San Joaquin River Exchange Contractors GSA

City of Newman GSA
City of Gustine GSA
City of Los Banos GSA
City of Dos Palos GSA
City of Firebaugh GSA
City of Mendota GSA
Turner Island Water District-2 GSA
County of Madera-3 GSA
Portion of Merced County – Delta-Mendota GSA
Portion of Fresno County – Management Area B GSA

Groundwater Sustainability Plan

for the

San Joaquin River Exchange Contractors GSP Group

in the

Delta-Mendota Subbasin (5-022.07)

June 2022

DELTA-MENDOTA SUBBASIN (5-022.07)

Groundwater Sustainability Plan for:

NEWMAN • GUSTINE • LOS BANOS • DOS PALOS • FIREBAUGH • MENDOTA • TURNER ISLAND WD • MERCED/FRESNO/MADERA COUNTIES • SJR EXCHANGE CONTRACTORS

San Joaquin River
Exchange
Contractors
GSP Group

June 2022

Pursuant to the Professional Engineers Act, and California Code of Regulations, Title 23, Division 2, Chapter 1.5, Subchapter 2, I, Jarrett Martin, affix my professional seal to the following Sections of the enclosed Groundwater Sustainability Plan: Sections 2.2.3, 2.2.5, 7.2, 8.2, 9.2, 10.2, 11.2, 12.2, 13.2, 14.2, 15.2, and 16.2. In accordance with applicable regulations, those portions of the Plan bearing my seal have been prepared in accordance with engineering professional standards of practice.

REGISTERED PROFESSIONAL ENGINEER
Jarrett Wade Martin
No. C 82048
Expires: 3/31/2024
CIVIL
STATE OF CALIFORNIA

Jarrett Wade Martin
California Professional
Civil Engineer No. 82048

EXECUTIVE SUMMARY

The Executive Summary provides a brief history of the San Joaquin River Exchange Contractors Groundwater Sustainability Agency (SJREC GSA) and the San Joaquin River Exchange Contractors Water Authority (SJRECWA or Exchange Contractors) and its member entities; Central California Irrigation District (CCID), San Luis Canal Company (SLCC), Firebaugh Canal Water District (FCWD) and Columbia Canal Company (CCC). The historical groundwater conditions are described along with historic groundwater management. The SJREC have managed groundwater sustainability which will be further described in the executive summary coupled with Sustainable Management Criteria (SMC). The GSA's partnering to develop this plan include: San Joaquin River Exchange Contractors GSA, City of Newman GSA, City of Gustine GSA, City of Los Banos GSA, City of Dos Palos GSA, City of Firebaugh GSA, City of Mendota GSA, Turner Island Water District – 2 GSA, County of Madera – 3 GSA, a Portion of the Fresno County Management Area B GSA and a portion of the Merced County – Delta-Mendota GSA. This GSP used the GSP Annotated Outline prepared by DWR as the genesis for the organization of content. Section 1 – Section 2.2.2 and Section 6 covers the SJREC GSP Group in its entirety with a major focus on the SJREC GSA covering almost 90% of the plan area. Section 2.2.3 – Section 5 is specific to the SJREC GSA. Each GSA will have its own discrete section for Water Budgets, SMC and Projects and Management Actions; Section 7 – Section 16. The final Section of this plan is the Appendices which are used to provide supporting documentation. Appendix B describes the Common Chapter for each GSP in the Delta-Mendota Subbasin which provides details on how each GSP in the Delta-Mendota Subbasin has coordinated to provide an overall sustainable plan for the subbasin. The Table of Contents can be used as a guide to organization of this GSP.

ES1 INTRODUCTION

In the 1860's, John Bensley had a vision of digging the "Great Canal" from Mendota Pool north with aspirations of developing a barge traffic system from Tulare Lake to the Sacramento-San Joaquin Delta. The first 40 miles of the canal was constructed from Mendota to the confluence of the Los Banos Creek. During this time America was struggling with the post Civil War era and there was a financial panic which caused the cash flow to complete the barge traffic system to be discontinued. However, there was another man with a more practical vision for the area. By 1871, Henry Miller owned a large tract of land near the San Joaquin River and was fully developing all of the Riparian and Appropriative water rights on the San Joaquin River. Henry Miller purchased the Great Canal and expanded the facilities another 40 miles north. The Great Canal is still in use today and is the CCID Main Canal. This was at the genesis of development of water rights in California.

Fast forward to the post World War 1 America and the Federal Government had a vision of developing water supply to the eastside of the Central Valley. The vision was to construct a dam and reservoir on the San Joaquin River and divert flows into new facilities for delivery from Madera County south to Kern County. The major concern was Henry Miller had fully developed the water rights on the San Joaquin River. Ultimately, in 1939 Henry Miller sold the high flow water rights to the federal government under the "Purchase Contract". The low flow water rights were retained by Henry Miller but through an agreement known as the "Exchange Contract", the water right would not be exercised so long as the federal government delivered a substitute water supply. This exchange allowed for the development of surface water on the eastside of the valley.

Ultimately, the Miller and Lux holdings were formed into four entities that maintained the historic water rights. The CCID was formed in 1951 and is the successor to the San Joaquin and Kings River Canal & Irrigation Company. The SLCC was formed in 1913. The CCC was formed in 1926. The Panoche Canal Company was incorporated in 1914 and was succeeded by the Firebaugh Canal Company in 1921. The Firebaugh Canal Company was succeeded by FCWD in 1988 and the district has remained the FCWD to date.

The groundwater around the City of Dos Palos, a Severely Disadvantaged Community (SDAC), was of poor quality. In 1936, the predecessor to CCID agreed to deliver surface water to the City of Dos Palos. In the late 1980's and early 1990's, CCID partnered with the local communities to jointly study and manage groundwater to ensure reliability for the communities that are completely dependent on groundwater. Those communities include: Newman (a DAC), Gustine (a DAC), Los Banos (a DAC), Firebaugh (a SDAC) and Mendota (a SDAC). The cities looked to CCID and the Exchange Contractors for a partnership to develop groundwater management strategies to promote long-term drinking water supply for these DAC's. Each City met with the SJREC to discuss a collaborative effort to implement the requirements set forth in the SGMA. Each City determined that it was their independent best interest to form their own GSA. The SJREC GSA agreed to take the lead developing a joint GSP. Historically, CCID shared the costs to develop the groundwater studies around the City. Consistent with historical practice, the SJREC GSA agreed to offset the cost for the City section in the SJREC GSP through a 50% cost share and further reduce costs to the cities by offsetting expenses with the SGWP grant received by the SJREC GSA.

The SJREC also have a great partnership with Grassland Water District (GWD) and the state and federal refuge complex in the Delta-Mendota Subbasin. Most of the water provided to the habitat in GWD and the refuges is delivered through the SJREC facilities. From 2009-2018, the SJRECWA wheeled about 200,000 acre-feet per year on average to the grassland area. The SJREC value the ecological importance of the Great Grassland Area and its significance to the Pacific Flyway for migratory waterfowl and the habitat it provides for endangered species. The Exchange Contractors are partnering with GWD on several local water resource projects to efficiently put more water to beneficial use in the area and help the United States Bureau of Reclamation (USBR) meet the water supply requirements prescribed in the Central Valley Improvement Project (CVPIA).

The SJREC have been working on water resource management projects with the four counties in the service area; Stanislaus County, Merced County, Madera County and Fresno County. This long partnership working jointly on water resource management with the Cities, Counties and refuges have afforded this SJREC GSA a great relationship to cooperate and solve regional problems. The SJREC have a proven track record of consulting with these parties and developing a strategic vision that benefits the area holistically.

The Sustainability Goal is defined as the existence and implementation of one or more GSP's that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin (or plan) is operated within its sustainable yield. Sustainable Yield is defined as managing groundwater that culminates in the absence of undesirable results by 2040. The SJREC GSP Group will manage the sustainability goal consistent with the Sustainable Management Criteria described in Section 3 of this plan.

ES2 BASIN SETTING

The genesis of drafting the Basin Setting for the SJREC GSP Group started in the 1990's when the San Joaquin River Exchange Contractors Water Authority (SJRECWA) worked with Kenneth D. Schmidt and Associates (KDSA) on to develop reports on groundwater conditions in and around the Exchange Contractors service area. The groundwater conditions were further studied with KDSA in collaboration with the cities within the Exchange Contractors service area. These reports are referenced in Section 6 of this plan.

The Cities (Newman, Gustine, Los Banos, Dos Palos, Firebaugh, Mendota) and Counties (Merced, Madera, Fresno) have land use planning authority and are each respectively members of this GSP. This plan, consistent with the SGMA, reaffirms the land use planning authority maintains with the appropriate City and County and is a continuation of historical collaboration to manage water resources. The monitoring and management actions proposed in this plan have mostly been in place for years with coordination of the local agencies.

The Delta-Mendota Subbasin is part of the Central Valley Basin and extends from the town of Tranquility in the south up to the near the City of Tracy in the north and covers about 750,000 acres. The subbasin has two principal aquifers throughout the majority of the area separated by an aquitard termed the Corcoran Clay. The Upper Aquifer is typically the unconfined area above the Corcoran Clay. The Lower Aquifer is the confined area below the Corcoran Clay. The depth to the Corcoran Clay in this GSP ranges from a depth of 100 feet to 450 feet below ground surface. The Corcoran Clay is deepest to the south and pinches out near the western boundary of the plan area. The definable bottom of the basin is consistent with the 1973 United States Geologic Survey report defined as an electrical conductivity of 3,000 micromhos per centimeter at 25°C to delineate the regional base of the fresh groundwater in the San Joaquin Valley. The depth below ground to the definable bottom of the basin ranges from 300 feet to 800 feet deep.

The primary beneficial users of groundwater are for agriculture and municipal water supply. Additional users of groundwater include domestic water supply, industry use and Groundwater Dependent Ecosystems (GDE). The lateral flow of groundwater in the upper aquifer generally flows to the east. In dry years there is a hydraulic divide in Stanislaus County and in Fresno County south of Dos Palos where water from the SJREC GSP Group flows to the west from the western boundary and flows east from the eastern boundary (refer to Appendix I for further details). In the lower aquifer groundwater typically flows east from the northern portion of the plan area. The southern portion of the plan area has lateral groundwater outflow from the lower aquifer to the south along the southwestern border and to the northeast from the eastern border. The lateral outflow of groundwater from the SJREC GSP area is indicative of sustainable pumping within the plan area. This is due to the significant recharge provided by the SJREC GSA. The primary sources of recharge include deep percolation of irrigation water and seepage from the unlined canals/ditches in the area. Additionally, some recharge is provided by precipitation and also recharge and recovery projects.

