some value to listed species or to birds protected by the Migratory Bird Treaty Act. Land within SLWD, which is considered by the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife to be important for connecting San Joaquin kit fox populations to the south with those in the northern range, would be protected by the commitment made by the district (see Appendix B in EA-14-009). Since no natural stream courses or additional surface water pumping would occur, there would be no effects on listed fish species. No critical habitat occurs within the area affected by the Proposed Action and so none of the primary constituent elements of any critical habitat would be affected.

The Proposed Action would not impact the giant garter snake at Mendota Pool. Water quality data from the wells that would be pumped has shown that selenium levels are not higher than 1 microgram per liter (µg/L), which is below the 2 µg/L threshold. In addition, the Proposed Action would not impact mosquitofish, one of the snakes prey, as they are tolerant of high levels of salinity and water quality changes would be limited to the range allowed (see Table 2-1 in EA-14-009).

With implementation of environmental commitments listed in Table 2-1 of EA-14-009 and based upon the nature of the Proposed Action, Reclamation has determined that there would be No Effect to proposed or listed species or critical habitat under the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 et seq.), and there would be no take of birds protected under the Migratory Bird Treaty Act (16 U.S.C. §703 et seq.).

Cultural Resources

The Proposed Action would facilitate the flow of water through existing facilities to existing users. As no construction or modification of facilities would be needed in order to complete the Proposed Action, Reclamation has determined that these activities have no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1). See Appendix C of EA-14-009 for Reclamation's determination.

Indian Sacred Sites

The Proposed Action will not limit access to or ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites.

Indian Trust Assets

The Proposed Action would not impact Indian Trust Assets as there are none in the Proposed Action area. See Appendix D of EA-14-009 for Reclamation's determination.

Socioeconomic Resources

The Proposed Action would have beneficial impacts on socioeconomic resources within SLWD as the exchanged water would be used to help sustain existing crops and maintain farming. There would be no adverse socioeconomic impacts within TQID as water needs would still be met and agricultural practices would be unchanged.

Environmental Justice

The Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease nor would it disproportionately impact economically disadvantaged or minority populations.

Air Quality

No construction or modification of facilities would be done for the Proposed Action. CVP water exchanged for pumped groundwater would be part of existing baseline conditions for pumped CVP water and would not require additional pumping to occur. In addition, groundwater would be pumped from TQID's existing well field by electric pumps which would not produce emissions that impact air quality. The generating power plant that produces the electricity to operate the electric pumps does produce emissions that impact air quality; however, the generating power plant is required to operate under permits issued by the air quality control district. As the Proposed Action would not change the emissions generated at the generating power plant, no additional impacts to air quality would occur and a conformity analysis is not required pursuant to the Clean Air Act.

Global Climate and Energy Use

The Proposed Action would not require additional electrical production beyond baseline conditions and would therefore not contribute to additional greenhouse gas emissions. As such, there would be no additional impacts to global climate change. Global climate change is expected to have some effect on the snow pack of the Sierra Nevada and the runoff regime. Current data are not yet clear on the hydrologic changes and how they will affect the San Joaquin Valley. CVP water allocations are made dependent on hydrologic conditions and environmental requirements. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change would be addressed within Reclamation's operation flexibility.

Cumulative Impacts

Cumulative impacts result from incremental impacts of the Proposed Action or No Action alternative when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. To determine whether cumulatively significant impacts are anticipated, Reclamation has reviewed existing or foreseeable projects that could affect or could be affected by the Proposed Action including those for the previous exchange programs described in EA-10-092. As in the past, hydrological conditions and other factors are likely to result in fluctuating water supplies which drive requests for water service actions. Water districts aim to provide water to their customers based on available water supplies and timing, while attempting to minimize costs. Farmers irrigate and grow crops based on these conditions

and factors, and a myriad of water service actions are approved and executed each year to facilitate water needs. Each water service transaction involving Reclamation undergoes environmental review prior to approval.

The Proposed Action and other similar projects would not hinder the normal operations of the CVP and Reclamation's obligation to deliver water to its contractors or to local fish and wildlife habitat. Since the Proposed Action would not involve construction or modification, nor interfere with CVP or State Water Project operations, there would be no cumulative impacts to existing facilities or other contractors.

Elastic and recoverable subsidence occurs as long as water levels remain above historic lows (Department of Water Resources 2014). To avoid the potential of inelastic subsidence, pumping would be suspended if average measured groundwater levels decline to 30 feet below mean sea level (the historic low static water level). The pumping would not be restarted until measured groundwater levels recovered to at least 20 feet below mean sea level. This would minimize the potential for cumulatively adverse impacts to water levels and subsidence rates. The Proposed Action may reduce the need for additional groundwater pumping in SLWD further minimizing the risk of groundwater overdraft and subsidence in its service area. As a result, the Proposed Action would not have substantial adverse cumulative impacts.

As the Proposed Action is not expected to result in any direct or indirect adverse impacts to land use, biological resources, cultural resources, Indian Sacred Sites, Indian Trust Assets, socioeconomics, minority or disadvantaged populations, air quality or global climate and energy use, there would be no cumulative adverse impacts to these resources.

RECLAMATION

Managing Water in the West

Final Environmental Assessment

Five Year Groundwater Exchange Program - Tranquillity Irrigation District to San Luis Water District

EA-14-009

U.S. Department of the Interior
Bureau of Reclamation
Mid Pacific Region
South-Central California Area Office
Fresno, California

June 2014

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.

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Appendices

Section 1 Introduction

The Bureau of Reclamation (Reclamation) provided the public with an opportunity to comment on the Draft Finding of No Significant Impact (FONSI) and Draft Environmental Assessment (EA) between June 16, 2014 and June 20, 2014. No comments were received. Changes between this Final EA and the Draft EA, which are not minor editorial changes, are indicated by vertical lines in the left margin of this document.

1.1 Background

Tranquillity Irrigation District (TQID) and San Luis Water District (SLWD) have requested approval from Reclamation for a continuation of a series of annual exchanges at the Mendota Pool for up to 7,500 acre-feet (AF) of groundwater pumped from TQID's well field (Figure 1-1). The request is for Contract Years[1] 2014 through 2018.

Similar exchanges have occurred in the past, the most recent of which was approved in 2011 and analyzed in EA-10-092 (Reclamation 2011). EA-10-092 analyzed the exchange at the Mendota Pool of up to 15,000 AF (not to exceed 7,500 AF in a given year) of groundwater pumped from TQID's well field over Contract Years 2011 through 2013. Under this previous exchange program, groundwater was used by Reclamation to meet Central Valley Project (CVP) needs at the Mendota Pool. In exchange, a like amount of CVP water was delivered to SLWD via the San Luis Canal (SLC). Reclamation determined that the previous exchange program would not significantly affect the quality of the human environment and a FONSI was executed on March 11, 2011. FONSI/EA-10-092 is hereby incorporated by reference. A total of 13,144 AF was exchanged under this previous program.

1.2 Need for the Proposed Action

The State of California is currently experiencing unprecedented water management challenges due to severe drought in recent years. Both the State and Federal water projects are forecasting very low storage conditions in all major reservoirs. In addition, South-of-Delta (SOD) CVP contractors experienced reduced water supply allocations from 2007 to 2013 due to hydrologic conditions and regulatory requirements. Based on hydrologic conditions, Reclamation declared an initial 0 percent allocation for SOD agricultural contractors for the 2014 Contract Year. As a result, SLWD needs to supplement their CVP allocation to ensure adequate water supply for over 24,000 acres of permanent crops within the district in the 2014 through 2018 contract years. The purpose of the Proposed Action is to offset the effects of pumping restrictions and uncertain water supply conditions.

[1] A Contract Year is from March 1 through February 28/29 of the following year.

