Discussions concerning the nature and magnitude of the MPG transfer pumping program have been ongoing since at least 1994. Five alternatives to the original project were evaluated in detail in the FEIR (Jones and Stokes and LSCE 1998). Additional negotiations have been undertaken between the interested parties since the release of the FEIR. The Settlement Agreement modified the project description presented in the FEIR and was based on results from field testing and monitoring efforts (KDSA and LSCE 2000a, b). The Settlement Agreement sets the guidelines for the proposed action and potential alternatives to the action.

2.1 DESCRIPTION OF PROPOSED ALTERNATIVES

This section provides a description of the Proposed Action and two alternatives to the proposed action. Other alternatives considered in the FEIR (Jones and Stokes and LSCE 1998) have been eliminated from further consideration in this EIS because they were determined in the FEIR to be not feasible.

2.1.1 DEFINITIONS

The project proposed by the project proponents (MPG) includes the federal proposed action and other components as described in the following section. This EIS evaluates the combined effects of all pumping by the MPG for either transfer or adjacent use.

The federal proposed action is the exchange with Reclamation of up to 25,000 acre-feet per year of non-CVP groundwater for CVP water delivered via the SLC.

As used in this EIS, the term transfer pumping refers to all water pumped by the MPG into the Mendota Pool for delivery to WWD, exchange with Reclamation (i.e., the proposed action), or trade with other users around the Mendota Pool.

Under the terms of the Settlement Agreement, the MPG may also pump up to 14,000 acre-feet per year to irrigate overlying/adjacent lands. This is referred to as adjacent use pumpage, and is in addition to transfer pumpage. The analyses presented in this EIS encompass both transfer and adjacent use pumpage unless specifically stated otherwise. Therefore, these analyses represent a worst-case evaluation.

2.1.2 PROPOSED ACTION

The federal action that requires the preparation of this EIS is the proposed exchange of up to 25,000 acre-feet of the water pumped during any given year to make up for a portion of the annual shortfall in the contract water delivered via the CVP. Reclamation would issue a series of 1-year exchange agreements based on review of the environmental monitoring data. A maximum of 200,000 acre-feet of water would be exchanged with Reclamation over the 10-year period.

The project proponents (MPG) propose to pump up to 269,600 acre-feet of groundwater for transfer over a ten-year period from wells located adjacent to the Mendota Pool into the Mendota Pool. The maximum volume of water to be pumped each year would be based on hydrologic supply conditions and would be subject to the design constraints specified in Section 2.1.2.3.

The water pumped into the Mendota Pool would be made available to Reclamation to offset existing water contract obligations at the Mendota Pool. Reclamation would reduce deliveries to the Pool by an amount corresponding to the quantity exchanged with the MPG. In exchange, Reclamation would make an equivalent amount of CVP water (up to 25,000 acre-feet per year) available to the members of the MPG for irrigation purposes at Check 13 of the DMC (Tracy Pumping Plant and SLR).

Any quantity of water pumped by the MPG beyond the 25,000 acre-feet exchanged with Reclamation each year would be available for exchange or trade between the MPG and other users for use on lands that are presently under irrigation around the Mendota Pool. This additional water is outside of the scope of the federal action. However, all water pumped by the MPG as part of this program is evaluated in this EIS.

As part of this program, a maximum of 12,000 acre-feet of groundwater would be pumped for transfer from deep wells (i.e., perforated interval[1] greater than 130 feet deep), with the remainder coming from shallow wells (i.e., perforated interval less than 130 feet deep) on an annual basis.

The maximum allowable quantity of water to be pumped in a given year would depend on whether the year is classified as wet (0 acre-feet per year), normal (up to 31,600 acre-feet per year), or dry (up to 40,000 acre-feet per year) (Table 2-1). The MPG will determine the classification of each year

[1] The perforated interval is the perforated (or screened) portion of a well through which groundwater can enter. Wells that are perforated at different depths tap groundwater from different layers.

during the spring, based primarily on estimated water demands and the projected allocations for that year. The projected allocations will be based primarily on the April 15 estimate of agricultural water allocations made by Reclamation each year. This projection will be used as a guide to determine the classification of each year:

- Wet year – projected allocations greater than 60 percent of full contract allocations
- Normal year - projected allocations between 30 percent and 60 percent of the full contract allocation
- Dry year – projected allocations at 30 percent or less of the full contract allocation.