The SJREC hold senior water rights on the San Joaquin River. In 1939, the predecessors to the Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District and Columbia Canal Company, collectively referred to as the San Joaquin River Exchange Contractors (SJREC), entered into an agreement with the federal government to not exercise their water rights on the San Joaquin River in exchange for a substitute water supply currently delivered via the Delta-Mendota Canal. The contract is commonly referred to as the “Exchange Contract”. The primary water supply for this GSP is the surface water supply of the SJREC. The historic water budget for the Delta-Mendota Subbasin was defined as Water Years 2003-2012. This time period represented a near normal 10-year hydrologic cycle. The most accurate method to estimate changes in groundwater storage is to evaluate water level trends and specific yields for the upper aquifer. The SJREC GSP reviewed the results of the water budget analysis and compared to the measured changes in groundwater levels to double check the results of the computational water budget. The change in groundwater storage for the historic water budget averaged -13,000 acre-feet/year for the upper aquifer. The current water budget year was defined as Water Year 2013 and an overdraft of 37,000 acre-feet was observed. After the current water year, California entered into a record drought that had devastating impacts across the state. Even after going through the worst drought on record, the water levels in the SJREC service area had fully recovered by 2019 indicating full recovery of groundwater storage in the upper aquifer. The projected water budget followed sequentially after the current year and represents Water Years 2014-2070. Actual data was used in the projected water budget for years 2014-2017. To represent a long hydrologic cycle, historic data from Water years 1965-2017 were used as a baseline for conditions. Once the baseline was established, impacts from Climate Change and population growth were used to refine the projected modeled water budget. Additionally, existing projects and projects under development were analyzed. The net result of the projected water budget shows no change in groundwater storage for the upper aquifer through the planning and implementation horizon (2070). The lower aquifer water budget has significantly fewer parameters than the upper aquifer. Primarily the water budget consists of: 1) extractions from the lower aquifer, 2) flow through the Corcoran Clay between the upper and lower aquifers, 3) lateral groundwater inflow and 4) lateral groundwater outflow. It should be noted that a confined aquifer cannot simply add these four parameters together to determine the change in storage. The most accurate method to determine the change in groundwater storage of the lower aquifer is to determine how much subsidence has occurred below the Corcoran Clay which reduces the total volume of groundwater that can be stored. Inelastic land subsidence causes a permanent reduction in groundwater storage in the lower aquifer. As described in further detail later in this plan, the SJREC GSP have very minimal groundwater extractions that are well below the established sustainable yield for the subbasin. The change in groundwater storage for the historic, current, and projected water budgets are respectively -10,000 acre-feet/year, -24,000 acre-feet, and -5,000 acre-feet/year. Land subsidence outside the Delta-Mendota subbasin is causing impacts in the Delta-Mendota Subbasin. The SJREC are working on several projects to mitigate land subsidence and further details are discussed in the plan. The key assumption in the projected water budget is that areas causing significant land subsidence outside the SJREC GSP area, will begin to ramp down their pumping from the lower aquifer to the point where subsidence has been mitigated between the 2030 and 2035 GSP updates.

Establishment of groundwater management areas for the SJRECWA was recommended by KDSA in the 1997 AB 3030 Groundwater Management Plan. That recommendation has carried through from the AB 3030 Groundwater Management Plan to the SGMA required Groundwater Sustainability Plan. In an effort to avoid confusion, the historic management areas established in 1997 will be reclassified, this GSP will refer to those “management areas” as “monitoring zones”. This update is done in coordination with DWR staff to address deficiency #4. Removing the (11) management areas from the SJREC GSP will simplify review on how SMC’s will allow for sustainable groundwater management through the planning and implementation horizon.

ES3 SUSTAINABLE MANAGEMENT CRITERIA

The indication of sustainable groundwater management is defined as the absence of Undesirable Results. The path to sustainability starts with good data. The SJREC started collecting groundwater data in the 1960's. With each passing decade, the SJREC sharpened their knowledge of the local groundwater conditions to the point where the area was operated under a groundwater management plan accompanied by annual groundwater assessments reports. With a broadening understanding of the groundwater conditions, the SJREC were monitoring the data and were able to implement groundwater management that was protective of the aquifers. Experience successfully managing groundwater leads to an understanding of the sustainability goal and how to maintain sustainable management criteria to less than significant and unreasonable.

The next step in the process is to define what constitutes significant and unreasonable. With good data and an understanding of the sustainability goal for the plan, the SJREC developed minimum thresholds to meet the goals set forth. The next step was to establish measurable objectives to provide operational flexibility to the beneficial users of groundwater, accounting for annual fluctuations of hydrology. With a good understanding of the operational bookends, the SJREC expanded their historic groundwater management strategies to comply with the SGMA.

Chronic lowering of groundwater is best managed through establishing water levels that trigger a management action to mitigate the risk of water levels declining to the minimum threshold. For the SJREC GSP, a trigger water level has been suggested to limit groundwater extractions leaving the monitoring zones when water levels have declined below the trigger level. This management was in place in the impacted areas during the drought of 2013-2016 and was successful in limiting aquifer impacts. By 2019, the water levels had fully recovered without any significant or unreasonable impacts.

The SJREC have managed and will continue to manage a reduction in groundwater storage consistent with the triggers established to keep water levels from chronically lowering. Furthermore, the SJREC recharge more surface water than they extract and have a positive impact on groundwater storage. The impacts of climate change have been included in this plan and will be monitored to maintain sustainability.

The Delta-Mendota Subbasin is unlikely to experience seawater intrusion and therefore sustainable management criteria have not been established for this sustainability indicator.

Degraded water quality is managed to mitigate the impacts of the migration of poor quality water from lands outside of this GSP. The Camp 13 area of CCID and FCWD have been actively mitigating the impacts of drainage water entering the service area. These projects principally either blend the poor quality water with surface, dispose of the drainage water to the San Joaquin River Improvement Project (SJRIP) or through groundwater elevation control of tile drainage lines to keep the root zone from being inundated by the drainage water.

In the Delta-Mendota Subbasin, inelastic land subsidence is caused by groundwater extractions from the lower aquifer. The SJREC are pumping well below the sustainable yield of the lower aquifer established for the subbasin. The SJREC have been impacted by groundwater pumping from outside its service area.

The SJREC has developed measurable objectives and interim milestones to address depletions of interconnected surface water and groundwater. Rather than developing a plan to mitigate a problem after the problem has presented itself, the SJREC GSP group has proposed to work with the counties to develop well construction standards to fully mitigate the potential for wells installed near the San Joaquin River to have an impact to the surface water flows.

ES4 PROJECTS AND MANAGEMENT ACTIONS

The SJREC has been actively managing groundwater conditions and independently have sustainable resource as described in Sections ES2 and ES3 above. The projects described in this plan are part of the SJRECWA Water Resources Plan. In 2012, the SJREC modeled the reliability to receive their surface water and decided that it was in their best interest, and the communities and habitat included in this GSP, to develop a water resource plan with the goal of having 50,000 acre-feet of local dispatchable storage. The goal would offset reductions in water supply during critical years under the Exchange Contract.

The Los Banos Creek Diversion Facility is a joint project with San Luis Water District (CVP contractor), Grasslands Water District (Refuge supply) and the SJREC. This project has an average annual yield of about 7,000 acre-feet and provides benefits to the Riparian corridor along the Los Banos Creek, improves wetland habitat, flood protection to the City of Los Banos, and water supply for the Riparian water users.

The Los Banos Creek Recharge and Recovery Project provides 7,000 acre-feet of water supply to the SJREC during a Critical year under the Exchange Contract. This project also benefits the riparian corridor in portions of the Los Banos Creek and provides a water quality benefit to the City of Los Banos (DAC). In 2017, the SJREC recharged a significant amount of water as part of this project. One of the City of Los Banos supply wells is located near the creek and experienced a reduction in hexavalent chromium due to the recharge of better quality water from the project. Furthermore, the domestic well users in the area reached out to the SJREC and were pleased to see the water level in their wells become shallower which reduces the cost to pump the water for their use. These projects will recharge more water than will be extracted, contributing to an improved overall water budget.

The Los Banos Creek Storage Project is another joint project with San Luis Water District, Grasslands Water District and the SJREC. This project will increase the beneficial use of the Los Banos Creek Detention Reservoir by making releases during the flood control season and provide that water to the Riparian landowners. These releases will also increase the flood protection. The project will provide 8,000 acre-feet of water supply to the SJREC during a Critical year under the Exchange Contract. In all other years, the SJREC will make the 8,000 acre-feet stored in the reservoir available to Grasslands Water District and San Luis Water District.

The Orestimba Creek Recharge and Recovery Project is a joint project with Del Puerto Water District and provides about 7,500 acre-feet of water supply to the SJREC during a Critical Year under the Exchange Contract. This project also provides a flood protection benefit to the City of Newman (DAC). These projects will recharge more water than will be extracted, contributing to an improved overall water budget.

The BB Limited and Farmers Water District Recharge Projects both have the ability to capture and recharge flood flows which will help reduce the potential flooding impact to the City of Firebaugh (SDAC) during high flow events from either the San Joaquin River or Kings River through the Fresno Slough. These projects will provide the SJREC about 8,000 acre-feet of water supply during a Critical year under the Exchange Contract. These projects will recharge more water than will be extracted, contributing to an improved overall water budget.

These projects combine to provide the SJREC with about 30,000 acre-feet of water supply during a Critical year under the Exchange Contract. This supply would have historically used groundwater to meet demand. The implementation of these projects will offset groundwater impacts during critically dry years by using stored water from these projects. The overall groundwater conditions are expected to improve as a result of these projects since some water will be left behind as a contribution to the local aquifers.

Another project the SJREC are participating in is the Red Top Area Subsidence Mitigation project. This project is helping to solve a regional problem that has impacted the SJREC due to groundwater extractions outside the SJREC service area and also outside of the Delta-Mendota Subbasin. The project includes the installation of recharge basins, facilities to capture and use flood flows and a pipeline under the San Joaquin River to deliver surface water to the Red Top area on the eastside of the river. Much of the area has recently used extractions from the lower aquifer to meet irrigation demands. This pumping has caused significant subsidence. The SJREC reached out to the landowners in the Red Top area to assess the problem and develop a vision to mitigate subsidence. The general concept is to capture flood flows and either recharge the upper aquifer or directly apply the water to meet crop demand (in-lieu recharge). The recharged water will create underground storage that can be used in later years. The subsidence reduction is achieved by abandoning wells in the lower aquifer and drilling shallower wells to use the recharged water in the upper aquifer. In 2017, almost 50,000 acre-feet was recharged directly and in-lieu of pumping groundwater. In 2018, an additional 10,000 acre-feet of surface water was put to beneficial use on the ranch. The current project is about 50% complete and the subsidence rate at Sack Dam (SLCC headworks) has reduced from 0.5’/year to 0.15’/year. Once the project is complete, the subsidence is expected to reduce to background levels.

The SJREC also have several management actions that were in place prior to the SGMA. One valuable management is the Annual Groundwater Assessment Report that reviews groundwater conditions for the SJREC monitoring zones. Each year the report is updated to track and compare the current year conditions with historical observations. The report includes water level trends, water quality trends, well pumping volumes, and well pump tests. Kenneth D Schmidt and Associates (KDSA) prepares an analysis of the groundwater conditions for the current year and makes recommendations on specific groundwater management strategies to be implemented to maintain a healthy aquifer. Three areas have historically been impacted during drought years; Monitoring Zone A, Monitoring Zone G and the Los Banos Creek Sub-area of Monitoring Zone C. Water levels and groundwater impacts from these areas were below the established triggers in the recent drought, and it was recommended to limit extractions in these areas. As a result, the water levels fully recovered by 2019 without any significant impacts to the beneficial users of groundwater.

The SJREC allow private well owners to pump into district facilities for credit. Groundwater pumped into district facilities must meet water quality standards and have overall limits on how much groundwater can be pumped while monitoring and mitigating damage to other beneficial users. Since 2000, about 70% of the total pumping within the SJREC area has been subject to these policies and the recommendations based on the annual groundwater report. Additionally, during 2014 and 2015 about 90% of the total pumping was subject to these policies which are the years of highest stress on the local aquifers. This management has afforded the SJREC the ability to monitor and manage groundwater conditions each year, allowing KDSA to review potential problems and provide monitoring and management strategies to mitigate the potential problem.

The SJREC have periodically updated joint groundwater condition reports with the cities adjacent to the SJREC service area. These updates allow collaboration on impacts to groundwater as the cities demand on water increases to support impacts from climate change and population growth.