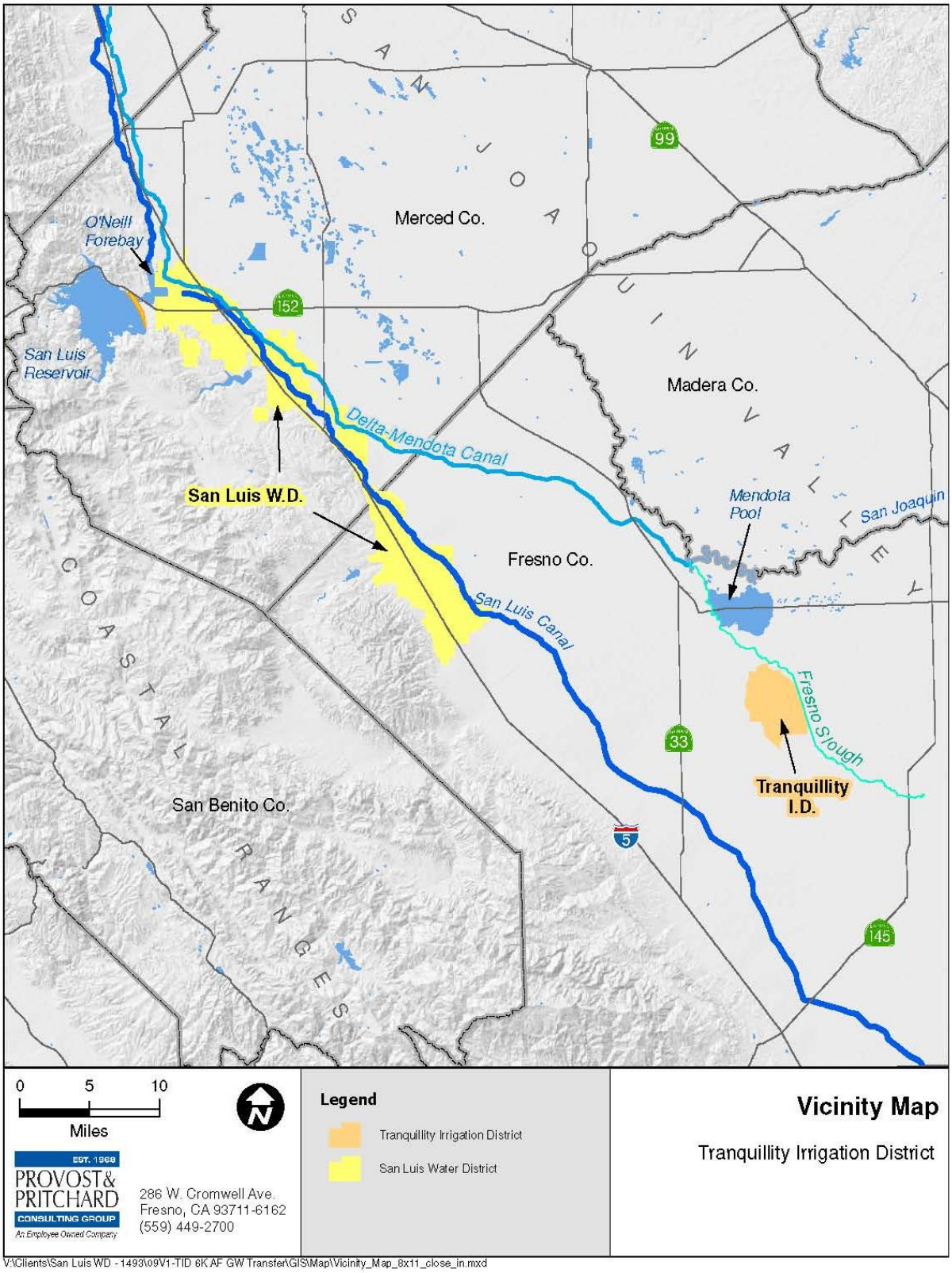

Figure 1-1 Proposed Action Area

Section 2 Alternatives Including the Proposed Action

This EA considers two possible actions: the No Action Alternative and the Proposed Action. The No Action Alternative reflects future conditions without the Proposed Action and serves as a basis of comparison for determining potential effects to the human environment.

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not approve a series of annual exchanges at the Mendota Pool of up to 7,500 AF of groundwater pumped from TQID's well field. Groundwater would continue to be pumped and used by TQID as it has in the past. SLWD would need to find other sources of water to supplement their water supplies.

2.2 Proposed Action

Reclamation proposes to approve a series of annual exchanges at the Mendota Pool of up to 7,500 AF of groundwater pumped from TQID's well field between Contract Years 2014 through 2018 (ending February 28, 2019).

Under the Proposed Action, TQID would pump groundwater into their distribution systems connected to either the Fresno Slough Main Canal or the Tranquillity Main Canal (Figure 2-1). Groundwater would then be diverted to spill into the neighboring Fresno Slough which flows into the backwaters of the Mendota Pool. Groundwater introduced into Mendota Pool, less 5 percent for losses, would be used by Reclamation to meet CVP demands at the Pool. In exchange, a like amount of CVP water would either be directly delivered to SLWD via the SLC or made available in San Luis Reservoir for later delivery to SLWD.

All deliveries to, or storage of, exchange water to SLWD would occur on a schedule approved by Reclamation. The San Luis Delta-Mendota Water Authority (SLDMWA) would account for groundwater introduced into Mendota Pool for exchange as well as any water directly delivered to SLWD or stored in San Luis Reservoir for later delivery.

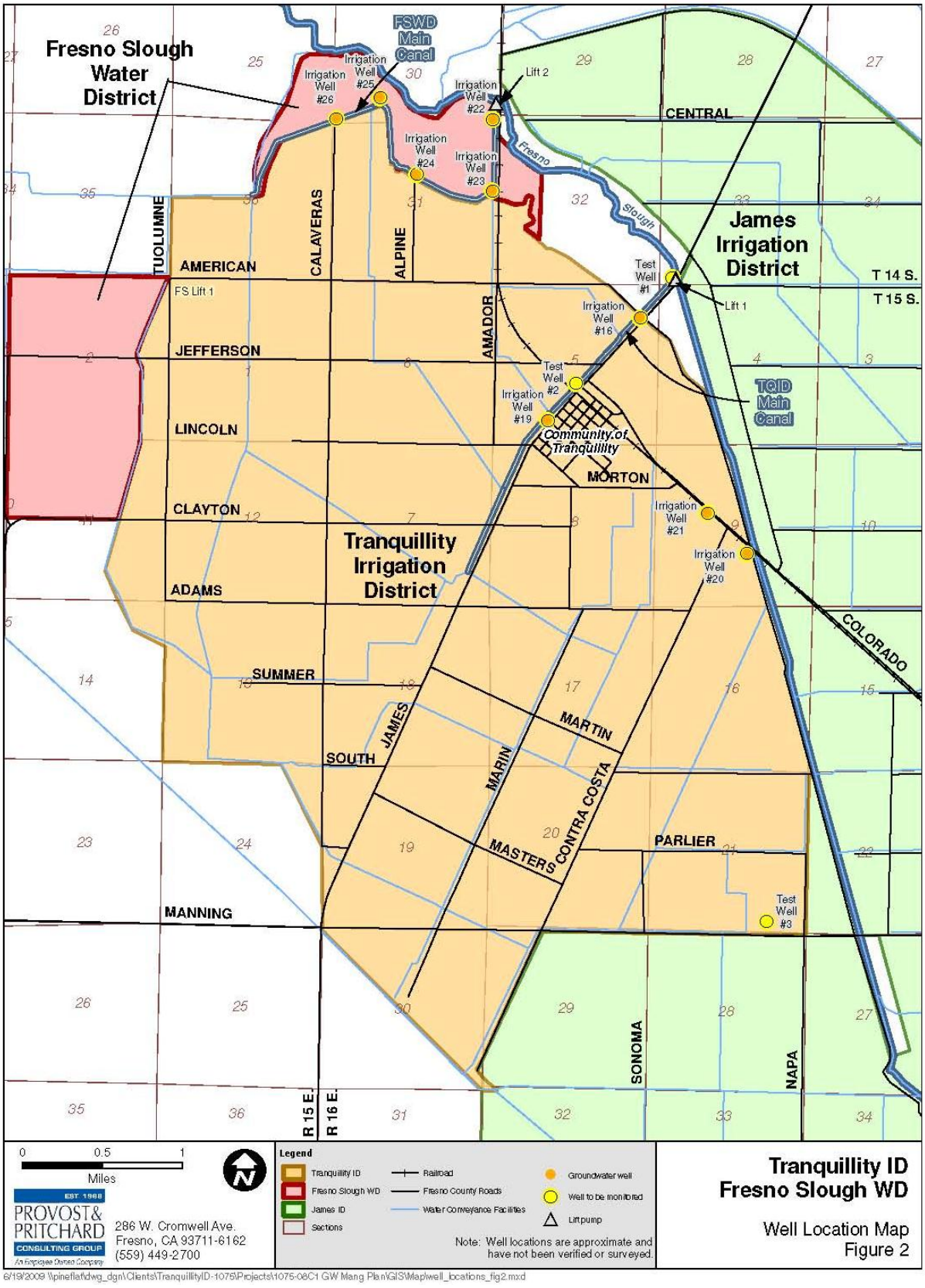

Figure 2-1 Tranquillity Irrigation District's Wells Proposed for Groundwater Pumping

2.2.1 Environmental Commitments

Reclamation, TQID, and SLWD would implement the following environmental protection measures to reduce or avoid environmental consequences associated with the Proposed Action (Table 2-1). Environmental consequences for resource areas assume the measures specified would be fully implemented.