Other factors that will be considered in the classification of the water year type are the requirements of the Settlement Agreement, which states that two years out of 10 must be classified as wet, no more than two years can be classified as dry, and two consecutive years cannot be classified as dry.

2.1.2.1 Pumping Program

The groundwater pumping program will be adaptively managed to minimize any potential environmental impacts. Pumping programs will be developed and reviewed on an annual basis to allow for year-to-year variations in hydrologic conditions. The pumping program will be defined in the spring, prior to the start of pumping. The pumping program would be based on consideration of several parameters including the design constraints (Section 2.1.2.3), the results of the previous year's monitoring program, the extent of groundwater level recovery, hydrologic conditions, and any Reclamation contractor's rescheduling of CVP deliveries from the previous water year. Rescheduled deliveries may occur between March 1 and April 15 each year. During the period that rescheduled deliveries are being made, no pumping into the Mendota Pool would be allowed.

Table 2-2 provides a typical pumping program for a normal year in which 31,000 acre-feet would be pumped. Transfer pumping would be conducted over a maximum of a nine month period each year, between March 1 and November 30. The annual pumping programs would consist of three seasonal components: spring, summer, and fall. During the spring (March through May), both shallow and deep wells would be pumped. During the summer (June through mid-September), only shallow wells would be pumped. However, during years when the program does not begin until after April 1, deep wells would be pumped during the month of June. During the fall (mid-

September through November), both shallow and deep wells would be pumped. Additional constraints on groundwater quality would be implemented during the fall season to ensure that water delivered to the MWA meets CDFG's water quality criteria. Furthermore, during a given year, adjustments may be made to the pumping program if the monitoring program indicates that actions need to be taken to maintain water quality in the Mendota Pool.

During a dry year, up to 40,000 acre-feet of water would be pumped for transfer. However, a maximum of 25,000 would be exchanged with Reclamation. The remainder of the water would be exchanged with other users around the Mendota Pool. The dry year pumping program would conform to all the design constraints imposed on the normal year pumping program.

During a wet year, no transfer pumping would be conducted. No water would be exchanged with Reclamation.

Wells included in the MPG pumping and monitoring wells are mapped in Figure 2-1. Water quality of production wells used in 2002 is provided in Table 2-3. No additional wells or other facilities would be constructed as part of this action. However, normal irrigation practices may require refurbishing or replacement of existing wells. Some wells may be taken out of service during this program due to water quality impacts. These wells may be replaced by others with better water quality.

2.1.2.2 Water Distribution

Once the water has been pumped into the Mendota Pool, it would be provided to farmlands owned or operated by MPG members in the following three ways (M. Carpenter 2001, pers. comm.):

- Exchange of up to 25,000 acre-feet with Reclamation for water at Check 13 of the DMC (i.e., the O'Neill Forebay) and conveyed via the SLC for delivery to MPG farmlands in WWD and SLWD. This is the proposed action evaluated in this EIS.

- Delivery from the Mendota Pool to irrigated farmlands in WWD via Lateral 6, and possibly Lateral 7. Since most of the MPG lands are not served by these laterals, some of this water would be exchanged with WWD for other water delivered to MPG lands via the SLC; or

- Exchange with other water districts for water delivered to MPG lands via the SLC.

The exchanged water would be used on farmlands owned or operated by MPG members within WWD and/or the SLWD (Figure 1-2). Although less than 25 percent of the MPG lands are in drainage-impaired areas, the amount of water to be delivered to these lands is not likely to worsen existing drainage problems. Farmers in these areas use drainage control practices to maintain historical production. Use of local groundwater would impact crop production and groundwater quality due to accumulation of salts in the soil profile. The MPG will not translocate water from the Mendota Pool to the California Aqueduct for transfer to the southern Central Valley or southern California.