The SJREC have been managing groundwater quality impacts from drainage from the San Luis Unit of the Central Valley Project. The areas primarily impacted are the Firebaugh Canal Water District (FCWD) and the Camp 13 area within the Central California Irrigation District (CCID). The SGMA requires that a GSP shall not affect the ability of another GSP to achieve sustainability. In order to mitigate the water quality impacts from lands upslope, the SJREC have an active mitigation plan for the migration of shallow saline groundwater. Such projects include 1) point source control through installation of high efficiency irrigation systems and canal lining projects, 2) groundwater management including blending some poor quality groundwater, 3) installation of tile drainage systems along with a pipeline to dispose of the drain water on a reuse area and 4) potential groundwater treatment options. This management has been vital to maintain water levels below the effective root zone. Due to this poor quality groundwater migrating through the area, the cities of Firebaugh and Mendota (both are SDAC's) have worked with the SJREC do develop urban water supply wells on the East side of the San Joaquin River so they can supply safe and affordable drinking water to their residents.

Most of these projects and management actions have been in place prior to the enactment of SGMA. The SJREC are committed to continue their partnership with local agencies to better manage water resources through collaborative and inclusive projects and management actions that can benefit the whole community. Groundwater recharged by the SJREC is used to offset overdraft from the GSA's partnering in this plan.

ES5 PLAN IMPLEMENTATION

The development of the SJREC GSP is estimated to cost $700,000. The SJREC GSA participated in grant funding on behalf of all of the GSA's in the SJREC GSP and have been awarded about $335,000 in Category 2 funding and also received Category 1 funding to offset costs to the Severely Disadvantaged Communities. The SJREC have been sustainably managing groundwater for decades and will continue to implement projects and management actions that will enhance the sustainability of the local aquifers and help neighboring GSA's and GSP Groups achieve and maintain sustainability.

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1.0 INTRODUCTION:

This section describes the purpose of this GSP and how each GSA will work together to meet the sustainability goal of this plan and the Delta-Mendota Subbasin. Some background information for each GSA is provided detailing the organization and management structure along with the legal and financial authority to implement this plan. DWR provided a checklist for GSP submittal which is included at the end of this section for reference.

1.1 Purpose of the Groundwater Sustainability Plan (GSP or Plan)

In 1914, the California Water Commission Act was enacted to create a state water commission for control of appropriation and use of surface water. California recognizes a dual doctrine system that allows both Riparian and Appropriative water rights. Appropriated water rights have seniority based on "first in time, first in right". One-hundred years after enacting the Water Commission Act, Governor Edmund G. Brown Jr., signed a group of three bills collectively known as the Sustainable Groundwater Management Act (SGMA) into law in September 2014. SGMA established a framework for local agencies to develop a Groundwater Sustainability Agency (GSA) to sustainably manage groundwater through implementation of a Groundwater Sustainability Plan (GSP). All high and medium priority basins, as defined in the Department of Water Resources Bulletin 118, must have complete GSA coverage by June 30, 2017. Failure to have full GSA coverage by the deadline allows the State Water Resources Control Board (State Board) to deem that basin "probationary" and assess non-compliance fees to fund the review of annual groundwater extractions and the development of an interim plan for the basin. Critically overdrafted high and medium priority basins must be managed under a GSP by January 31, 2020. If a basin is not managed under a GSP or the GSP is inadequate to achieve sustainability, the State Board may designate that basin as probationary and assume the management responsibility. The goal of SGMA is to have sustainably managed groundwater within 20 years of the initial GSP submittal and maintain sustainability for a 50-year planning and implementation horizon. Each basin must submit annual progress reports to DWR for analysis. An updated GSP must be submitted to DWR starting in 2025 and every year thereafter that ends in a (0) or a (5).

DWR is responsible for developing regulations to modify groundwater basin boundaries. California's existing groundwater basins and subbasins are described in DWR's Bulletin 118 and have been revised based on the best available information during each update. The Basin Boundary Modification (BBM) process builds off historical knowledge of the basin and provides a mechanism to modify boundaries based on new scientific information and local groundwater management knowledge to improve coordination and promote statewide sustainable groundwater management. The legislative intent and fundamental goal of SGMA is for groundwater to be managed locally. Successful groundwater management may, at times, require a BBM based on scientific and/or jurisdictional justification. A scientific modification is based on the geologic or hydrologic conditions that define that basin. A jurisdictional modification is based on coordination of local agencies t implement strategies towards sustainable groundwater management.

Local groundwater management is best achieved with involvement of stakeholders. Outreach is critical for successful implementation of the SGMA. Each GSP shall include a summary of information relating to notification and communication by the GSA to other stakeholders. Some stakeholders include:

- State, Federal and Tribal Governments: Governor's Administration, Legislature and key State and federal agencies, tribes
- Regional and local governments and agencies: Water and groundwater management agencies and districts; land use entities such as counties and cities
- Other stakeholders: Non-governmental organizations representing water, groundwater, environmental, environmental justice, and agriculture interests as well as universities
- The public

SGMA requires that each basin prepare a GSP(s) consistent with the goals of the legislation. All of the GSA's in a basin must coordinate implementation efforts to comply with the GSP regulations. As of 2018, DWR published the first six Best Management Practices (BMP's) to provide guidance to help GSA's develop essential elements of a GSP. BMP refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science. A GSA may use BMP's established by DWR or develop their own BMP's. BMP's will provide a consistent framework on data collection and management for the basin. The following is a list of currently available DWR published BMP's.

- BMP 1 – Monitoring Protocols Standards and Sites
- BMP 2 – Monitoring Networks and Identification of Data Gaps
- BMP 3 – Hydrogeologic Conceptual Model
- BMP 4 – Water Budget
- BMP 5 – Modeling
- BMP 6 – Sustainable Management Criteria (DRAFT)

The SGMA established six Undesirable Results that, if applicable, must be sustainably managed. Triggers and thresholds may be established to prevent the occurrence of Undesirable Results in the basin. Those Undesirable Results include:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon.
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Depletions of interconnected surface water that has significant and unreasonable adverse impacts on beneficial uses of the surface water.

1.1.1 Key Definitions

- Refer to California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 1.5 Groundwater Management, Subchapter 2. Groundwater Sustainability Plans, Article 2. Definitions, § 351. Definitions.
- **GSP Group** – Collection of GSA's working together to prepare a Groundwater Sustainability Plan

- **San Joaquin River Exchange Contractors GSP Group** – The following group of GSA's working together to develop a GSP in the Delta-Mendota Subbasin: SJREC GSA, City of Newman GSA, City of Gustine GSA, City of Los Banos GSA, City of Dos Palos GSA, City of Firebaugh GSA, City of Mendota GSA, TIWD GSA, Madera County – 3 GSA, Portion of Merced County – Delta-Mendota GSA, and Portion of Fresno County Management Area B GSA
- **Shallow Zone/Aquifer** – locally termed aquifer above the A-Clay
- **Deep Zone/Aquifer** – locally termed aquifer between the A-Clay and Corcoran Clay

1.1.2 Acronyms

- **AB 3030 – 1992 California Assembly Bill 3030**
- **AWMP – Agriculture Water Management Plan**
- **BMP – Best Management Practices**
- **CASGEM – California Statewide Groundwater Elevation Monitoring**
- **CCC – Columbia Canal Company**
- **CCF – Climate Change Factors**
- **CCID – Central California Irrigation District**
- **CDFW – California Department of Fish and Wildlife**
- **CFS – Cubic Feet per Second**
- **CVP – Central Valley Project**
- **CVRWQCB – Central Valley Regional Water Quality Control Board**
- **DAC – Disadvantaged Community**
- **DMC – Delta-Mendota Canal**
- **DPDD – Dos Palos Drainage District**
- **DPWD – Del Puerto Water District**
- **DWR – California Department of Water Resources**
- **ET – Evapotranspiration**
- **ET_c – Total Crop Evapotranspiration**
- **ET_{iw} – Crop Evapotranspiration of Irrigation Water**
- **ET_{misc} – Miscellaneous Evapotranspiration including; canal evaporation, consumptive use of phreatophytes, etc.**
- **ET_{precip} – Evapotranspiration from precipitation**
- **FCWD – Firebaugh Canal Water District**
- **FNF – Full Natural Flow**
- **GDD – Gustine Drainage District**
- **GDE – Groundwater Dependent Ecosystem**
- **GPM – Gallons Per Minute**
- **GRCD – Grassland Resource Conservation District**
- **GSA – Groundwater Sustainability Agency**
- **GSP – Groundwater Sustainability Plan**
- **GWD – Grassland Water District**
- **GWMP – Groundwater Management Plan**
- **HCM – Hydrogeologic Conceptual Model**
- **HMRD – Henry Miller Reclamation District**

- **ILRP – Irrigated Lands Regulatory Program**
- **IRWMP – Integrated Regional Water Management Plan**
- **JPA – Joint Powers Authority**
- **KDSA – Kenneth D. Schmidt & Associates**
- **LSCE – Luhdorff and Scalmanini Consulting Engineers**
- **MAF – Million Acre-Feet**
- **KDSA – Kenneth D. Schmidt and Associates**
- **NASA JPL – National Aeronautics and Space Administration Jet Propulsions Laboratory**
- **P&P – Provost and Pritchard Consulting Group**
- **SAGBI – Soil Agriculture Groundwater Banking Index**
- **SB 372 – 2017 California Senate Bill 372**
- **SGMA – Sustainable Groundwater Management Act**
- **SGWP – Sustainable Groundwater Planning**
- **SJREC – San Joaquin River Exchange Contractors**
- **SJREC GSA – San Joaquin River Exchange Contractors Groundwater Sustainability Agency**
- **SJRECWA – San Joaquin River Exchange Contractors Water Authority or Exchange Contractors**
- **SJRIP – San Joaquin River Improvement Project**
- **SJRRP – San Joaquin River Restoration Program**
- **SLCC – San Luis Canal Company**
- **SLDMWA – San Luis and Delta-Mendota Water Authority**
- **SLWD – San Luis Water District**
- **SMC – Sustainable Management Criteria**
- **SWP – State Water Project**
- **SWRCB – State Water Resources Control Board**
- **TAF – Thousand Acre-Feet**
- **TIWD – Turner Island Water District**
- **TNC – The Nature Conservancy**
- **USACE – United States Army Corp of Engineers**
- **USBR – United States Bureau of Reclamation**
- **USF&WS – United State Fish and Wildlife Service**
- **USGS – United States Geological Survey**
- **UWMP – Urban Water Management Plan**
- **WSIP – Water Storage Investment Program**
- **WWD – Westlands Water District**
- **WWTF – Waste Water Treatment Facility**

1.2 Sustainability Goal

Each Agency shall establish in its Plan a sustainability goal for the basin the culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.

For a more in depth analysis of the sustainability goal of this plan refer to Section 3.1. The SJREC GSP Group has developed this plan to achieve independent plan sustainability while also working with the other GSP's in the Delta-Mendota Subbasin to coordinate the plans together to achieve sustainability for the subbasin. The Delta-Mendota Subbasin Sustainability Goal is further described in the Delta-Mendota Subbasin Common Chapter; Appendix B.

1.3 Agency Information

1.3.1 SJREC GSA Information

The San Joaquin River Exchange Contractors Water Authority (SJRECWA or Exchange Contractors) was established as a Joint Powers Authority in May 1993 and consists of four water agencies, Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District and Columbia Canal Company (member entities) serving approximately 240,000 acres of prime agricultural land east of Interstate-5 and west of the San Joaquin River with about 16,000 acres situated east of the San Joaquin River. These lands span four counties: Fresno, Madera, Merced and Stanislaus, from the town of Mendota in the south to Patterson in the north. The Exchange Contractors hold some of the oldest water rights in the state which date back to the late 1800's. The rights were established by Henry Miller of the legendary Miller and Lux cattle empire. Today several of the original Miller and Lux canals continue to be operated by the Exchange Contractors entities. The Exchange Contractors mission is to monitor environmental, legislative and legal issues which may impact any of the four entities.