Table 2-1 Environmental Protection Measures and Commitments

Resource	Protection Measure
Water Resources	TQID will monitor water quality in order to comply with established water quality standards for introduction of groundwater into Mendota Pool (see Appendix A). TQID shall submit water quality reports to Reclamation prior to the start of groundwater pumping each year the exchange is to occur as well as monthly water quality reports during pumping operations.
	TQID will monitor groundwater levels monthly to prevent groundwater levels exceeding historic lows (approximately 30 feet below mean sea level [msl]). If average water levels reach 30 feet below msl, pumping shall be suspended until water levels recover to at least 20 feet below msl.
Biological Resources	Selenium in well water pumped into Mendota Pool would not exceed 2.0 microgram per liter (µg/L).
	No native or untilled land (fallow for three consecutive years or more) may be cultivated with CVP water without additional environmental analysis and approval.
	SLWD would not deliver CVP water to developments or other habitat conversions without evidence of Endangered Species Act compliance. SLWD has committed to this requirement (see Appendix B).
	No new construction or modification of existing facilities may occur in order to complete the Proposed Action.
Various Resources	The Proposed Action cannot alter the flow regime of natural waterways or natural watercourses such as rivers, streams, creeks, ponds, pools, wetlands, etc., so as to have a detrimental effect on fish or wildlife or their habitats.
	The Proposed Action must comply with all applicable Federal, State and local laws, regulations, permits, guidelines and policies.
	The Proposed Action would not increase or decrease water supplies that would result in development.

Section 3 Affected Environment and Environmental Consequences

The areas in which impacts may occur are the same as those analyzed in EA-10-092 and include the CVP service area boundaries of TQID and SLWD, as well as the Mendota Pool, SLC, and San Luis Reservoir (Figure 1-1). The environmental impacts analyzed within Section 3 of EA-10-092 are still valid and adequately assesses the environmental effects from this Proposed Action, which is hereby incorporated by reference. Potential impacts to the following resources were re-considered as a result of this proposal and were still found to be minor. Brief explanations of impacts are provided in Table 3-1.

Table 3-1 Resources Eliminated from Further Analysis

Resource	Reason Eliminated
Land Use	TQID and SLWD would not change historic land and water management practices under the Proposed Action. TQID's overall water supply would not change and irrigated acreages and crop mixes would remain the same. CVP water would move through existing facilities for delivery to lands within SLWD for use on existing crops. The water would not be used to place untilled or new lands into production, or to convert undeveloped land to other uses.
Cultural Resources	The Proposed Action would facilitate the flow of water through existing facilities to existing users. As no construction or modification of facilities would be needed in order to complete the Proposed Action, Reclamation has determined that these activities have no potential to cause effects to historic properties pursuant to 36 CFR Part 800.3(a)(1). See Appendix C for Reclamation's determination.
Indian Sacred Sites	The Proposed Action would not limit access to or ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites.
Indian Trust Assets	The Proposed Action would not impact Indian Trust Assets are there are none in the Proposed Action area. See Appendix D for Reclamation's determination.
Socioeconomics	The Proposed Action would have beneficial impacts on socioeconomic resources within SLWD as the exchanged water would be used to help sustain existing crops and maintain farming. There would be no adverse socioeconomic impacts within TQID as water needs would still be met and agricultural practices would be unchanged.
Environmental Justice	The Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease nor would it disproportionately impact economically disadvantaged or minority populations.
Air Quality	No construction or modification of facilities would be done for the Proposed Action. CVP water exchanged for pumped groundwater would be part of existing baseline conditions for pumped CVP water and would not require additional pumping to occur. In addition, groundwater would be pumped from TQID's existing well field by electric pumps which would not produce emissions that impact air quality. The generating power plant that produces the electricity to operate the electric pumps does produce emissions that impact air quality; however, the generating power plant is required to operate under permits issued by the air quality control district. As the Proposed Action would not change the emissions generated at the generating power plant, no additional impacts to air quality would occur and a conformity analysis is not required pursuant to the Clean Air Act.
Global Climate and Energy Use	The Proposed Action would not require additional electrical production beyond baseline conditions and would therefore not contribute to additional greenhouse gas emissions. As such, there would be no additional impacts to global climate change. Global climate change is expected to have some effect on the snow pack of the Sierra Nevada and the runoff regime. Current data are not yet clear on the hydrologic changes and how they will affect the San Joaquin Valley. CVP water allocations are made dependent on hydrologic conditions and environmental requirements. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change would be addressed within Reclamation's operation flexibility.

3.1 Water Resources

3.1.1 Affected Environment

The affected environment for TQID, SLWD, Mendota Pool, and CVP conveyance facilities is the same as described in Section 3.1 of EA-10-092. Rather than repeating the same information that has been incorporated by reference into this document, the affected environment and environmental consequences section in this EA will focus on updates or changes.

Central Valley Project

CVP water is used for the irrigation of agricultural areas, for municipal and industrial uses, for the restoration of fisheries and aquatic habitat in the waterways that have been affected by water development, for wildlife refuges, and for other purposes. The largest use of CVP water is for agricultural irrigation. The greatest demand for irrigation water occurs in mid to late summer, as crops mature and crop water use increases. During the winter, farmers in the CVP also use water for frost control, pre-irrigation of fields to saturate the upper soil and for irrigation when precipitation is insufficient.

The amount of CVP water available each year for contractors is based, among other considerations, on the storage of winter precipitation and the control of spring runoff in the Sacramento and San Joaquin River basins. Reclamation's delivery of CVP water diverted from these rivers is determined by State water right permits, judicial decisions, and State and Federal obligations to prior rights holders, to maintain water quality, to enhance environmental conditions, and to prevent flooding.

SOD CVP agricultural allocations averaged 47 percent from 2005 to 2014 (Table 3-2). Over the last five years the average allocation was 37 percent with a range of 0 to 80 percent. A 100 percent allocation was only received once in the last 10 years (2006). Due to operational constraints and fluctuating hydrologic conditions, water allocations in the future are likely to be similar to those shown in Table 3-2.

Table 3-2 Ten Year Average SOD Agricultural Allocation

Contract Year	Agricultural Allocations (%)[1]
2014[2]	0
2013	20
2012	40
2011	80
2010	45
2009	10
2008	40
2007	50
2006	100
2005	85
Average	47

[1]As percentage of Water Service Contract total
[2]Initial 2014 allocation.
Source: http://www.usbr.gov/mp/cvo/vungvari/water_allocations_historical.pdf

Tranquillity Irrigation District

TQID is a CVP contractor with a CVP water service contract that provides up to 13,800 AFY (Contract No. 14-06-200-701-A-LTR1). As a SOD CVP agricultural water contractor, TQID has

experienced similar reductions as SLWD to their CVP contract supply (see Table 3-2); however, TQID also has access to CVP water supplies based upon historic water rights that were affected by the construction of Friant Dam on the San Joaquin River. This water rights settlement water (up to 20,200 AFY) has priority delivery status and as such is a firmer source of supply only suffering from limited reductions in drought years. TQID also has access to groundwater (TQID Well Field) and maintains high flow rights from the Kings River.

Previous Pumping Exchanges TQID has previously exchanged pumped groundwater with Reclamation for CVP water delivered to SLWD via the SLC. The first exchange program allowed for an exchange of up to 14,000 AF between Contract Years 2009 through 2011. Under the 2009-2011 exchange program, a total of 8,420 AF was delivered to SLWD. As described in Section 1.1, the most recent exchange program allowed for an exchange of up to 15,000 AF (not to exceed 7,500 AF in a given year) between Contract Years 2011 through 2013. A total of 13,144 AF was delivered to SLWD during this period. Figure 3-1 illustrates the average groundwater levels within TQID's Well Field during the previous groundwater exchange programs.