2.1.2.3 Program Design Constraints

The proposed action incorporates several design constraints intended to prevent adverse environmental effects. Some of these constraints were initially specified in the Settlement Agreement between the MPG, the SJREC, and NLF. Additional constraints were developed based on the results of previous monitoring efforts and to address concerns of other water users around the Mendota Pool. These constraints were intended to minimize the potential environmental impacts of the proposed pumping program. The constraints apply to the initial design of the annual pumping programs and to triggers based on the results of the annual monitoring program. These design constraints include:

- Pump MPG wells along the Fresno Slough only when flow in the Fresno Slough is to the south. Wells in FWD could pump irrespective of flow direction.

- Shut off MPG wells if electrical conductivity (EC) measurements at the Exchange Contractors' canal intakes exceed that of the DMC by 90 μmhos/cm for a period of three days or more. If the MPG wells are shut off for this reason, they would not be turned back on until the EC at the canal intakes returns to a level that is no more than 30 μmhos/cm above the DMC inflow.

- Minimize deep zone drawdowns by reducing MPG deep zone transfer pumping during the summer months when the majority of non-MPG irrigation pumping occurs in the Mendota area.

- Limit deep zone drawdowns throughout the pumping program to limit subsidence at the Yearout Ranch and Fordel extensometers caused by transfer pumping to less than an average of 0.005 foot per year over the 10 year period. Compaction data collected from the extensometers will be used along with model results to estimate the amount of subsidence cause by MPG pumping each year.

- Reduce transfer pumping if there is evidence that transfer pumping is causing long-term overdraft.

- Modify the pumping program based on the results of the surface water monitoring program to reduce overall surface water quality degradation, particularly with respect to salinity [total dissolved solids (TDS) or EC]. This will ensure that the quality of water supplied to the MWA and other users in the southern portion of the Mendota Pool will meet applicable water quality criteria. Wells with TDS concentrations greater than 2,000 mg/L will not be pumped as part of the proposed action. During the fall pumping period, when there is reduced flow in the Mendota Pool and water quality at the MWA is most critical, wells with TDS higher than 1,200 mg/L will not be pumped for transfer.

- Shut off wells with selenium concentrations equal to or greater than the water quality criterion of 2 μg/L.

- Minimize groundwater quality degradation by modifying the pumping program, based on the results of predictive modeling of the effects of the pumping program and the results of the groundwater monitoring program, and by minimizing drawdowns.

Total transfer pumping from the deep zone would be limited to 12,000 acre-feet per year. The purpose of this limit on deep zone pumpage is to reduce the average subsidence caused by transfer pumping to less than 0.005 foot per year and to reduce water level impacts and the rate of groundwater quality degradation that would otherwise occur.

If 12,000 acre-feet of water are pumped from the deep zone, shallow zone pumping would be limited to 19,600 acre-feet during a normal year and 28,000 acre-feet per year in a dry year. Shallow zone pumpage may also be limited due to (1) the quality of water pumped from these wells, (2) potential impacts to deep zone groundwater (e.g., overdraft or groundwater quality), and (3) potential overdraft of the shallow aquifer.

There are five MPG wells located in Madera County, adjacent to the East and West Loops of the San Joaquin River. These five wells (Farmers Water District WL-1, WL-2, WL-3, EL-2, and EL-3) will not be pumped for transfer and will not constitute part of the exchanged waters.

Additional mitigation actions are included in the proposed action. Beginning with the 2001 irrigation season, the MPG has offered to compensate the other major groundwater pumpers in the Mendota area for increased power and

other additional costs due to drawdowns estimated to have been caused by the MPG transfer pumping.