The Exchange Contractors' water rights are based on the riparian and pre-1914 diversions made by Henry Miller. When construction of Friant Dam of the Central Valley Project was under consideration, feasibility studies showed that no extensive development could occur on the east side of the San Joaquin Valley between Chowchilla and Bakersfield unless water could be diverted from the San Joaquin River to those areas. In the 1930's, the Exchange Contractors were asked by the United States to quantify their water rights and "exchange" their right to divert San Joaquin and Kings River water for guaranteed deliveries of "substitute" water from the Sacramento River by means of the Delta-Mendota Canal; hence the name, "San Joaquin River Exchange Contractors." In 1939, the United States Government signed two contracts with Miller and Lux and the four entities, to exchange where they exchanged use of their pre-1914 Appropriative and Riparian water from the San Joaquin and Kings Rivers for substitute water delivered from the Delta-Mendota Canal (DMC). This agreement is commonly referred to as the "Exchange Contract" and was accompanied by what is known as the "Purchase Contract". The Exchange Contractors are currently operating under the "Second Amended Contract for Exchange of Waters" executed in 1968. The Exchange Contractors did not abandon their San Joaquin River water rights. Instead, they agreed not to exercise those water rights as long as guaranteed deliveries continued to be made to them by the U.S. Bureau of Reclamation (Bureau) through the Delta-Mendota Canal or from other Bureau sources. In the event that the Bureau is unable to make its contracted deliveries of substitute water to the Exchange Contractors, the Exchange Contractors have reserved the right to return to the San Joaquin River to satisfy their historic water rights. In non-critical years under the Exchange Contract, the United States Bureau of Reclamation (USBR) will deliver of 100% of the contractual water allotment (840,000 acre-feet) and will deliver 77% (650,000 acre-feet) during critical years. This water is delivered through the DMC when available and down the San Joaquin River during those times when conveyance down the DMC cannot meet the obligations set forth in the "Exchange and Purchase Contracts".

The California Department of Water Resources (DWR) deemed the Exchange Contractors as the Exclusive GSA for the service area on March 28, 2016. The SJREC GSA, through SB 372, is the successor to the SJRECWA GSA as the exclusive GSA for the Exchange Contractor member's service area. The Exchange Contractors service area delivers water to approximately 240,000 acres. Figure 2 shows the SJREC GSP area. The SJREC members have proactively monitored groundwater pumping since the 1960's. A stable surface water supply coupled with active groundwater management has enabled sustainable groundwater management over that period.

1.3.1.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

Contact Information:

Website: http://sjrecwa.net/groundwater.html

SJREC GSA Board of Directors
Eric Fontana , Kimberly Brown (Chair), James Nickel, and Mike Stearns

San Joaquin River Exchange Contractors Water Authority & SJREC GSA
Chris White, Executive Director: cwhite@sjrecwa.net
541 H Street
Los Banos, CA 93635
(209) 827-8616

Central California Irrigation District
Jarrett Martin, General Manager: jmartin@ccidwater.org
1335 West I Street
Los Banos, CA 93635
(209) 826-1421

San Luis Canal Company
John Wiersma, General Manager: jwiersma@hmrd.net
11704 W. Henry Miller Road
Dos Palos, CA 93620
(209) 826-5112

Columbia Canal Company
Randy Houk, General Manager: rghccc@sbcglobal.net
6770 Avenue 7-1/2
Firebaugh, CA 93622
(559) 659-2426

Firebaugh Canal Water District
Jeff Bryant, General Manager: bryant_jeff@sbcglobal.net

2412 Dos Palos Road
Mendota, CA 93640
(559) 655-4761

Included herein is the contact information for the other partnering GSA's within the SJREC GSP Group

City of Newman GSA
Michael Holland, City Manager mholland@cityofnewman.com
938 Fresno Street
Newman, CA 95360
(209) 862-3725

City of Gustine GSA
Doug Dunford, City Manager ddunford@cityofgustine.com
352 Fifth Street
Gustine, CA 95322
(209) 854-9403

City of Los Banos GSA
Nirorn Than, Public Works Director Nirorn.than@losbanos.org
520 J Street
Los Banos, CA 93635
(209) 827-7056

City of Dos Palos GSA
Darrell Fonseca, City Manager cityofdp@cityofdp.com
2174 Blossom Street
Dos Palos, CA 93620
(209) 392-2174

City of Firebaugh GSA
Ben Gallegos, City Manager BGallegos@ci.firebaugh.ca.us
1133 P Street
Firebaugh, CA 93622
(559) 659-2043

City of Mendota GSA
Cristian Gonzalez, City Manager cristian@cityofmendota.com
643 Quince Street
Mendota, CA 93640
(559) 655-4298

Turner Island Water District – 2 GSA
Kel Mitchel, kel@turnerislandwaterdistrict.com
7543 North Ingram, Suite 102
Fresno, CA 93711

County of Merced Delta-Mendota GSA
Lacey McBride, Water Resources Coordinator Lacey.McBride@countyofmerced.com
2222 M Street
Merced, CA 95340
(209) 385-7654
County of Madera – 3 GSA
Stephanie Anagnoson, Director of Water and Natural Resources
stephanie.anagnoson@maderacounty.com
200 W. Fourth Street
Madera, CA 93637
(559) 675-7703

County of Fresno Management Area B GSA
Augustine Ramirez, Senior Engineer auramirez@fresnocountyca.gov
2220 Tulare Street
Fresno, CA 93721
(559) 600-4022

1.3.1.2 Legal Authority of the GSA

The SJREC GSA received Special Act Legislation (SB 372) with an update Water Code Section 10723 to include the SJREC GSA as an agency created by statute to manage groundwater and is deemed the exclusive local agency within its respective statutory boundary. Refer to Appendix A for SB 372.

1.3.1.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The Exchange Contractors are currently funding much of the obligations of the SGMA through current programs. Funding for implementing the GSP is part of the standard operating budget for the agency and will continue to be funded through those existing mechanisms. The estimated cost to develop and implement the GSP for the SJREC GSA is $505,000. Refer to Section 5.1 of this GSP for a more detailed explanation.

1.3.1.4 Contact Information of Plan Manager

The collective GSP Groups in the Delta-Mendota Subbasin, through the Coordination Agreement (Appendix B), have authorized Andrew Garcia of the SLDMWA to be the Plan Manager for the Subbasin. The contact information for John Brodie is below:

- John Brodie, Plan Manager: john.brodie@sldmwa.org
  San Luis & Delta-Mendota Water Authority
  842 6th Street
  Los Banos, CA 93635
  (209) 832-6200 / Fax (209) 833-1034

1.3.2 City of Newman GSA Information

The City of Newman was incorporated on June 10, 1908. Currently, the only source of potable water for the residents of Newman is treated groundwater. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.2.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Newman GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.2.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Newman, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on December 13, 2016. DWR deemed the GSA exclusive on March 13, 2017.

1.3.2.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Newman is $20,000. The CCID has a long-standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. Both the SJREC GSA and the City GSA intend to build off this successful partnership and develop a sustainable groundwater management plan. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.3 City of Gustine GSA Information

The City of Gustine was incorporated on November 11, 1915. Currently, the only source of potable water for the residents of Gustine is treated groundwater. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.3.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Gustine GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.3.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Gustine, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on June 23, 2017. DWR deemed the GSA exclusive on September 21, 2017.

1.3.3.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Gustine is $15,000. The CCID has a long-standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. Both the SJREC GSA and the City GSA intend to build off this successful partnership and develop a sustainable groundwater management plan. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.4 City of Los Banos GSA Information

The City of Los Banos received its first post office in 1873. Currently, the only source of potable water for the residents of Los Banos is treated groundwater. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.4.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Los Banos GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.4.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Los Banos, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on February 9, 2017. DWR deemed the GSA exclusive on May 10, 2017.

1.3.4.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Los Banos is $75,000. The CCID has a long-standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. The local CVP contractors have engaged the City of Los Banos for local water resource projects. As a result, the SJREC GSA, GWD GSA and SLWD are working with the City to develop sustainable groundwater management within the greater Los Banos area. More details on this joint effort is described in Section 9.0. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA, GWD GSA, SLWD and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.5 City of Dos Palos GSA Information

The City of Dos Palos was incorporated on May 24, 1935. Currently, the City provides treated surface water for residents. In the event of a catastrophic failure to the delivery system, the City is planning to use groundwater as an emergency supply. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.5.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Dos Palos GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.5.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Dos Palos, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on June 29, 2017. DWR deemed the GSA exclusive on September 27, 2017.

1.3.5.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Dos Palos is $5,000. The CCID has a long standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. Both the SJREC GSA and the City GSA intend to build off this successful partnership and develop a sustainable groundwater management plan. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.6 City of Firebaugh GSA Information

The City of Firebaugh received its first post office in 1865. Currently, the only source of potable water for the residents of Firebaugh is treated groundwater. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.6.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Firebaugh GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.6.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Firebaugh, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on May 18, 2017. DWR deemed the GSA exclusive on August 16, 2017.

1.3.6.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Firebaugh is $15,000. The CCID has a long-standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. Both the SJREC GSA and the City GSA intend to build off this successful partnership and develop a sustainable groundwater management plan. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.7 City of Mendota GSA Information

The City of Mendota received its first post office in 1892. Currently, the only source of potable water for the residents of Mendota is treated groundwater. With a vested interest in sustainable groundwater management, the City Council approved filing as the local GSA for the City limits.

1.3.7.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The City of Mendota GSA uses the same organization and management structure for both GSA and City operations. The three main departments engaged in development of this GSP include: Administration, Public Works and Planning.

1.3.7.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The City of Mendota, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the City limits on February 3, 2017. DWR deemed the GSA exclusive on May 4, 2017.

1.3.7.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the City of Mendota is $15,000. The CCID has a long-standing history jointly developing groundwater assessment reports and equally splitting the associated costs for the area in and around the City. Both the SJREC GSA and the City GSA intend to build off this successful partnership and develop a sustainable groundwater management plan. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the City in this Plan, will receive a portion of the SGWP grant funds. The remaining costs will be equally split between the SJREC GSA and the City GSA. The City plans to cover their share of the costs as part of their annual budget. These costs will be updated consistent with current laws and practices utilizing a rate adjustment to cover City costs.

1.3.8 Turner Island Water District-2 GSA Information

Turner Island Water District is a conjunctive use district that facilitates the delivery of water to the landowners. TIWD lies within both the Merced Subbasin (05-022.04) and the Delta-Mendota Subbasin (05-022.07). TIWD-2 GSA is the portion of the district within this GSP and the Delta-Mendota Subbasin. However, TIWD intends to maintain flexibility to deliver water to the landowners in each Subbasin. A more detailed analysis on sustainable groundwater management for TIWD is described in Section 13.0.

1.3.8.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

The TIWD-2 GSA uses the same organization and management structure for both the GSA and Water District.

1.3.8.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The TIWD, a public agency, notified the DWR of its intent to be the Exclusive GSA for the district lands in the Delta-Mendota Subbasin on March 27, 2017. DWR deemed the GSA exclusive on June 25, 2017.

1.3.8.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs
The estimated cost to develop and implement the GSP for the TIWD-2 GSA is $15,000. The SLCC and TIWD have a long-standing relationship managing surface water and groundwater. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering TIWD in this Plan will receive a portion of the SGWP grant funds. The remaining costs will be covered by TIWD. These costs will be updated consistent with current laws and practices. The TIWD implemented a landowner agreement in lieu of a Prop 218 election.

1.3.9 County of Madera-3 GSA Information
Madera County was founded in 1893. With a vested interest in sustainable groundwater management, the County Board of Supervisors approved filing as the local GSA for white areas in the Delta-Mendota Subbasin.

1.3.9.1 Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)
The County of Madera - 3 GSA uses the same organization and management structure for both GSA and County operations. The three main departments engaged in development of this GSP include: Administration, Water & Natural Resources, and Planning.

1.3.9.2 Legal Authority of the GSA
Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The County of Madera, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the white areas in the County on February 9, 2017. DWR deemed the GSA exclusive on May 10, 2017.