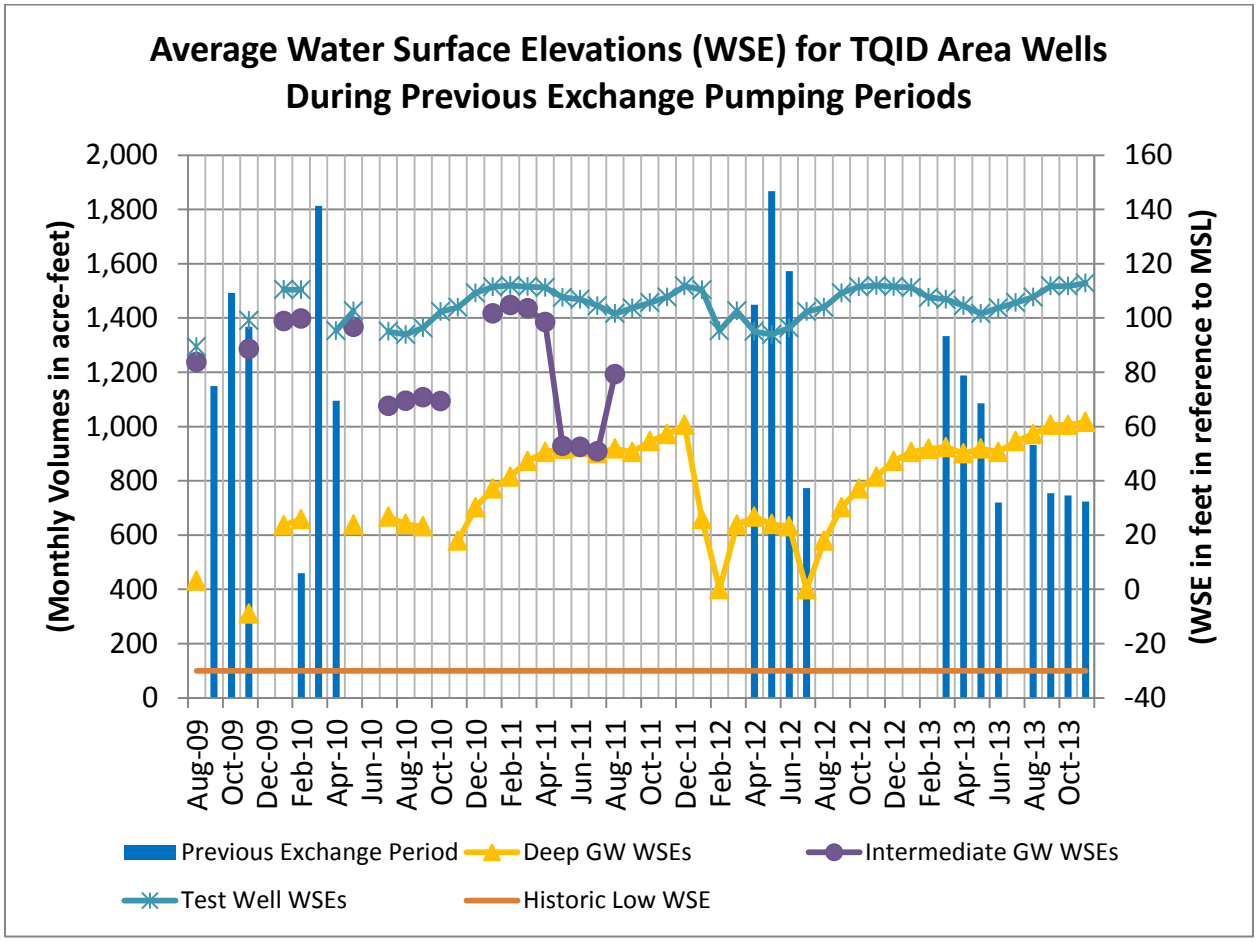

Figure 3-1 TQID Groundwater Levels During Previous Groundwater Pumping Periods

Groundwater Resources The TQID Manager reports that the historic low static water level in the confined aquifer underneath TQID's Well Field is approximately 30 feet below msl (Figure

3-1). Static water levels were approximately 60 feet above msl in October 2013, and as can be seen in Figure 3-1, while the pumping water levels dropped during the 2012-2013 exchange program, they recovered to pre-pumping levels after the exchange with Reclamation (and TQID's own pumping) was completed. In previous years, TQID has observed that once pumping has ceased, water levels in the well field tend to recover over a one week period, rising as much as 30 feet before reaching a static state. Current static water levels are between 15 and 18 feet below msl (see Table 3-3).

Table 3-3 Current Water Levels by Well

Well #	Static Water Level (depth to water in feet)	Static Water Level (below msl)
25	171	15
27	175	18
31	170	17

Water Quality As in the past, each well used for the exchange is tested for water quality at the wellhead prior to pumping for the exchange program. A summary of water quality testing for 2014 is provided in Appendix E. Specific results by well for TDS and selenium in 2014 are included in Table 3-4.

Table 3-4 Water Quality Testing Results

Well #	Total Dissolved Solids (mg/L)	Selenium (µg/L)*
25	899	Non-detect
27	795	1
31	888	1
Maximum Contaminant Levels	**See Appendix A**	**2**
*Detection limit = 1 µg/L		

Subsidence

Land subsidence is caused by subsurface movement of earth materials. Principal causes of subsidence within the San Joaquin Valley include: aquifer compaction due to groundwater pumping, hydrocompaction caused by application of water to dry soils, and oil mining (Poland and Lofgren 1984). In 2013, the U.S. Geological Survey (USGS), in cooperation with Reclamation and the SLDMWA, published a Scientific Investigations Report (2013-5142) which assessed land subsidence and water levels in the vicinity of the Delta-Mendota Canal from 2003-2010 (USGS 2013). Analysis of land surface deformation determined that the northern portion of the Delta-Mendota Canal was relatively stable between 2003-2010 but that the area around Checks 15-21 (below O'Neill Forebay to the Mendota Pool) was part of a large area of subsidence located south of the town of El Nido. This indicated a shift northeast of the area of maximum subsidence previously recorded for 1926-1970. Approximately 80 millimeters (0.26 feet) of subsidence was recorded within the Mendota Pool area between 2004 and 2010 with the majority (0.23 feet or 70 millimeters) occurring after 2006, a rate of nearly 0.066 feet (20 millimeters) per year. The vast majority of compaction within this area was determined to be beneath the Corcoran Clay layer (USGS 2013).

Various entities, including Reclamation, USGS, California Department of Water Resources, SLDMWA, and the San Joaquin River Exchange Contractors have monitored subsidence in the Mendota Pool area. As shown in Figure 3-2, subsidence rates between December 2012 and

December 2013 for the areas surrounding the town of Tranquillity and the Mendota Pool were between 0.45 and 0.6 feet.