2.1.2.4 Monitoring Program

The MPG, in cooperation with other interested parties, has designed a surface water, groundwater, and subsidence monitoring program to assess the impacts of this action. The current monitoring program was developed with input from the USFWS, the U.S. Geological Survey (USGS), and the CDFG. The monitoring program was initiated in 1999 and is planned to last for the duration of the action. In 2001, the MPG implemented a sediment sampling program to assess accumulation of selenium, boron, arsenic, and molybdenum in Mendota Pool sediments. The complete monitoring program is described in Appendix B. The monitoring program consists of the following components:

- Monitor pumpage of the MPG wells on at least a monthly basis
- Measure groundwater levels on a bimonthly basis throughout the year
- Conduct continuous monitoring at the Yearout Ranch and Fordel extensometers to estimate compaction and land subsidence
- Sample groundwater quality on an annual basis
- Evaluate data from continuous EC recorders located at the DMC, the Exchange Contractors' intakes, and the MWA at regular intervals
- Conduct surface water quality sampling during the pumping season
- Conduct sediment sampling at eight locations in the fall of each year

A quality assurance/quality control program is in place to verify accuracy of monitoring data. The monitoring data are provided to Reclamation to verify full implementation of the pumping and monitoring plan. In addition, monitoring data are provided to USFWS, CDFG, SJREC, and NLF, among others.

The monitoring program involves the participation of the MPG and several entities around the Mendota Pool (Table 2-4). The entities that have contributed to the monitoring program in the past include the SJREC, NLF, San Luis and Delta-Mendota Water Authority (SLDMWA), City of Mendota, and Spreckels Sugar Co. The participation of the MPG, SJREC, and NLF in the monitoring program is required under the terms of the Settlement Agreement. Data that are obtained by the SLDMWA as part of its responsibilities to manage the flow of water in the Mendota Pool are provided

to the MPG. The City of Mendota and Spreckels Sugar Co. are not obligated to participate in the monitoring program and have intermittently provided data when requested. Other entities that provided data for the monitoring program in 2002 include Reclamation, DWR, Mendota Biomass, James Irrigation District (JID), Aliso Water District, and Gravelly Ford Water District. Data collected by these entities are provided to the MPG for compilation and analysis.

The data are summarized in an annual monitoring report prepared jointly by the MPG, SJREC, and NLF at the conclusion of the pumping season. The results of the monitoring program will be used in the design of the subsequent year's pumping program.

2.1.3 No Action Alternatives

Two No Action alternatives are described in this section. These alternatives assume that Reclamation does not allow the proposed exchange of groundwater pumped into the Mendota Pool for water taken from the DMC at Check 13. Therefore, the MPG would not be able to obtain supplemental (i.e., exchanged) water via the SLC for delivery to lands in portions of WWD and SLWD.

The No Action alternatives assume the continuation of WWD's efforts to secure water transfers and implement its water conservation program. The current level of groundwater pumping for local use by farmers and others in the Mendota region would remain without the action.

The MPG members would independently seek to obtain water from other sources in order to maintain agricultural production to the fullest extent possible. This EIS considers two options that are the most feasible and could be implemented by the MPG. These options are:

- New Well Construction – in SLWD and WWD to provide 25,000 acre-feet of groundwater per year.
- Land Fallowing – temporary removal of land from production and reallocation of water to other land under production.

These options are discussed in more detail below. In addition to these alternatives, the MPG could continue to pump up to 9,000 acre-feet per year into the Mendota Pool for exchange or trade with other users around the Mendota Pool or conveyed to WWD via Laterals 6 or 7 (Table 2-1). The amount of water traded would depend on the amount of water available from existing Reclamation CVP contractors receiving CVP project water at the

Mendota Pool, cropping patterns, availability of conveyance capacity, and the amount of land fallowed. This action would not require any State or Federal permits.

In the analysis presented in this EIS, the Well Construction and Land Fallowing options will be treated as independent actions. In reality, individual members of the MPG may either choose of these options or choose some combination of the two. A comparison of the total pumpage for each alternative over the 10-year program is provided in Table 2-5.

2.1.3.1 New Well Construction

To compensate for the 25,000 acre-feet of water that would have been provided through the exchange with Reclamation, the MPG members may choose to install new wells in WWD and SLWD to provide irrigation water for overlying lands. These wells would likely tap water from below the Corcoran Clay where water quality is generally better than in the aquifer above the Clay.