1.3.9.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs
The estimated cost to develop and implement the GSP for the County of Madera-3 GSA is $5,000. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the County of Madera-3 in this Plan will receive a portion of the SGWP grant funds. The remaining costs will be covered by the County. These costs will be updated consistent with current laws and practices.

1.3.10 Portion of Merced County – Delta-Mendota GSA Information
Merced County was founded in 1855. With a vested interest in sustainable groundwater management, the County Board of Supervisors approved filing as the local GSA for white areas in the Delta-Mendota Subbasin. A portion of the GSA is covered by this Plan.

1.3.10.1Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)
Merced County – Delta-Mendota GSA uses the same organization and management structure for both GSA and County operations. The three main departments engaged in development of this GSP include: Administration, Community & Economic Development, and Planning.

1.3.10.2 Legal Authority of the GSA
Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The County of Merced, a political subdivision of the State of California,

notified the DWR of its intent to be the Exclusive GSA for the white areas in the County on March 28, 2017. DWR deemed the GSA exclusive on June 26, 2017.

1.3.10.3Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the Portion of Merced County – Delta-Mendota GSA is $25,000. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the Portion of Merced County – Delta-Mendota GSA in this Plan will receive a portion of the SGWP grant funds. The remaining costs will be covered by the County. These costs will be updated consistent with current laws and practices.

1.3.11 Portion of Fresno County – Management Area B GSA Information

Fresno County was founded in 1856. With a vested interest in sustainable groundwater management, the County Board of Supervisors approved filing as the local GSA for white areas in the Delta-Mendota Subbasin.

1.3.11.1Organization and Management Structure of the Groundwater Sustainability Agency (GSA or Agency)

Fresno County – Management Area B GSA uses the same organization and management structure for both GSA and County operations. The Department of Public Works and Planning was engaged in the development of this GSP.

1.3.11.2 Legal Authority of the GSA

Any local public agency that has water supply, water management, or land use responsibilities in a basin can decide to become a GSA. The County of Fresno, a political subdivision of the State of California, notified the DWR of its intent to be the Exclusive GSA for the white areas in the County on May 30, 2017. DWR deemed the GSA exclusive on August 28, 2017.

1.3.11.3 Estimated Cost of Implementing the GSP and the GSA's Approach to Meet Costs

The estimated cost to develop and implement the GSP for the Portion of Fresno County – Management Area B GSA is $5,000. The SJREC GSA has participated in the SGWP Grant in the Delta-Mendota Subbasin on behalf of the SJREC GSP Group. The costs associated with covering the Portion of Fresno County – Management Area B GSA in this Plan will receive a portion of the SGWP grant funds. The remaining costs will be covered by the County on a pro-rata share with the SJREC GSA costs to develop and implement the GSP. It is anticipated that the County may impose extractions fees for non-minimum pumpers, through Proposition 218, to recover expenses.

1.4 GSP Organization

1.4.1 Description of how the GSP is organized

The Delta-Mendota Subbasin (5-022.07) has twenty-three GSA's working to coordinate six GSP's. Figure 1 gives a graphical representation of the governance structure for the GSA's and GSP's in the Delta-Mendota Subbasin. The GSA's held a meeting to discuss GSP coordination consistent with the requirements defined in the SGMA. The group collectively decided to form a Coordination Committee with the initial task of developing a Coordination Agreement and accompanying Cost Sharing Agreement; Appendices B and C respectively. In addition, the Coordination Committee approves recommendations of the other committees and also authorizes coordinated expenditures. The

Coordination Committee recommended the formation of a Technical Subcommittee tasked with coordinating GSP development and implementation. One recommendation from the Technical Subcommittee was for all six GSP's to have a Common Chapter for the subbasin wide coordinated elements; refer to Appendix B of this GSP. For more details about the Coordination Committee refer to Appendix B.

The GSA's in the SJREC GSP Group have elected a representative from the SJREC GSA to represent the entire group on the various committees and sub-committees established for coordinating development and implementation of the six GSP's in the Delta-Mendota Subbasin. The SJREC GSA representative is tasked with keeping the group informed of pertinent information and will ask for each GSA to weigh in on decisions that may affect that respective GSA. The SJREC GSA has an MOU directly with each other GSA that is party to the SJREC GSP Group. The MOU describes how development and implementation of the GSP occurs and each party's respective role and responsibility.

This GSP used the GSP Annotated Outline prepared by DWR as the genesis for the organization of content. Section 1 – Section 2.2.2 and Section 6 covers the SJREC GSP Group in its entirety with a major focus on the SJREC GSA covering almost 90% of the plan area. Section 2.2.3 – Section 5 is specific to the SJREC GSA. Each GSA will have its own discrete section for Water Budgets, SMC and Projects and Management Actions; Section 7 – Section 16. Section 17 describes the Common Chapter for each GSP in the Delta-Mendota Subbasin. The final Section of this plan is the Appendices which are used to provide supporting documentation. The Table of Contents can be used as a guide to organization of this GSP.

Delta-Mendota Subbasin SGMA Governance Structure

5/2/19 Version

FIGURE 1 - DELTA-MENDOTA SUBBASIN GOVERNANCE

1.4.2 Preparation Checklist for GSP Submittal

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 3. Technical Reporting Standards				
352.2		Monitoring Protocols	Monitoring protocols adopted by the GSA for data collection and management	3.5.2
			Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	3.5.2
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	Executive Summary	Executive Summary
			List of references and technical studies	6
354.6		Agency Information	GSA Mailing List	1.3.1
			Organization and management structure	1.3.1
			Contact information of Plan Manager	1.3.1.4
			Legal authority of GSA	1.3.2
			Estimate of implementation costs	1.3.3 & 5.1
354.(a)	10727(a)(4)	Map(s)	Area covered by GSP	2.1.1
			Adjudicated areas, other agencies within the basin, and areas covered by an Alternative	N/A
			Jurisdictional boundaries of Federal or State land	2.1.1
			Existing land use designations	2.1.3
			Density of wells per square mile	2.1.1
354.8(b)		Description of the Plan Area	Summary of jurisdictional areas and other features	2.1.1
354.8(c) 354.8(d) 354.8(e)	10727.2(g)	Water Resource Monitoring and Management Programs	Description of water resources monitoring and management programs	2.1.2 (see GSA specific Section 7.0 - Section 16.0)
			Description of how the monitoring networks of those plans will be incorporated into the GSP	
			Description of how those plans may limit operational flexibility in the basin	
			Description of conjunctive use programs	

354.8(f)	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	Summary of general plans and other land use plans	2.1.3
			Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects	
			Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans	
			Summary of the process for permitting new or replacement wells in the basin	
			Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	
354.8(g)	102727.4	Additional GSP Contents	**Description of Actions Related To:**	
			Control of saline water intrusion	2.1.4
			Wellhead protection	
			Migration of contaminated groundwater	
			Well abandonment and well destruction program	
			Replenishment of groundwater extractions	
			Conjunctive use and underground storage	
			Well construction policies	
			Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects	
			Efficient water management practices	
			Relationships with State and Federal regulatory agencies	
			Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	2.1.3
			Impacts on groundwater dependent ecosystems	2.1.4
354.10		Notice and Communication	Description of beneficial uses and users	2.1.5
			List of public meetings	
			GSP comments and responses	
			Decision-making process	
			Public engagement	
			Encouraging active involvement	

			Informing the public on GSP implementation progress	
Article 5. Plan Contents, Subarticle 2. Basin Setting				
354.14		Hydrogeologic Conceptual Model	Description of the Hydrogeologic Conceptual Model	2.2.1
			Two scale cross-sections	
			Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	
354.14(c)(4)	10727(a)(5)	Map of Recharge Areas	Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	2.2.1
	10727.2(d)(4)	Recharge Areas	Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	2.2.1
354.16	10727.2(a)(1) 10727.2(a)(2)	Current and Historical Groundwater Conditions	Groundwater elevation data	2.2.2
			Estimate of groundwater storage	
			Seawater intrusion conditions	
			Groundwater quality issues	
			Land subsidence conditions	
			Identification of interconnected surface water systems	
			Identification of groundwater-dependent ecosystems	2.1.4
354.18	10727.2(a)(3)	Water Budget Information	Description of inflows, outflows, and change in storage	2.2.3
			Quantification of overdraft	
			Estimate of sustainable yield	
			Quantification of current, historical, and projected water budgets	
	10727.2(d)(5)	Surface Water Supply	Description of surface water supply used or available for use for groundwater recharge or in-lieu use	1.3 and 2.2.3
354.20		Management Areas	Reason for creation of each management area	2.2.4 and 3
			Minimum thresholds and measurable objectives for each management area	
			Level of monitoring and analysis	
			Explanation of how management of management areas will not cause undesirable results outside the management area	

			Description of management areas	
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	Description of the sustainability goal	3.1
354.26		Undesirable Results	Description of undesirable results	3.4
			Cause of groundwater conditions that would lead to undesirable results	3.4
			Criteria used to define undesirable results for each sustainability indicator	3.4
			Potential effects of undesirable results on beneficial uses and users of groundwater	3.4
354.28	10727.2(d)(1) 10727.2(d)(2)	Minimum Thresholds	Description of each minimum threshold and how they were established for each sustainability indicator	3.3
			Relationship for each sustainability indicator	3.3
			Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater	3.3
			Standards related to sustainability indicators	3.3
			How each minimum threshold will be quantitatively measured	3.3
354.30	10727.2(b)(1) 10727.2(b)(2) 10727.2(d)(1) 10727.2(d)(2)	Measurable Objectives	Description of establishment of the measurable objectives for each sustainability indicator	3.2
			Description of how a reasonable margin of safety was established for each measurable objective	3.2
			Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	3.2
Article 5. Plan Contents, Subarticle 4. Monitoring Networks				
354.34	10727.2(d)(1) 10727.2(d)(2) 10727.2(e) 10727.2(f)	Monitoring Networks	Description of monitoring network	3.5.1
			Description of monitoring network objectives	3.5.1
			Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions	3.5.1

			Description of how the monitoring network provides adequate coverage of Sustainability Indicators	3.5.1
			Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends	3.5.1
			Scientific rational (or reason) for site selection	3.5.3
			Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used	3.5.1
			Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	3.5.2
354.36		Representative Monitoring	Description of representative sites	3.5.3
			Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators	3.5.3
			Adequate evidence demonstrating site reflects general conditions in the area	3.5.3
354.38		Assessment and Improvement of Monitoring Network	Review and evaluation of the monitoring network	3.5.4
			Identification and description of data gaps	3.5.4
			Description of steps to fill data gaps	3.5.4
			Description of monitoring frequency and density of sites	3.5.4
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions				
354.44		Projects and Management Actions	Description of projects and management actions that will help achieve the basin's sustainability goal	4
			Measurable objective that is expected to benefit from each project and management action	
			Circumstances for implementation	
			Public noticing	
			Permitting and regulatory process	
			Time-table for initiation and completion, and the accrual of expected benefits	
			Expected benefits and how they will be evaluated	

			How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included	
			Legal authority required	
			Estimated costs and plans to meet those costs	
			Management of groundwater extractions and recharge	
354.44(b)(2)	10727.2(d)(3)		Overdraft mitigation projects and management actions	
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be submitted to the Department together with the GSP's for the basin and, if approved, shall become part of the GSP for each participating Agency.	**Coordination Agreements shall describe the following:**	
			A point of contact	Appendix B
			Responsibilities of each Agency	
			Procedures for the timely exchange of information between Agencies	
			Procedures for resolving conflicts between Agencies	
			How the Agencies have used the same data and methodologies to coordinate GSP's	
			How the GSP's implemented together satisfy the requirements of SGMA	
			Process for submitting all Plans, Plan Amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations	
			A coordinated data management system for the basin	
			Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	

Table 1 – Preparation Checklist for GSP Submittal

2.0 PLAN AREA AND BASIN SETTING

This section describes the SJREC GSP Group plan area and Basin Setting. More specifically, this section describes the location of the geographic areas covered in this GSP and the following categories, that when coordinated, provide a robust plan for sustainability for the area. The plan area includes some State and Federal Jurisdictional Areas. This section will discuss coordination with state and local agencies to coordinate sustainable management criteria with existing and planned land use designations, land use zoning, well permitting, well construction standards, well destruction standards and wellhead protection. Additionally, this plan will have coordinated goals with existing water management plans including Agriculture Water Management Plans (AWMP), Urban Water Management Plans (UWMP), Groundwater Management Plans (GWMP), California Statewide Groundwater Elevation Monitoring (CASGEM), Irrigated Lands Regulatory Program (ILRP) and Integrated Regional Water Management Plan (IRWMP). A description of each GSA's water source and water use will be discussed and how the information provided in the Hydrogeologic Conceptual Model (HCM), Groundwater Conditions, Water Budgets and Monitoring Zones, will further the goal of sustainability and efficient water use. Notice and communication with the public and beneficial users of groundwater is discussed below.