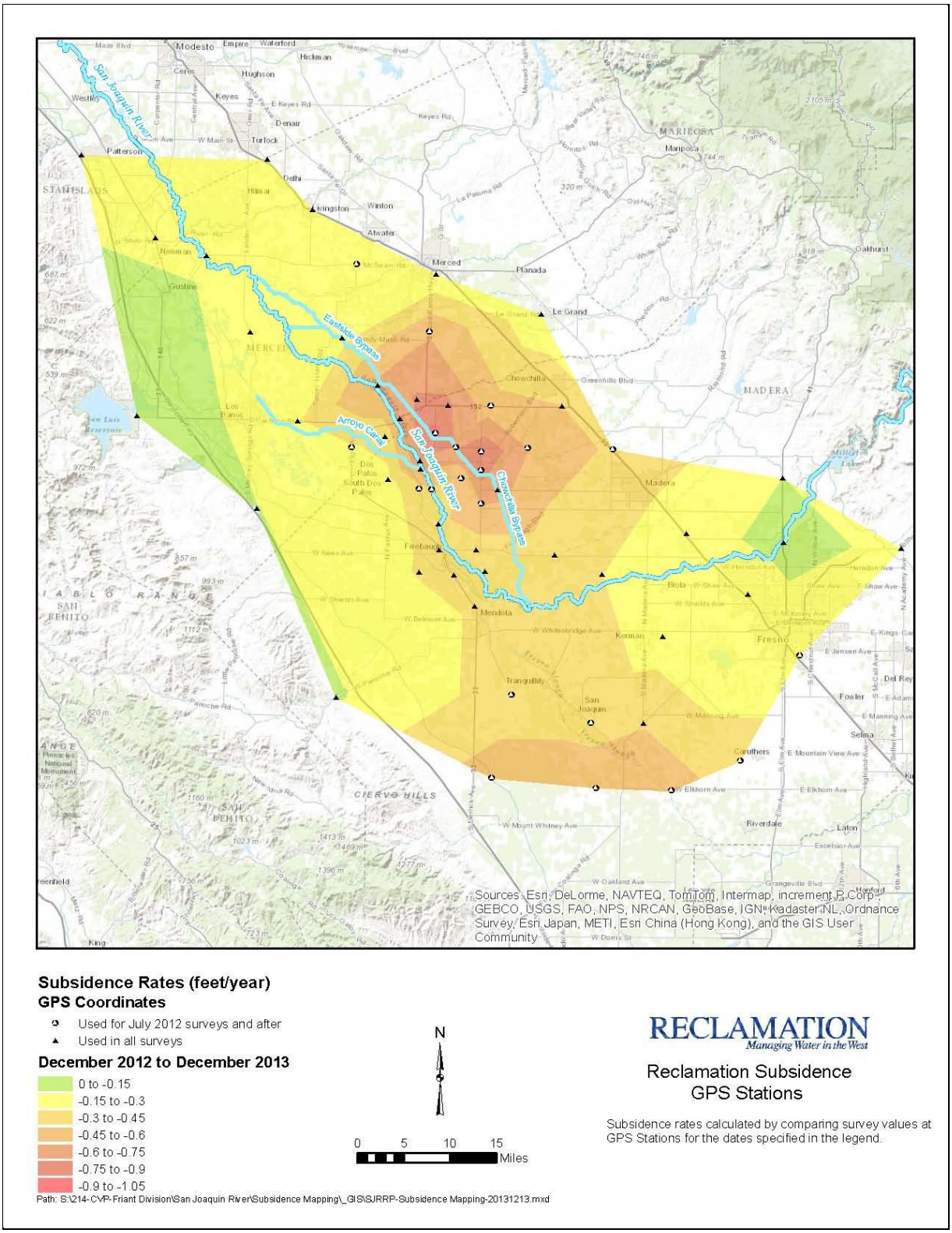

Figure 3-2 Subsidence Rates December 2012 to December 2013

3.1.2 Environmental Consequences

No Action

Under the No Action Alternative, Reclamation would not approve a series of annual exchanges at the Mendota Pool of up to 7,500 AF of groundwater pumped from TQID's well field. Groundwater would continue to be pumped and used by TQID for in-district demands. For 2014, TQID anticipates pumping approximately 9,200 AF (3,200 AF more than its previous maximum of 6,000 AF) to meet in-district demands due to current hydrologic conditions. TQID anticipates pumping volumes to be similar in 2015 unless water allocations in the CVP markedly improve. Although, TQID would pump less groundwater in the next few years than what would be cumulatively done under the Proposed Action, landowners in SLWD that have available groundwater supplies would likely pump additional groundwater or acquire other surface water supplies in order to meet water supply needs. Landowners may also need to abandon crops or fallow lands beyond what has been part of their historic practice if additional water supplies cannot be found.

Proposed Action

Under the Proposed Action, TQID would pump up to 7,500 AFY of groundwater from its well field for exchange with Reclamation for a like amount, less losses, of CVP water delivered to SLWD via the SLC or stored in San Luis Reservoir for later delivery to SLWD. Similar to the No Action Alternative, TQID intends to pump additional groundwater in order to meet in-district demands due to current hydrologic conditions. This pumping would be in addition to the up to 7,500 AF it is proposing to pump to benefit SLWD under the Proposed Action. Increased groundwater pumping would reduce water levels further and could increase rates of subsidence in an area that has subsided 0.45 and 0.6 feet in 2012 (Figure 3-2). Specific environmental commitments have been included in the Proposed Action (see Table 2-1) in order to minimize impacts to groundwater levels. Following these commitments would minimize potential adverse impacts to the groundwater basin.

In addition, environmental commitments to protect water quality in the Mendota Pool have been incorporated into the Proposed Action as outlined in Table 2-1. These commitments would ensure that no adverse impacts to water quality would occur.

TQID's pumped groundwater would be used by Reclamation to meet demands at the Mendota Pool. CVP water would be exchanged for this water and conveyed to SLWD as a supplemental surface water supply to meet existing irrigation demands. This would beneficial effect SLWD's water supply during water short years. In addition, the delivery of up to 7,500 AFY of exchanged water would reduce the need for those landowners that have access to groundwater in SLWD to pump a like amount of groundwater to meet demands. This would have beneficial impacts to groundwater levels within the SLWD service area.

Cumulative Impacts

Cumulative impacts result from incremental impacts of the Proposed Action or No Action alternative when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. To determine whether cumulatively significant impacts

are anticipated, Reclamation has reviewed existing or foreseeable projects that could affect or could be affected by the Proposed Action including those for the previous exchange programs described in EA-10-092. As in the past, hydrological conditions and other factors are likely to result in fluctuating water supplies which drive requests for water service actions. Water districts aim to provide water to their customers based on available water supplies and timing, while attempting to minimize costs. Farmers irrigate and grow crops based on these conditions and factors, and a myriad of water service actions are approved and executed each year to facilitate water needs. Each water service transaction involving Reclamation undergoes environmental review prior to approval.

The Proposed Action and other similar projects would not hinder the normal operations of the CVP and Reclamation's obligation to deliver water to its contractors or to local fish and wildlife habitat. Since the Proposed Action would not involve construction or modification, nor interfere with CVP or State Water Project operations, there would be no cumulative impacts to existing facilities or other contractors.

Elastic and recoverable subsidence occurs as long as water levels remain above historic lows (Department of Water Resources 2014). To avoid the potential of inelastic subsidence, pumping would be suspended if average measured groundwater levels decline to 30 feet below msl. The pumping would not be restarted until measured groundwater levels recovered to at least 20 feet below msl. This would minimize the potential for cumulatively adverse impacts to water levels and subsidence rates. The Proposed Action may reduce the need for additional groundwater pumping in SLWD further minimizing the risk of groundwater overdraft and subsidence in its service area. As a result, the Proposed Action would not have substantial adverse cumulative impacts.

3.2 Biological Resources

3.2.1 Affected Environment

The Proposed Action area includes the CVP service areas of TQID and SLWD. These service areas are primarily cultivated agricultural lands and include field crops, vineyards, and orchards. These areas are associated with irrigation water delivery systems and drainage canals. There is some urban development, although limited, and any vegetation frequently includes weedy non-native annual and biennial plants.

On June 14, 2014, Reclamation requested a list of endangered, threatened, and sensitive species from the U.S. Fish and Wildlife Service (USFWS) via the Sacramento Field Office's website: http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-form.cfm (Document No. 140604030932). The list is for the following U.S. Geological Survey 7½-minute topographic quadrangles which underlie or are very close to the Action area: Jamesan, San Joaquin, Tranquillity, Cantua Creek, Chounet Ranch, Mercy Hot Springs, Dos Palos, Hammonds Ranch, Broadview Farms, Charleston School, Ortigalita Peak NW, Laguna Seca Ranch, Los Banos Valley, Ingomar, Volta, Los Banos, Howard Ranch, and San Luis Dam. Reclamation further queried the California Department of Fish and Wildlife's California Natural Diversity Database (CNDDB) for records of special-status species within 10 miles of the area associated with the Proposed Action (CNDDB 2014). This information, in addition to other information within

Reclamation's files, was reviewed to determine the potential for species to occur within the Action area (see Table 3-5).

Table 3-5 Threatened and Endangered Species and Critical Habitat that may occur within the Vicinity of the Action Area

Species	Status[1]	Effects[2]	Occurrence in the Study Area[3]
AMPHIBIANS			
California red-legged frog (*Rana draytonii*)	FT, X	NE	**Possible.** There are CNDDB records for individuals approximately 2 miles west of SLWD. No individuals or habitat in Action area and there would be no construction of new facilities or conversion of lands from existing uses.
California tiger salamander (*Ambystoma californiense*)	FT, X ST	NE	**Absent.** No individuals or habitat in area of effect.
BIRDS			
California condor (*Gymnogyps californianus*)	FE, SE	NE	**Possible.** Species will forage up to 100 miles from a roost/nest. There are records for this species approximately 70 miles southeast of TQID; however, there would be no construction of new facilities or conversion of lands from existing uses.
greater sandhill crane (*Grus canadensis tabida*)	ST	NE	**Present.** CNDDB records indicate this species occurs in the Action area; however, there would be no construction of new facilities or conversion of lands from existing uses.
Swainson's hawk (*Buteo swainsoni*)	ST	NE	**Present.** CNDDB records indicate this species occurs in the Action area; however, there would be no construction of new facilities or conversion of lands from existing uses.
FISH			
Central Valley steelhead (*Oncorhynchus mykiss*) (NMFS)	FT	NE	**Absent.** No natural waterways within the species' range will be affected by the Proposed Action.
delta smelt (*Hypomesus transpacificus*)	FT, SE	NE	**Absent.** No natural waterways within the species' range will be affected by the Proposed Action.
INVERTEBRATES			
longhorn fairy shrimp (*Branchinecta longiantenna*)	FE	NE	**Absent.** No individuals or habitat in area of effect.
valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	NE	**Possible.** Closest record (from 1987) is approximately 3 miles away from the Action area. No individuals have been documented in the Action area and there would be no construction of new facilities or conversion of lands from existing uses.
vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	NE	**Absent.** No individuals or habitat in area of effect.
vernal pool tadpole shrimp (*Lepidurus packardi*)	FE	NE	**Absent.** No individuals or habitat in area of effect.
MAMMALS			
Fresno kangaroo rat (*Dipodomys nitratoides exilis*)	FE, X, SE	NE	**Absent.** Believed extirpated from Action area. No individuals or habitat in area of effect and there would be no construction of new facilities or conversion of lands from existing uses.
giant kangaroo rat (*Dipodomys ingens*)	FE, SE	NE	**Absent.** No individuals or habitat in area of effect.
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, ST	NE	**Present.** CNDDB records indicate this species occurs in the Action area; however, there would be no construction of new facilities or conversion of lands from existing uses.
PLANTS			
palmate-bracted bird's-beak (*Cordylanthus palmatus*)	FE, SE	NE	**Absent.** No individuals or habitat in area of effect.