The irrigation season in WWD and SLWD typically extends from June through August (92 days) (Jones and Stokes, 1995). As the typical well capacity in WWD is approximately 2.5 cfs (M. Carpenter, 2002, pers. comm.), it would require approximately 55 wells operating at full capacity throughout the irrigation season to provide the required 25,000 acre-feet of water. Due to the need to provide water during certain peak portions of the year, or due to the higher demands of certain crops (e.g., cotton), as many as 125 wells could be required. The wells would be installed adjacent to the fields to be irrigated or linked to the WWD or SLWD distribution systems. This alternative also assumes that during the years when anticipated allocations are greater than 60 percent of full allocation (i.e., wet years), these wells would not be pumped, as sufficient surface water supplies would be available from Reclamation.

This alternative would require additional piping to distribute water to the fields or to connect to existing WWD or SLWD distribution systems. The wells would be high-efficiency wells with a limited perforation interval. A typical well would be approximately 1000 feet deep and powered by a 250 horsepower electric motor.

This alternative would not be subject to the design constraints or monitoring program requirements of the proposed action.

2.1.3.2 Land Fallowing

This alternative would compensate for the 25,000 acre-feet of water that would not be provided through the exchange with Reclamation by fallowing an amount of land equivalent to that which could have been irrigated by 25,000 acre-feet of water. The lands irrigated by the MPG in WWD and SLWD typically require three acre-feet of water per acre of land per year to maintain production (M. Carpenter, 2001 pers. comm.). Fallowed land requires approximately 0.5 acre-foot of water per year for weed suppression activities. Therefore, the farmers could reallocate approximately 2.5 acre-feet of water per acre of land fallowed. In order to compensate for the 25,000 acre-feet of water that would not be exchanged, a total of 10,000 acres would need to be fallowed on an annual basis. This alternative also assumes that during the years when anticipated allocations are greater than 60 percent of full allocation (i.e., wet years) no land would be fallowed, as sufficient surface water supplies would be available from Reclamation.

This alternative would not require construction of any additional wells or distribution facilities. This alternative would not be subject to the design constraints or monitoring program requirements of the proposed action.

2.1.4 Alternatives Removed from Further Consideration

An alternative that would shift some pumpage from dry years to wet years was initially considered. This alternative would be substantially similar to the Proposed Action with the exception of changes to the amounts of dry and wet year pumping. Both the total amount of water to be pumped over the 10-year period (269,000 acre-feet) and the amount of water to be exchanged with Reclamation over the 10-year period (200,000 acre-feet) would be the same as in the proposed action.

In this alternative, dry years would be treated identically to normal water supply years. During dry years, up to 31,600 acre-feet of water would be pumped for exchange, with up to 25,000 acre-feet exchanged with Reclamation. During each of the two wet years, up to 8,400 acre-feet would be pumped for exchange with others around the Mendota Pool. No water would be exchanged with Reclamation during the wet years.

This alternative was rejected because it would require modification of the terms of the Settlement Agreement.

2.2 DESCRIPTION OF PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS NOT PART OF THE PROPOSED ACTION BUT RELATED TO CUMULATIVE EFFECTS

Historically, other similar groundwater conveyance programs were operated on an interim basis during the 1989-1994 drought period, when the CVP and State Water Project (SWP) water supplies to federal and state contractors were reduced. The CVP and SWP have accepted well water into the aqueduct and granted credit to their water users for future use as a means of managing and distributing scarce water supplies.

Because surface water supplies are currently limited and are expected to remain limited, most farmers in the region are expected to continue to pump groundwater to irrigate their fields. Should future events further limit the ability of the CVP and SWP to meet their water contracts, additional demands may be placed on groundwater supplies.

Limitations on MPG pumping for adjacent use are included in the Settlement Agreement and are based on the volume of transfer pumping. The MPG may pump up to 14,000 acre-feet per year (in addition to the groundwater pumped for transfer) to irrigate overlying/adjacent lands (referred to as adjacent use pumpage) (Table 2-6). This water would be used on overlying lands or lands adjacent to the Mendota Pool (Figure 1-4) and is independent of which alternative is selected.