2.1 Description of the Plan Area

2.1.1 Description of Jurisdictional Areas and Other Features

The Delta-Mendota Subbasin (5-022.07) lies within the greater San Joaquin Valley Basin (5-022). Effective groundwater management requires coordination with areas adjacent to the Delta-Mendota Subbasin to ensure groundwater management of one subbasin does not negatively impact the groundwater management of another subbasin. As a result, the GSA's in the Delta-Mendota Subbasin have engaged the GSA's in the following subbasins of the San Joaquin Valley Basin that are adjacent to the Delta-Mendota Subbasin: Tracy Subbasin (05-022.15), Eastern San Joaquin Subbasin (05-022.01), Modesto Subbasin (05-022.02), Turlock Subbasin (05-022.03), Merced Subbasin (05-022.04), Chowchilla Subbasin (05-022.05), Madera Subbasin (05-022.06), Kings Subbasin (05-022.08), and Westside Subbasin (05-022.09).

SUBBASIN	GSA
Chowchilla Subbasin (5-022.05)	Triangle T Water District GSA
	County of Merced - Chowchilla Subbasin GSA
	County of Madera - 1
	Chowchilla Water District
Eastern San Joaquin Subbasin (5-022.01)	Eastside San Joaquin GSA
	South San Joaquin GSA
	Oakdale Irrigation District GSA
	Central San Joaquin Water Conservation District
	South Delta Water Agency
	Central Delta Water Agency
	City of Lathrop
	Woodbridge Irrigation District
	City of Manteca
	Linden County Water District
	North San Joaquin Water Conservation District
	City of Lodi
	San Joaquin County - ESJ
	San Joaquin County No. 2
	City of Stockton
	Lockeford Community Service District
	Stockton East Water District
Kings Subbasin (5-022.08)	Tulare County GSA
	South Kings GSA
	McMullin Area GSA
	Central Kings GSA
	North Fork Kings GSA
	North Kings GSA
	Kings River East GSA
	James Irrigation District

SUBBASIN	GSA
Madera Subbasin (5-022.06)	County of Madera - 2
	New Stone Water District
	City of Madera
	Madera Water District
	Root Creek Water District
	Gravelly Ford Water District
	Madera Irrigation District
Merced Subbasin (5-022.04)	Merced Irrigation - Urban GSA
	Merced Subbasin GSA
	Turner Island Water District - 1
Modesto Subbasin (5-022.02)	Tuolumne GSA
	Stanislaus and Tuolumne Rivers Groundwater Basin Association
Tracy Subbasin (5-022.15)	Stewart Tract GSA
	Byron-Bethany Irrigation District
	City of Antioch
	Diablo Water District
	East Contra Costa Irrigation District
	Contra Costa County
	Discovery Bay Community Services District
	County of Sacramento
	City of Brentwood
	West Side Irrigation District
	City of Tracy
	Banta-Carbona Irrigation District
	San Joaquin County - Tracy
Turlock Subbasin (5-022.03)	East Turlock Subbasin GSA
	West Turlock Subbasin GSA
Westside Subbasin (5-022.09)	Fresno County - Westside Subbasin
	Westlands Water District

Table 2 - GSA's in Subbasins Adjacent to the Delta-Mendota Subbasin

The Delta-Mendota Subbasin has twenty-three GSA's coordinating the development of six GSP's. The SJREC are working with the other GSA's in the subbasin to develop and implement a coordinated effort for the development of a sustainable plan for the subbasin. The table below is color coordinated into each of the GSP's in the Delta-Mendota Subbasin. Fresno County Management Area B has a portion of the GSA in the SJREC GSP and the remaining portion in the Fresno County GSP. The Merced County – Delta Mendota has a portion of the GSA in the SJREC GSP and the remaining portion in the Grassland GSP.

City of Dos Palos	Central Delta-Mendota Region Multi-Agency GSA
City of Firebaugh	City of Patterson
City of Gustine	DM-II (Del Puerto WD)
City of Los Banos	Northwestern Delta-Mendota GSA
City of Mendota	Ora Loma Water District
City of Newman	Patterson Irrigation District
County of Madera - 3	West Stanislaus Irrigation District
San Joaquin River Exchange Contractors	Widren Water District GSA
Turner Island Water District - 2	Aliso Water District
Fresno County - Management Area B	Fresno County - Management Area A
Merced County - Delta Mendota	Farmers Water District
Grasslands GSA	

Table 3 - GSA's in the Delta-Mendota Subbasin by GSP Group

Description of the Plan Area: The San Joaquin River Exchange Contractors (SJREC) GSP contains eleven GSA's within the Delta-Mendota Subbasin. Nine of the GSA's are wholly contained within the limits of the SJREC GSP and are respectively; SJREC GSA, City of Newman GSA, City of Gustine GSA, City of Los Banos GSA, City of Dos Palos GSA, City of Firebaugh GSA, City of Mendota GSA, Turner Island Water District – 2 GSA, and County of Madera – 3 GSA. Two of the GSA's, Merced County – Delta-Mendota GSA and Fresno County – Management Area 'B' GSA, are only partially included in the SJREC GSP. The remaining area in the Merced County – Delta-Mendota GSA will be included in the GSP prepared by the Grassland GSA. The remaining area in the Fresno County - Management Area 'B' GSA will be included jointly in the GSP prepared with the Fresno County – Management Area A GSA.

Each of the City GSA's in the SJREC GSP Group (Newman, Gustine, Los Banos, Dos Palos, Firebaugh, and Mendota) geographically covers the City limits. The TIWD GSA covers all of the land in the district that is in the Delta-Mendota Subbasin. The Madera County GSA covers all white areas in the Delta-Mendota Subbasin. The portion of Fresno County Management Area B in the SJREC GSP Group is generally defined as the County white area in the Delta-Mendota Subbasin and north of the City of Mendota GSA; refer to Figure 2 for the geographic locations depicted on a map. The portion of Merced County – Delta-Mendota GSA in the SJREC GSP Group is generally defined as the County white area in the Delta-Mendota Subbasin, primarily consisting of farmland, east of the SJREC GSA western boundary; refer to Figure 2 for the geographic locations depicted on a map.

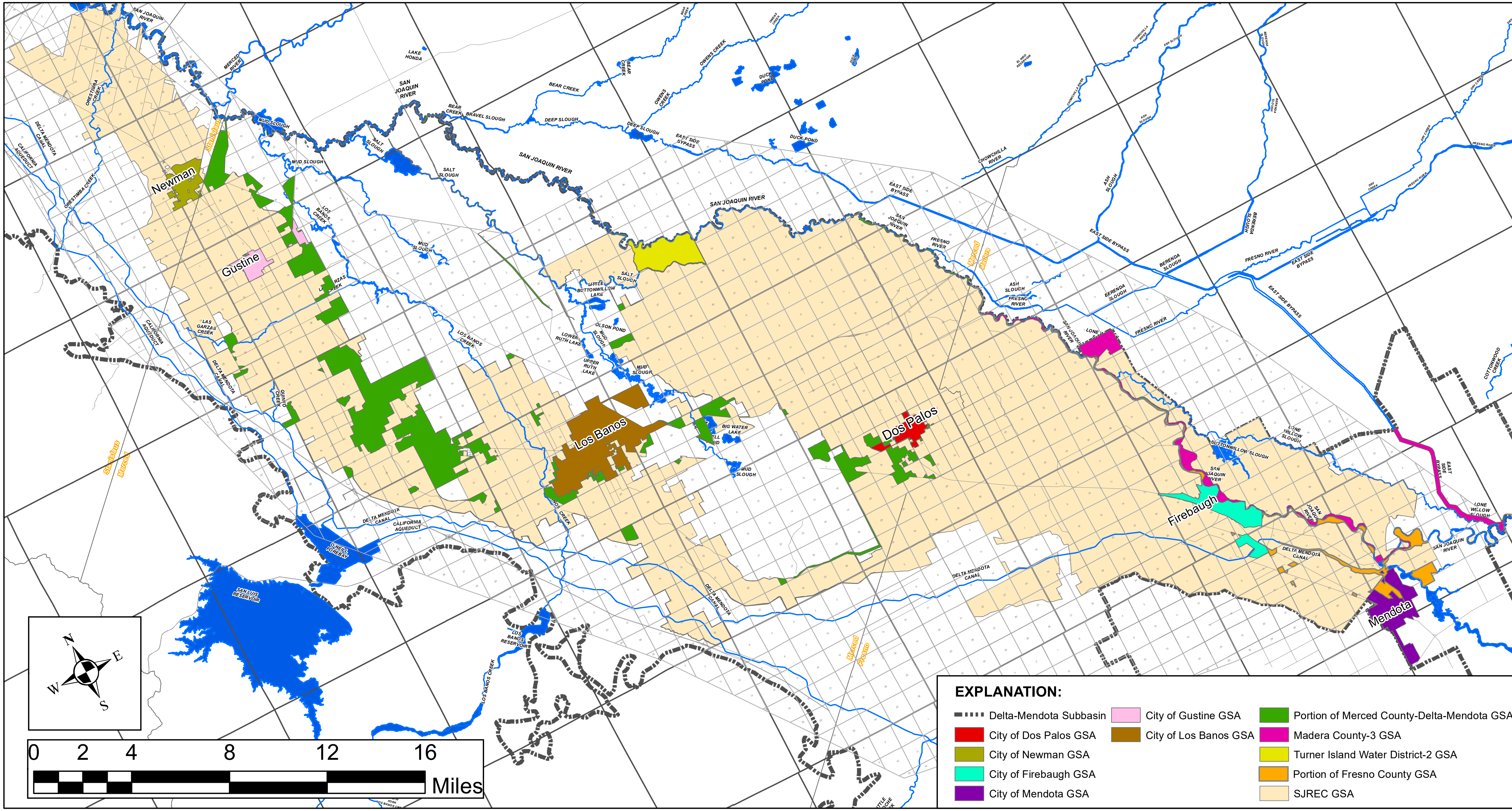

FIGURE 2 - MAP OF GSA'S IN THE SJREC GSP GROUP

The Delta-Mendota Subbasin does not have any areas managed through an Adjudication of Groundwater Rights.

There are several State and Federal jurisdictional areas within the SJREC GSP. Those areas are depicted on Figure 3. The United States Bureau of Reclamation manages the Central Valley Project and owns certain facilities in the SJREC GSP including the Delta-Mendota Canal (DMC), shared ownership with DWR on the California Aqueduct (San Luis Canal), San Luis Drain, Newman Spillway, Volta Spillway and the Firebaugh Spillway. The United States Fish & Wildlife Service owns land east of the City of Los Banos. There are several parcels of land that have a California Conservation Easement. The California Department of Fish and Wildlife own and operate lands included California Protected Areas and Wildlife Areas.