Species	Status[1]	Effects[2]	Occurrence in the Study Area[3]
San Joaquin woolly-threads (*Monolopia congdonii*)	FE	NE	**Absent.** No individuals or habitat in area of effect.
REPTILES			
blunt-nosed leopard lizard (*Gambelia sila*)	FE, SE	NE	**Present.** Documented as extant along western border of SLWD; however, there would be no construction of new facilities or conversion of lands from existing uses.
giant garter snake (*Thamnophis gigas*)	FT, ST	NE	**Present.** The most recent CNDDB record for the giant garter snake in the region dates back to 2001 and is a record at the Mendota Wildlife Area. There are other records for the Meyers Groundwater Bank (adjacent to the Mendota Pool) which date back to the 1970s. In addition, although not recorded in the CNDDB, a giant garter snake was found in the Mendota Pool vicinity (Mendota Wildlife Area) in 2008 (Hansen 2008). However, there would be no construction of new facilities or conversion of lands from existing uses as a result of the Proposed Action and water quality would be continuously monitored in order to comply with established water quality standards (see Table 2-2).

1 Status= Listing of Federal and State special status species
E: Listed as Endangered
T: Listed as Threatened
X: Critical Habitat designated for this species in one or more quadrangles on the list
2 Effects = Effect determination
NE: No Effect from the Proposed Action to federally listed species
3 Definition Of Occurrence Indicators
Absent: Species not recorded in study area and habitat requirements not met
Possible: Species not known from area but habitat is present or may be present
Present: Species recorded in area and habitat present

Special-Status Species

As described in Table 3-5 and due to the nature of the Proposed Action, the only special-status species that could be affected include the San Joaquin kit fox and giant garter snake. As such, this section will only focus on those species.

San Joaquin Kit Fox Land in SLWD is considered by the USFWS and California Department of Fish and Wildlife to be important for the San Joaquin kit fox. SLWD has committed not to deliver water to lands for development without evidence of compliance with the Federal Endangered Species Act (see Appendix B).

Giant Garter Snake The giant garter snake occurs at Mendota Pool, in low numbers (Hansen 2008). The giant garter snake can potentially be affected by low water quality, and in this portion of its range, the species is threatened with extirpation. Its status has been detailed in the biological opinion issued by the USFWS for the third use agreement for the Grassland Bypass Project (USFWS 2010). The biological opinion explains the risks that elevated selenium pose for the giant garter snake, and specifically states that snakes should not be exposed to water with selenium concentrations that exceed 2 microgram (µg/L) in order to avoid selenium toxicosis.

Reclamation is not aware of any studies on garter snakes to determine the effects of salinity; however, regulatory agency biologists have expressed concern over potential effects of salinity on the giant garter snakes prey base. Mosquitofish, a common prey item for giant garter snake is

found at the Mendota Pool. Mosquitofish can tolerate high levels of salinity, even those found in evaporation ponds.

3.2.2 Environmental Consequences

No Action

Under the No Action Alternative, there would be no impacts to biological resources since conditions would remain the same as existing conditions.

Proposed Action

Most of the habitat types required by species protected by the Endangered Species Act do not occur in the Action area (see Table 3-4). The Proposed Action would not involve the conversion of any land fallowed and untilled for three or more years. In addition, the Proposed Action would not change the land use patterns of the cultivated or fallowed fields that do have some value to listed species or to birds protected by the Migratory Bird Treaty Act. Land within SLWD, which is considered by the USFWS and the California Department of Fish and Wildlife to be important for connecting kit fox populations to the south with those in the northern range, would be protected by the commitment made by the district (see Appendix B). Since no natural stream courses or additional surface water pumping would occur, there would be no effects on listed fish species. No critical habitat occurs within the area affected by the Proposed Action and so none of the primary constituent elements of any critical habitat would be affected.

The Proposed Action would not impact the giant garter snake at Mendota Pool. Water quality data from the wells that would be pumped has shown that selenium levels are not higher than 1 µg/L, which is below the 2 µg/L threshold. In addition, the Proposed Action would not impact mosquitofish, one of the snakes prey, as they are tolerant of high levels of salinity and water quality changes would be limited to the range allowed (see Table 2-1).

With implementation of environmental commitments listed in Table 2-1 and based upon the nature of the Proposed Action, Reclamation has determined that there would be No Effect to proposed or listed species or critical habitat under the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 et seq.), and there would be no take of birds protected under the Migratory Bird Treaty Act (16 U.S.C. §703 et seq.).

Cumulative Impacts

As the Proposed Action would not result in any direct or indirect impacts to biological resources, it would not contribute cumulatively to impacts on those same resources.

Section 4 Consultation and Coordination

4.1 Public Review Period

Reclamation provided the public with an opportunity to comment on the Draft FONSI and Draft EA between June 16th and June 20th. No comments were received.

Section 5 Preparers and Reviewers

Rain L. Emerson, M.S., Supervisory Natural Resources Specialist, SCCAO
Shauna McDonald, Wildlife Biologist, SCCAO
William Soule, Archaeologist, MP-153
Patricia Rivera, ITA, MP-400
Erma Leal, Repayment Specialist, SCCAO – reviewer
Ned Gruenhagen, Acting Supervisory Wildlife Biologist – reviewer
David E. Hyatt, Acting Resources Management Division Chief – reviewer

Section 6 References

Bureau of Reclamation (Reclamation). 2011. *Tranquillity Irrigation District/San Luis Water District Groundwater Transfer/Exchange Program–2011 through 2013* (EA-10-092). South-Central California Area Office. Fresno, California. Website: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=7276.

Department of Water Resources. 2014. Land Subsidence. Website: http://www.water.ca.gov/groundwater/well_info_and_other/land_subsidence.cfm.

Hansen, E.C. 2008. Report of Progress to Date under Bureau of Reclamation Agreement No. 08FG200042. Prepared by Eric C. Hansen, Consulting Environmental Biologist, and submitted to John Thomson, Central Valley Project Conservation Program Manager, Bureau of Reclamation, Sacramento, CA.

Poland, J.F. and B.E. Lofgren. 1984. Case History No. 9.13. San Joaquin Valley, California, U.S.A. in *Guidebook to studies of land subsidence due to ground-water withdrawal*. J.F. Poland (Ed). Prepared for the International Hydrological Programme, Working Group 8.4. Website: http://wwwrcamnl.wr.usgs.gov/rgws/Unesco/ Accessed: November 6, 2009.

U.S. Fish and Wildlife Service (USFWS). 2010. Endangered Species Consultation on the Proposed Continuation of the Grassland Bypass Project, 2010 – 2019. Issued to the Bureau of Reclamation, South-Central California Area Office, Fresno, CA.

U.S. Geological Survey (USGS). 2013. Land Subsidence along the Delta-Mendota Canal in the Northern Part of the San Joaquin Valley, California, 2003-10. Scientific Investigations Report 2013-5142. Website: http://pubs.usgs.gov/sir/2013/5142/.

Appendix A

Water Quality Standards for Mendota Pool

EXHIBIT D

Water Quality Standards

RECLAMATION CONTRACTUAL WATER QUALITY STANDARDS AT MENDOTA POOL

DAILY:	The quality of water shall not exceed a mean daily value of eight hundred (800) parts per million of total dissolved solids (tds). The mean daily values are computed by weighting the instantaneous values on the basis of time of occurrence during each day.
MONTHLY:	The quality of water shall not exceed a mean monthly value of six hundred (600) parts per million of tds. The mean monthly value is computed by weighting each mean daily value of tds on a basis of the quantity of water delivered each day of the month.
ANNUAL:	The quality of water shall not exceed a mean annual value of four hundred and fifty (450) parts per million of tds. The mean annual value is computed by weighting each mean daily value of tds on the basis of quantity of water delivered each day of the year.
FIVE YEAR:	The average quality of water for any five (5) consecutive years shall not exceed a mean value of four hundred (400) parts per million of tds. The 5-year average shall be computed by weighting each mean daily value of tds on the basis of water delivered each day of the five (5) consecutive years ending with the current year.

Reference: Second Amended Contract for Exchange of Waters, Contract No. I1r-1144. (12/6/1967)

Revised: 2/6/2012

Appendix B

San Luis Water District Letter

Attachment C.

LAW OFFICES OF
GARY W. SAWYERS

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FRESNO, CALIFORNIA 93704

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May 3, 2006

VIA FACSIMILE ONLY
(559) 487-5397

Ms. Kathy Wood
Chief, Resource Management Division
Bureau of Reclamation
South-Central California Area Office
1243 "N" Street
Fresno, CA 93721

Re: San Luis Water District
Our File No. 52120.001

Dear Kathy:

In connection with the pending Agreement for the Acquisition of Water by the United States, San Luis & Delta-Mendota Water Authority, and Madera Irrigation District from the San Joaquin River Exchange Contractor Water Authority, I understand that Reclamation requires certain confirmations from the San Luis Water District. As you know, I am general counsel to the District. On behalf of the District, I hereby confirm that the District will not deliver Central Valley Project water to development or converted habitat without confirmation from the Bureau of Reclamation or other evidence that compliance with the Endangered Species Act has occurred with respect to the subject land either through Section 7 or Section 10 of the Act.