The City of Mendota relies entirely on groundwater for its municipal supply. The City currently delivers approximately 1,600 acre-feet of water to its customers. Given the City's current rate of growth, water deliveries are anticipated to reach 2,000 acre-feet per year in 2013 and 2,400 acre-feet per year in 2025 (Hepworth 2003). Due to groundwater quality degradation, the City has entered into a lease agreement with BB Limited, and has relocated its primary water supply wells to BB Limited's property on the east side of the Fresno Slough. The agreement grants the City exclusive rights to extract water from BB Limited's property. The City has the right to extract up to 2,000 acre-feet of groundwater per year, with an option to extract up to 2,400 acre-feet per year. In exchange, the City must provide a minimum of 2,000 acre-feet of water per year from offsite sources to BB Limited. If the City should pump more than 2,000 acre-feet per year, it would be required to provide BB Limited with an equivalent amount, plus a 5 percent conveyance loss. The City will convey the water to BB Limited via the Mendota Pool from wells located on the west side of the Slough. The City intends to obtain this water from wells at Fordel, Inc. As pumpage by BB Limited in 2001 was 3,700 acre-feet, the total volume of groundwater pumpage on BB Limited's property would decrease. The volume of groundwater pumpage on the west side of the

Fresno Slough would remain relatively constant, but pumpage would shift from the City of Mendota's existing wells to other wells west of the Fresno Slough.

Industrial users such as Spreckels Sugar Co. and Mendota Biomass also depend on groundwater to operate their facilities. Other influences on groundwater quality include seepage from Spreckels Sugar Co. wastewater ponds and City of Mendota sewage treatment facilities.

Numerous users have historically required water deliveries through the Mendota Pool during the fall months (October to December), including JID, Tranquillity Irrigation District (TID), Fresno Slough Water District (FSUD), and the MWA. The largest of these users is the MWA, which uses the water to provide wildlife habitat. Water deliveries to users taking water from the southern portion of the Mendota Pool were 13,600 acre-feet in 1999 (2 months), 14,200 acre-feet in 2000 (3 months), and 10.700 acre-feet in 2001 (2 months) (SLDMWA 2001). It is anticipated that there would be a similar demand in future years.

Reclamation's San Luis Drainage Feature Re-evaluation Project (Reclamation 2002) re-evaluates the options for providing drainage service to the San Luis Unit of the CVP to achieve long-term, sustainable salt and water balance in the root zone of irrigated lands in the San Luis Unit. Poor subsurface drainage conditions have developed in the Valley due to the clay soils beneath the fields that prevent irrigation water from percolating deeper into the soil and away from crop roots. This results in higher water tables causing irrigation water to accumulate in the shallow root zone, thus threatening farmlands. Reclamation has identified the following alternatives to collect and remove shallow ground water from the root zone. The alternatives are as follows:

- In-Valley Disposal with five sub-alternatives that constitute disposal of drain water and salts in or near the drainage-affected area, possibly with prior treatment to remove selenium or other constituents.

- Out-of-Valley Disposal constitutes transport of drain water to the Pacific Ocean (four sub-alternatives), Delta (three sub-alternatives), or San Joaquin River, possibly with treatment to remove selenium or other constituents, and

- Beneficial and/ or Commercial Use with five sub-alternatives that constitute use of treated drain water for irrigation, municipal, or other uses and potential commercial use of removed salts.

WWD's Proposed Land Retirement (Economic Insights et al., 2003) addresses two serious problems confronting Westlands:

- inadequate drainage on lands overlying shallow ground water, where it rises to the surface and affects the roots of crops, reducing yields, and eventually making the land unproductive, and

- insufficient and increasingly unreliable water supply.

WWD has analyzed potential economic impacts of various options (Economic Insights, 2003). The land retirement proposal is viewed as a potential opportunity for solving the dual problems of drainage and worsening water supply reliability. The U.S. would purchase up to 200,000 acres of drainage-impacted lands from willing individual landowners, permanently removing the land from irrigated agricultural production. The lands would be put to beneficial uses such as wildlife habitat, dry land farming, or related economic development activities. The lands would be managed in ways compatible with continuing agriculture on the remaining farmlands.