The SJREC have a great partnership with Grassland Water District (GWD) and the state & federal refuge complex. Most of the water provided to the habitat in GWD and the refuges is delivered through the SJREC facilities. In March 1989, the Report on Refuge Water Supply Investigations was published by USBR. The report presented information on water needs and potential water sources and conveyance systems for providing a firm water supply of good quality to ten National Wildlife Refuges, four Wildlife Management Areas and one privately managed wetland area (GRCD). In December 1989, USBR, USF&WS and California Department of Fish and Game (currently CDFW) released the Action Plan Report which identified wetland enhancement. In October 1992, the Central Valley Project Improvement Act (CVPIA) was enacted into law, which requires the Secretary of the Interior to provide firm water supplies in accordance with the 1989 Investigation Report. Several subsequent reports were published consistent with public engagement to review conveyance alternatives based on environmental, technical and economic factors. The SJREC member entities own and operate various canals which have historically been used to make deliveries to GWD. In 1998, the USBR and CCID entered into a contract to deliver refuge water supplies consistent with CVPIA. Much of the infrastructure was in place and some improvements were necessary to deliver adequate supplies to meet wetland management needs. Currently, water deliveries are made under the “Contract Between the United States and Central California Irrigation District for the Conveyance of Refuge Water Supplies to the China Island and Salt Slough Units of the North Grasslands Wildlife Area, Los Banos Wildlife Area, Freitas and Kesterson Units of the San Luis National Wildlife Refuge and Grassland Resource Conservation District. The current contract is in effect until February 28, 2042. From 2009-2018, the SJRECWA wheeled about 200,000 acre-feet per year on average to GWD and the refuges. The SJREC value the ecological importance of the Grassland area and its significance to the Pacific Flyway for migratory waterfowl. The SJREC are working on joint projects with GWD to efficiently put more water to beneficial use in the area. Some of these projects are referenced in Section 4 of this plan. GWD and the SJRECWA have peak water demands during different times of the year. A natural partnership with GWD enhances our ability to efficiently use our local water resources throughout the year while maintaining flexibility to meet demand.

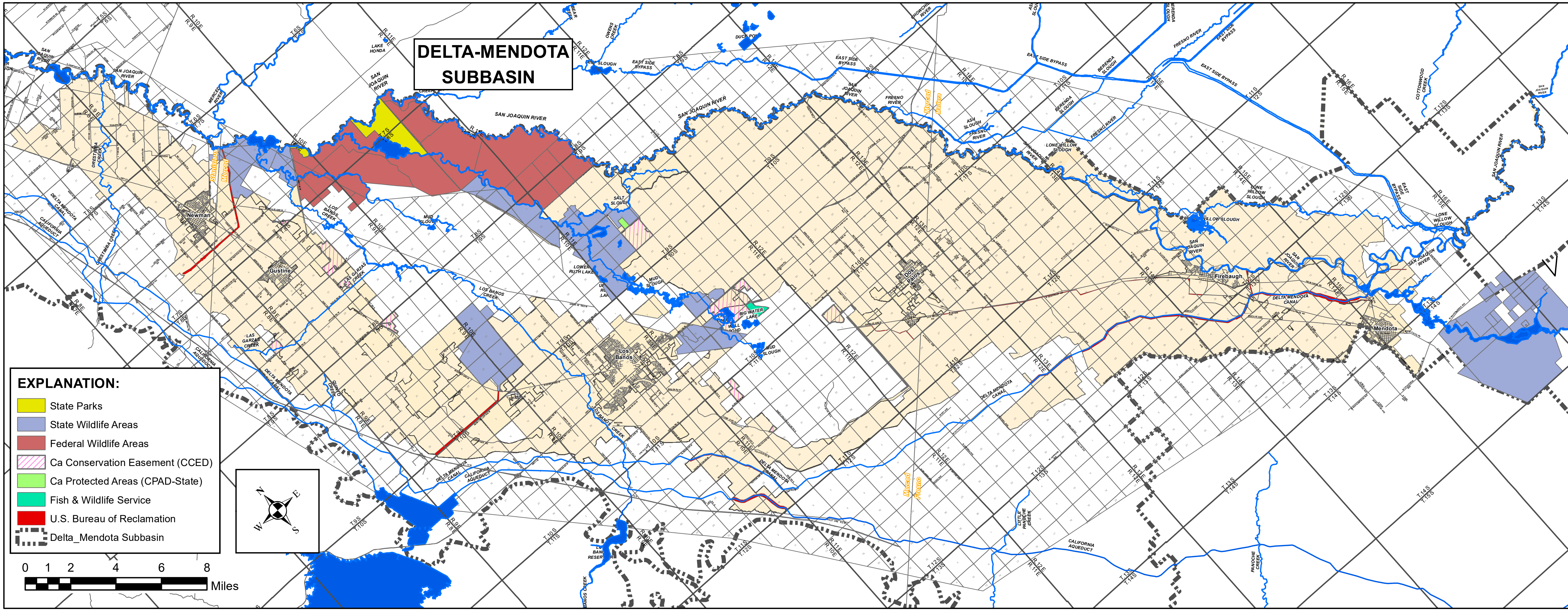

FIGURE 3 - JURISDICTIONAL BOUNDARIES OF STATE AND FEDERAL LANDS

A majority of the area in the SJREC GSP is agriculture. Refer to Figure 4 for a map of the current Land Use Designations. This information was collected from the CADWR Land Use Viewer for 2014: https://gis.water.ca.gov/app/CADWRLandUseViewer/. The data in this map is used for consistency in the Basin and it should be noted that the actual Land Use for this area has not been vetted by the SJREC GSA for accuracy. It should further be noted that land use may change from year to year and the data from this should be used as a point in time and may not be representative as a surrogate for past or future land use. Each GSA in the SJREC GSP has differing Water Source Types and Water Use Sectors. Following is a general explanation. A more detailed understanding of water source type and water use sector for each GSA is described in their respective water budget section.

The primary source of water for the SJREC GSP group is from the Central Valley Project. The major facilities are included below.

C. W. "Bill" Jones Pumping Plant (Jones Pumping Plant): The Jones Pumping Plant lifts water from the Sacramento-San Joaquin Delta into the Delta-Mendota Canal. Most of the water supplied to the Jones Pumping Plant comes from CVP reservoirs located in northern California. Water is released from these reservoirs and routed across the Sacramento-San Joaquin Delta, from the Sacramento and San Joaquin Rivers, to the intakes of the pumps. The Plant has six pumps that lift the water about 200 feet from the intake to the headworks of the DMC at a maximum flow rate of 5,200 cfs.

Delta-Mendota Canal (DMC): The headworks of the DMC is at the Jones Pumping Plant. The DMC carries water from Jones Pumping Plant and terminates at the Mendota Pool. The DMC was completed in 1951 with a capacity of 4,600 cfs at the head that gradually decreases to 3,200 cfs after the 116 mile journey to the Mendota Pool.

O'Neill Pumping-Generating Plant: Located about twelve miles west of the City of Los Banos on the DMC, the O'Neill Pumping Plant connects the DMC to the O'Neill Forebay and ultimately the San Luis Reservoir. This plant was completed in 1968 and is capable of pumping about 3,900 cfs into the O'Neill Forebay and is ultimately pumping into the San Luis Reservoir. The O'Neill Plant is also capable of generating power when water is released from the San Luis Reservoir into the O'Neill Forebay and then released into the DMC. This facility was constructed along with the State Water Project to allow for storage of water south of the Delta.

San Luis Reservoir and O'Neill Forebay: The State Water Project (SWP) received authorization of the Legislature in 1951 to begin construction of a water storage and supply system. One of the projects was a joint venture between the USBR and DWR to construct the California Aqueduct (San Luis Canal), O'Neill Forebay and the San Luis Reservoir to provide additional surface water to agriculture and urban areas south of the Delta. The San Luis Reservoir can store over 2.0 MAF shared between the SWP contractors and the CVP contractors.

Mendota Pool: The Mendota Pool is located near the City of Mendota at the confluence of the San Joaquin River and Fresno Slough (Kings River). The Mendota Pool is also the terminus of the DMC. CCID, FCWD and CCC receive their water from Mendota Pool.

Sack Dam: Sack Dam is located on the San Joaquin River downstream of the Mendota Pool and is the headworks where SLCC takes delivery of surface water.

- SJREC GSA – The water source type is conjunctive use of San Joaquin River water, Central Valley Project water, groundwater, local supplies and precipitation. The Water Use Sector is agriculture, managed wetlands, managed recharge and native vegetation. The SJRECWA's member entities submitted 2016 AWMP's. Documented in the 2016 AWMP's are water conservation and efficiency measures implemented by each agency. One major water conservation effort is installation of canal lining and high efficiency irrigation systems to reduce the amount of water lost to shallow saline groundwater in the southwestern area of the GSA. The SJREC actively manage their surface water, groundwater and conserved water resources conjunctively, and manage water application within their service area to minimize drainage discharges from their service area in accordance with existing laws and regulations. Additionally, the SJRECWA adopted an updated AB 3030 Groundwater Management Plan in 2014. A valuable management tool employed by each entity is installing conservation projects that increase water use efficiency. While the SJREC primarily use surface water to meet consumptive use, groundwater extractions are vital to meet demand during drought years. Groundwater pumping in the SJREC area is also necessary to control the water levels from rising too high and saturating the effective rooting depths.
- City of Newman GSA – The water source type is groundwater, local supplies and precipitation. The Water Use Sector is urban and industrial. The City of Newman is developing a strategy to capture runoff to offset groundwater extractions.
- City of Gustine GSA – The water source type is groundwater, local supplies and precipitation. The Water Use Sector is urban and industrial. The City of Gustine is developing a strategy to capture runoff to offset groundwater extractions.
- City of Los Banos GSA – The water source type is groundwater, local supplies and precipitation. The Water Use Sector is urban and industrial. The City of Los Banos is developing a strategy to capture runoff to offset groundwater extractions.
- City of Dos Palos GSA – The water source type is Central Valley Project, local supplies and precipitation. The Water Use Sector is urban and industrial.
- City of Firebaugh GSA – The water source type is groundwater, local supplies and precipitation. The Water Use Sector is urban and industrial.
- City of Mendota GSA – The water source type is groundwater, local supplies and precipitation. The Water Use Sector is urban and industrial.
- Turner Island Water District – 2 GSA - The water source type is groundwater, surface water supplies, local supplies and precipitation. The Water Use Sector is agriculture.
- Madera County – 3 GSA - The water source type is groundwater, local supplies and precipitation. The Water Use Sector is agriculture.
- Merced County Delta-Mendota GSA - The water source type is groundwater, local supplies and precipitation. The Water Use Sector is agriculture and industrial.
- Fresno County Management Area 'B' GSA - The water source type is groundwater, local supplies and precipitation. The Water Use Sector is agriculture.