If you have any questions or need further confirmation, please contact me.

Very truly yours,

Gary W. Sawyers

GWS:lj
cc: Mr. Martin McIntyre (via facsimile only)
Mr. Daniel Nelson (via facsimile only)

Appendix C

Reclamation's Cultural Resources Determination

CULTURAL RESOURCE COMPLIANCE
Reclamation Division of Environmental Affairs
MP-153

MP-153 Tracking Number: 14-SCAO-157

Project Name: Tranquillity Irrigation District/San Luis Water District Groundwater Transfer and Exchange Program 2014-2018

NEPA Document: SCCAO-EA/FONSI 14-009

NEPA Contact: Charles Siek, Natural Resource Specialist

MP 153 Cultural Resources Reviewer: William Soule, Archaeologist

Date: 04/09/2014

Reclamation proposes to approve an exchange of groundwater pumped from the Tranquillity Irrigation District (TQID) Well Field of 2,500 to 7,500 acre-feet for water years 2014/15 through 2018/19. This is the type of undertaking that does not have the potential to cause effects to historic properties, should such historic properties be present, pursuant to the National Historic Preservation Act (NHPA) Section 106 regulations codified at 36 CFR Part 800.3(a)(1).

This groundwater would be pumped into the TQID distribution systems connected to either the Fresno Slough Main Canal or the Tranquillity Main Canal and then diverted to spill into the neighboring Fresno Slough which flows into the backwaters of the Mendota Pool. There the water would be exchanged with Reclamation for water that would otherwise be delivered to CVP contractors (Exchange Contractors and/or other CVP contractors).

After reviewing the materials submitted by SCAO, I concur with a determination in SCCAO-EA/FONSI 14-009 which states that neither the proposed action nor the no action alternative have the potential to cause effects to historic properties pursuant to the NHPA Section 106 regulations codified at 36 CFR Part 800.3(a)(1). With this determination, Reclamation has no further NHPA Section 106 obligations. This memorandum is intended to convey the completion of the NHPA Section 106 process for this undertaking. Please retain a copy in the administrative record for this action. Should changes be made to this project, additional NHPA Section 106 review, possibly including consultation with the State Historic Preservation Officer, may be necessary. Thank you for providing the opportunity to comment.

CC: Cultural Resources Branch (MP-153), Anastasia Leigh – Regional Environmental Officer (MP-150)

Appendix D

Reclamation's Indian Trust Assets Determination

Emerson, Rain <remerson@usbr.gov>

Re: 14-009 Request for Review

RIVERA, PATRICIA <privera@usbr.gov> Fri, Jun 6, 2014 at 4:33 PM
To: "Emerson, Rain" <remerson@usbr.gov>
Cc: Kristi Seabrook <kseabrook@usbr.gov>, "Williams, Mary D (Diane)" <marywilliams@usbr.gov>

Rain,

I reviewed the proposed action t approve a series of annual exchanges at the Mendota Pool of up to 7,500 acre-feet (AF) of groundwater pumped from Tranquillity Irrigation District's (TQID's) well field between Contract Years 2014 through 2018 (ending February 28, 2019).

Under the Proposed Action, TQID would pump groundwater into their distribution systems connected to either the Fresno Slough Main Canal or the Tranquillity Main Canal. Groundwater would then be diverted to spill into the neighboring Fresno Slough which flows into the backwaters of the Mendota Pool. Groundwater introduced into Mendota Pool, less 5 percent for losses, would be used by Reclamation to meet Central Valley Project (CVP) demands at the Pool. In exchange, a like amount of CVP water would either be directly delivered to San Luis Water District (SLWD) via the San Luis Canal or made available in San Luis Reservoir for later delivery to SLWD.

The proposed action does not have a potential to impact Indian Trust Assets.

Patricia Rivera
Native American Affairs Program Manager
US Bureau of Reclamation
Mid-Pacific Region
2800 Sacramento, California 95825
(916) 978-5194

Appendix E

Water Quality Tests for Wells Proposed for Pumping

April 30, 2014

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Lab ID : VI 1441186-006
Customer ID : 4-7350

Sampled On : April 23, 2014
Sampled By : Neil Jessup
Received On : April 23, 2014
Matrix : Ag Water

Description : Well 25
Project : Water Qulaity Monitoring

General Irrigation Suitability Analysis

Test Description	Result				Graphical Results Presentation				
Cations	mg/L	Meq/L	% Meq	Lbs/AF	Good	Possible Problem	Moderate Problem	Increasing Problem	Severe Problem
Calcium	31	1.5	12	84	**				
Magnesium	3	0.25	2	8	**				
Potassium	4	0.1	1	11	**				
Sodium	246	11	85	670					
Anions									
Carbonate	< 10	0	0	0					
Bicarbonate	110	1.8	14	300	**				
Sulfate	443	9.2	72	1200	**				
Chloride	62	1.7	14	170					
Nitrate	< 0.4	0	0	0					
Nitrate Nitrogen	< 0.1			0					
Fluoride	< 0.1	0	0	0					
Minor Elements									
Boron	1.1			3.0					
Copper	< 0.01			0.00					
Iron	0.060			0.16					
Manganese	0.16			0.44					
Zinc	< 0.02			0.00					
TDS by Summation	899			2400					
Other									
pH	7.9			units					
E. C.	1.32			dS/m					
SAR	11.3								
Crop Suitability									
No Amendments	Poor								
With Amendments	Good								
Amendments									
Gypsum Requirement	1.3			Tons/AF					
Sulfuric Acid (98%)	6.3			oz/1000Gal	Or 15 oz/1000Gal of urea Sulfuric Acid (15/49).				
Leaching Requirement	10			%					

Good Problem

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

** Used in various calculations; mg/L = Milligrams Per Liter (ppm) meq/L = Milliequivalents Per Liter

April 30, 2014

Tranquillity Irrigation Dist.

Lab ID : VI 1441186-006
Customer ID : 4-7350
Description : Well 25

Micro Irrigation System Plugging Hazard

Test Description	Result		Graphical Results Presentation (Slight / Moderate / Severe)
Chemical			
Manganese	0.16	mg/L	
Iron	0.06	mg/L	
TDS by Summation	899	mg/L	
No Amendments			
pH	7.9	units	
Alkalinity (As CaCO3)	90	mg/L	
Total Hardness	89.7	mg/L	
With Amendments			
Alkalinity (As CaCO3)	18	mg/L	
Total Hardness	18	mg/L	
pH	5.4 - 6.7	units	

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

Water Amendments Application Notes:

The Amendments recommended on the previous pages include:

Gypsum:

This should be applied at least once a year to the irrigated soil surface area. Gypsum can also be applied in smaller quantities in the irrigation water. Apply the smaller (bracketed) amount of gypsum when also applying the recommended amount of Sulfuric Acid and the larger amount when applying only Gypsum.

Sulfuric Acid:

These products should be applied as needed to prevent emitter plugging in micro irrigation systems and/or as a soil amendment to adjust soil pH to improve nutrient availability and to facilitate leaching of salts. Please exercise caution when using this material as excesses may be harmful to the system and/or the plants being irrigated. The reported Acid requirement is intended to remove approximately 80 % of the alkalinity. The final pH should range from 5.4 to 6.7. We recommend a field pH determination to confirm that the pH you designate is being achieved. This application is based upon the use of a 98% Sulfuric Acid product. The application of Urea Sulfuric Acid is based upon the use of a product that contains 15% Urea (1.89 lbs Nitrogen), 49% Sulfuric Acid and has a specific gravity of 1.52 at 68 °F.

Guidelines for the above interpretations are sourced from USDA & U.C. Cooperative Extension Service publications. Please contact us if you have any questions.

FRUIT GROWERS LABORATORY, INC.

Scott Bucy

Scott Bucy, Director of Ag. Services

SB1:KDM

FGL ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

April 30, 2014

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Lab ID : VI 1441186-001
Customer ID : 4-7350

Sampled On : April 23, 2014
Sampled By : Neil Jessup
Received On : April 23, 2014
Matrix : Ag Water

Description : Well 27
Project : Water Qulaity Monitoring

General Irrigation Suitability Analysis

Test Description	Result				Graphical Results Presentation				
Cations	mg/L	Meq/L	% Meq	Lbs/AF	Good	Possible Problem	Moderate Problem	Increasing Problem	Severe Problem
Calcium	12	0.6	5	33	**				
Magnesium	1	0.082	1	3	**				
Potassium	3	0.077	1	8	**				
Sodium	241	10	93	660					
Anions									
Carbonate	< 10	0	0	0					
Bicarbonate	140	2.3	20	380	**				
Sulfate	310	6.5	57	840	**				
Chloride	88	2.5	22	240					
Nitrate	< 0.4	0	0	0					
Nitrate Nitrogen	< 0.1			0					
Fluoride	0.2	0.011	0	0.5					
Minor Elements									
Boron	1.1			3.0					
Copper	< 0.01			0.00					
Iron	0.060			0.16					
Manganese	0.070			0.19					
Zinc	< 0.02			0.00					
TDS by Summation	795			2200					
Other									
pH	7.8			units					
E. C.	1.18			dS/m					
SAR	18.0								
Crop Suitability									
No Amendments	Poor								
With Amendments	Good								
Amendments									
Gypsum Requirement	1.4			Tons/AF					
Sulfuric Acid (98%)	7.7			oz/1000Gal	Or 19 oz/1000Gal of urea Sulfuric Acid (15/49).				
Leaching Requirement	9.2			%					

Good Problem

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

** Used in various calculations; mg/L = Milligrams Per Liter (ppm) meq/L = Milliequivalents Per Liter

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CA ELAP Certification No. 1573

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Office & Laboratory
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FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
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Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

April 30, 2014

Tranquillity Irrigation Dist.

Lab ID : VI 1441186-001
Customer ID : 4-7350
Description : Well 27

Micro Irrigation System Plugging Hazard

Test Description	Result		Graphical Results Presentation
			Slight / Moderate / Severe
Chemical			
Manganese	0.07	mg/L	
Iron	0.06	mg/L	
TDS by Summation	795	mg/L	
No Amendments			
pH	7.8	units	
Alkalinity (As CaCO3)	110	mg/L	
Total Hardness	34.1	mg/L	
With Amendments			
Alkalinity (As CaCO3)	22	mg/L	
Total Hardness	22	mg/L	
pH	5.4 - 6.7	units	

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

Water Amendments Application Notes:

The Amendments recommended on the previous pages include:

Gypsum:

This should be applied at least once a year to the irrigated soil surface area. Gypsum can also be applied in smaller quantities in the irrigation water. Apply the smaller (bracketed) amount of gypsum when also applying the recommended amount of Sulfuric Acid and the larger amount when applying only Gypsum.

Sulfuric Acid:

These products should be applied as needed to prevent emitter plugging in micro irrigation systems and/or as a soil amendment to adjust soil pH to improve nutrient availability and to facilitate leaching of salts. Please exercise caution when using this material as excesses may be harmful to the system and/or the plants being irrigated. The reported Acid requirement is intended to remove approximately 80 % of the alkalinity. The final pH should range from 5.4 to 6.7. We recommend a field pH determination to confirm that the pH you designate is being achieved. This application is based upon the use of a 98% Sulfuric Acid product. The application of Urea Sulfuric Acid is based upon the use of a product that contains 15% Urea (1.89 lbs Nitrogen), 49% Sulfuric Acid and has a specific gravity of 1.52 at 68 °F.

Guidelines for the above interpretations are sourced from USDA & U.C. Cooperative Extension Service publications. Please contact us if you have any questions.

FRUIT GROWERS LABORATORY, INC.

Scott Bucy

Scott Bucy, Director of Ag. Services

SB1:KDM

FGL ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

April 30, 2014

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Lab ID : VI 1441186-003
Customer ID : 4-7350

Sampled On : April 23, 2014
Sampled By : Neil Jessup
Received On : April 23, 2014
Matrix : Ag Water

Description : Well 31
Project : Water Qulaity Monitoring

General Irrigation Suitability Analysis

Test Description	Result				Graphical Results Presentation				
Cations	mg/L	Meq/L	% Meq	Lbs/AF	Good	Possible Problem	Moderate Problem	Increasing Problem	Severe Problem
Calcium	23	1.1	9	63	**				
Magnesium	2	0.16	1	5	**				
Potassium	4	0.1	1	11	**				
Sodium	254	11	89	690					
Anions									
Carbonate	< 10	0	0	0					
Bicarbonate	130	2.1	17	350	**				
Sulfate	379	7.9	62	1000	**				
Chloride	96	2.7	21	260					
Nitrate	< 0.4	0	0	0					
Nitrate Nitrogen	< 0.1			0					
Fluoride	0.1	0.0053	0	0.3					
Minor Elements									
Boron	1.1			3.0					
Copper	< 0.01			0.00					
Iron	< 0.05			0.00					
Manganese	0.10			0.27					
Zinc	< 0.02			0.00					
TDS by Summation	888			2400					
Other									
pH	7.6			units					
E. C.	1.32			dS/m					
SAR	13.6								
Crop Suitability									
No Amendments	Poor								
With Amendments	Good								
Amendments									
Gypsum Requirement	1.4			Tons/AF					
Sulfuric Acid (98%)	7.0			oz/1000Gal	Or 17 oz/1000Gal of urea Sulfuric Acid (15/49).				
Leaching Requirement	10			%					

Good ▬ Problem

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

** Used in various calculations; mg/L = Milligrams Per Liter (ppm) meq/L = Milliequivalents Per Liter

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April 30, 2014

Tranquillity Irrigation Dist.

Lab ID : VI 1441186-003
Customer ID : 4-7350
Description : Well 31

Micro Irrigation System Plugging Hazard

Test Description	Result		Graphical Results Presentation (Slight / Moderate / Severe)
Chemical			
Manganese	0.1	mg/L	
Iron	< 0.05	mg/L	
TDS by Summation	888	mg/L	
No Amendments			
pH	7.6	units	
Alkalinity (As CaCO3)	100	mg/L	
Total Hardness	65.6	mg/L	
With Amendments			
Alkalinity (As CaCO3)	20	mg/L	
Total Hardness	20	mg/L	
pH	5.4 - 6.7	units	

Good — Problem

Note: Color coded bar graphs have been used to provide you with 'AT-A-GLANCE' interpretations.

Water Amendments Application Notes:

The Amendments recommended on the previous pages include:

Gypsum:

This should be applied at least once a year to the irrigated soil surface area. Gypsum can also be applied in smaller quantities in the irrigation water. Apply the smaller (bracketed) amount of gypsum when also applying the recommended amount of Sulfuric Acid and the larger amount when applying only Gypsum.

Sulfuric Acid:

These products should be applied as needed to prevent emitter plugging in micro irrigation systems and/or as a soil amendment to adjust soil pH to improve nutrient availability and to facilitate leaching of salts. Please exercise caution when using this material as excesses may be harmful to the system and/or the plants being irrigated. The reported Acid requirement is intended to remove approximately 80 % of the alkalinity. The final pH should range from 5.4 to 6.7. We recommend a field pH determination to confirm that the pH you designate is being achieved. This application is based upon the use of a 98% Sulfuric Acid product. The application of Urea Sulfuric Acid is based upon the use of a product that contains 15% Urea (1.89 lbs Nitrogen), 49% Sulfuric Acid and has a specific gravity of 1.52 at 68 °F.

Guidelines for the above interpretations are sourced from USDA & U.C. Cooperative Extension Service publications. Please contact us if you have any questions.

FRUIT GROWERS LABORATORY, INC.

Scott Bucy

Scott Bucy, Director of Ag. Services

SB1:KDM

May 2, 2014

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Lab ID : VI 1441186-006
Customer ID : 4-7350

Sampled On : April 23, 2014-12:00
Sampled By : Neil Jessup
Received On : April 23, 2014-19:00
Matrix : Ag Water

Description : Well 25
Project : Water Qulaity Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Metals, Total[P:1'5]								
Selenium	ND	1	ug/L		200.8	05/01/14:204952	200.8	05/01/14:206326

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2 ‡Surrogate. * PQL adjusted for dilution.

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May 2, 2014

Lab ID : VI 1441186-001
Customer ID : 4-7350

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Sampled On : April 23, 2014-11:05
Sampled By : Neil Jessup
Received On : April 23, 2014-19:00
Matrix : Ag Water

Description : Well 27
Project : Water Qulaity Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Metals, Total[P:T5]								
Selenium	1	1	ug/L		200.8	05/01/14:204952	200.8	05/01/14:206326

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2 ‡Surrogate. * PQL adjusted for dilution.

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May 2, 2014

Tranquillity Irrigation Dist.
P.O. Box 487
Tranquillity, CA 93668

Lab ID : VI 1441186-003
Customer ID : 4-7350

Sampled On : April 23, 2014-11:25
Sampled By : Neil Jessup
Received On : April 23, 2014-19:00
Matrix : Ag Water

Description : Well 31
Project : Water Qulaity Monitoring

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Metals, Total[P:T5]								
Selenium	1	1	ug/L		200.8	05/01/14:204952	200.8	05/01/14:206326

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2 ‡Surrogate. * PQL adjusted for dilution.

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