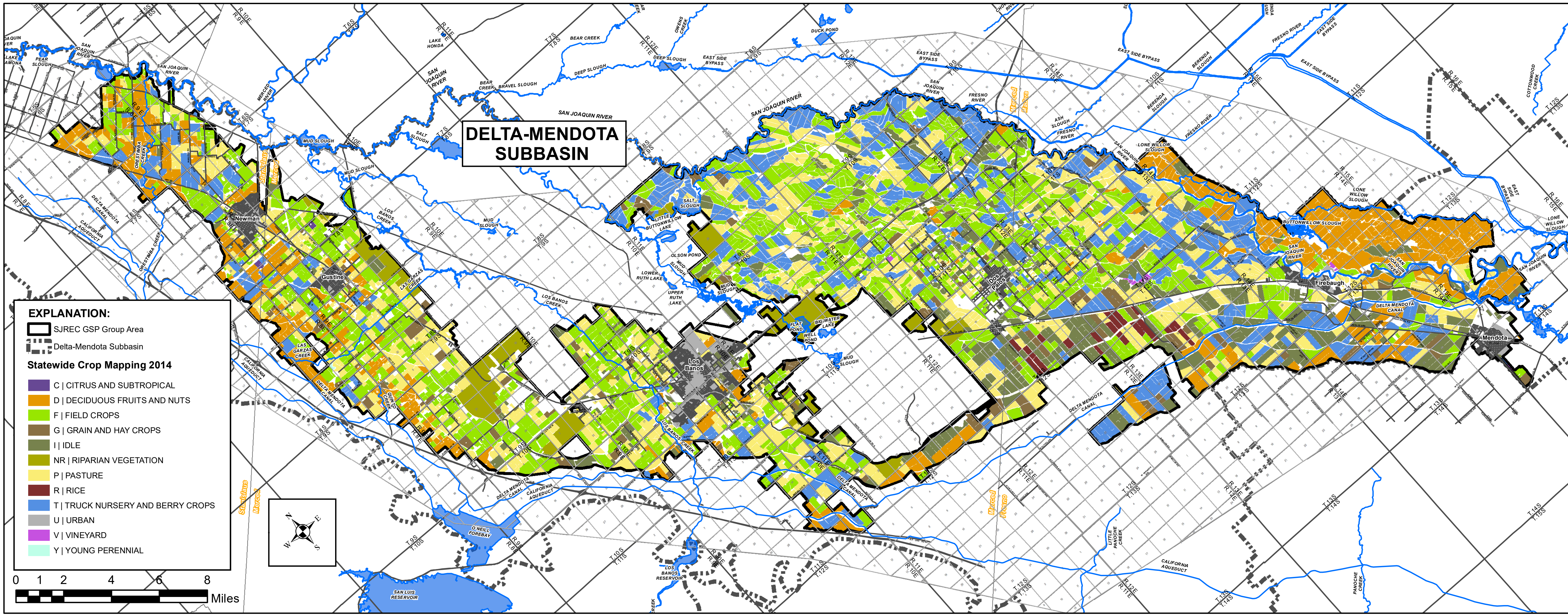

FIGURE 4 - 2014 LAND USE FROM CADWR

Figure 5 shows the density of domestic wells per square mile within the SJREC GSP. Data for Figure 5 used the information provided on the DWR Well Completion Report Map Application (https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37). These wells are typically referred to as "de minimis" extraction wells. Figure 6 shows the density of production (agriculture, City, industry, etc.) wells per square mile within the SJREC GSP. Data for Figure 6 was provided from historic field surveys of active wells in the area. Field surveys provide the most reliable data to map active wells in an area. Primarily, all communities are dependent upon groundwater or plan to use groundwater as an emergency water supply.

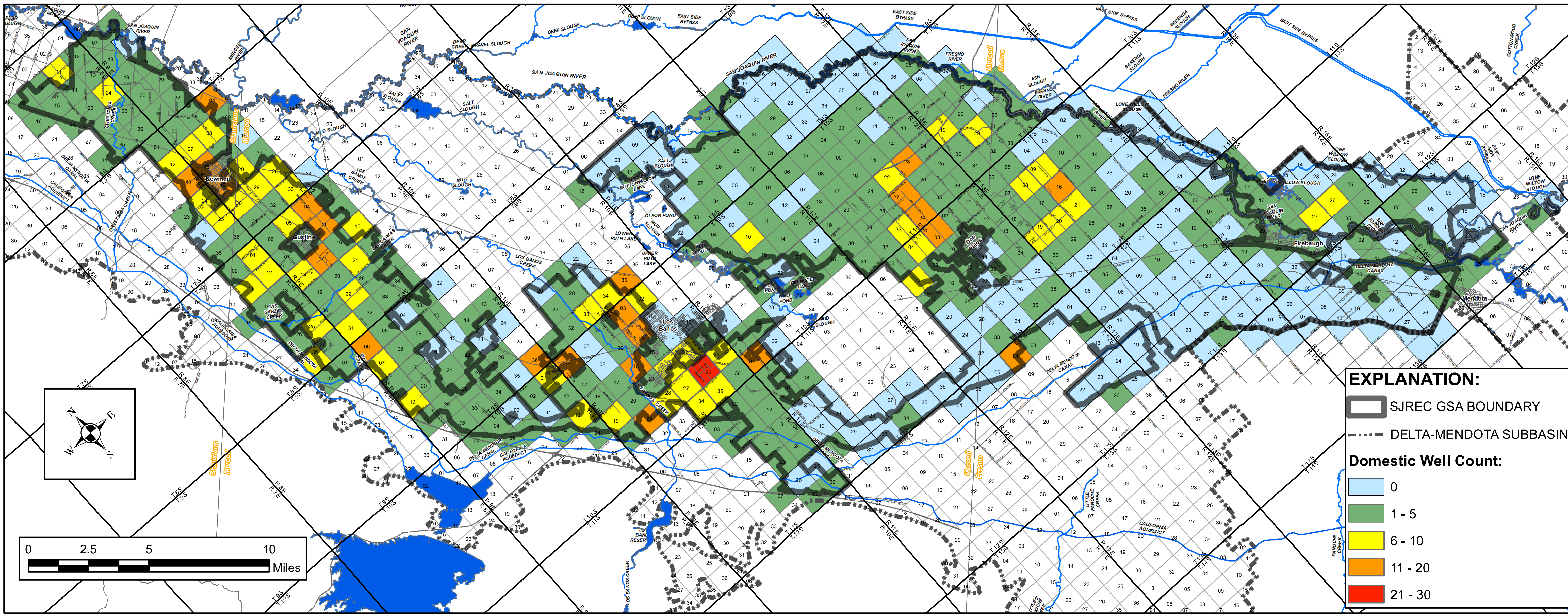

FIGURE 5 - WELL DENSITY MAP FOR DOMESTIC WELLS

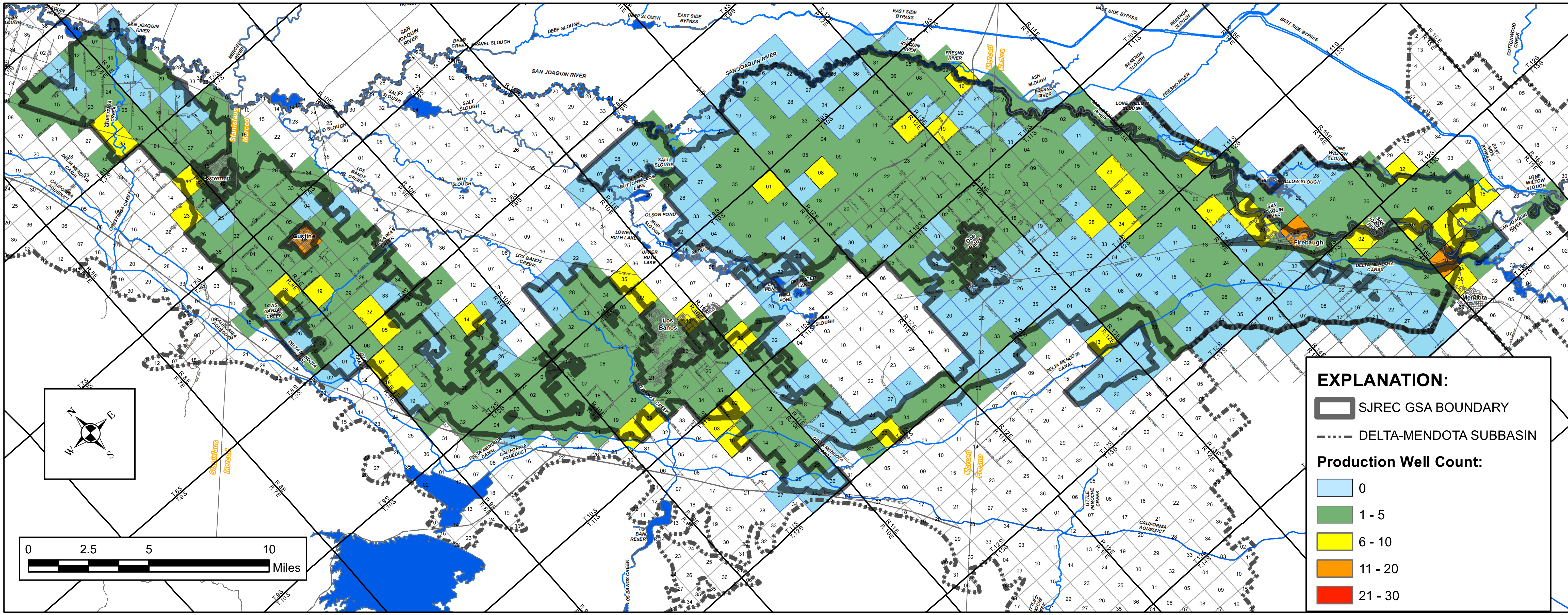

FIGURE 6 - WELL DENSITY MAP FOR PRODUCTION WELLS

2.1.2 Water Resources Monitoring and Management Programs

Agricultural Water Management Plans (AWMP's) are required through the state enacted Water Conservation Act of 2009 (Senate Bill X7-7). The SJRECWA has adopted the 2016 AWMP on behalf of its member agencies. Data reported in the AWMP's will be used to supplement other data sets to successfully manage groundwater through the SGMA.

The Urban Water Management Planning Act was enacted through the California Legislature in 1983. Every urban water supplier that provides over 3,000 acre-feet of water annually or serves more than 3,000 urban connections is required to submit an Urban Water Management Plan (UWMP). UWMP's are prepared by urban water suppliers every five years. The primary purpose of the UWMP is to provide urban water suppliers with a long-term plan to ensure that adequate water supplies are available to meet existing and future water needs. The City of Newman GSA and the City of Los Banos GSA have adopted an UWMP. Water Resource planning requires flexibility to changing water supply and demand. A more detailed analysis on urban water management can be found in the respective City GSA Section in this GSP.

The Groundwater Management Act (AB 3030) was enacted through the California Legislature in 1992. Groundwater Management Plans (GWMP's) provided a planned and coordinated monitoring, operation, and administration of groundwater basins with the long-term goal of groundwater resource sustainability. The GSP's required through the SGMA, once adopted, will replace GWMP's. The SJRECWA is currently managing groundwater through their AB 3030 GWMP adopted in 2014. The SJRECWA AB 3030 plan is the foundation for the successful management of groundwater within the SJRECWA service area. One of the key elements of the plan was establishing management areas, which are now called monitoring zones, based on hydrogeological characteristics.

The California Statewide Groundwater Elevation Monitoring (CASGEM) Program was enacted through the California Legislature in 2009 (Senate Bill X7-6). CASGEM was established to systematically monitor and manage groundwater in California. Data reported in CASGEM will be used to supplement other data sets to successfully manage groundwater through the SGMA. The Groundwater Monitoring Program in the Delta-Mendota Subbasin is managed by the SLDMWA and characterizes the groundwater basin and outlines monitoring procedures.

The Irrigated Lands Regulatory Program (ILRP) was initiated in 2003 to prevent agricultural runoff from impairing surface waters, and in 2012, groundwater regulations were added to the program. ILRP in the Delta-Mendota Subbasin is managed by the CVRWQCB. All irrigated lands used commercially, require an ILRP discharge permit. All irrigated agriculture in the SJREC GSA has coverage through the Westside San Joaquin River Watershed Coalition. Data reported in ILRP will be used to supplement groundwater quality data sets to successfully manage groundwater through the SGMA.

The Regional Water Management Planning Act (Senate Bill 1672) was passed by the California Legislature in 2002. Integrated Regional Water Management (IRWM) is a collaborative effort to identify and implement water management solutions on a regional scale that increase regional self-reliance, reduce conflict, and manage water to concurrently achieve social, environmental, and economic objectives. The SJREC GSP group participates in the Westside San Joaquin Integrated Water Resources Plan. This integrated regional plan has promoted collaborative water resource management. This process is a continuation of regional collaboration to implement local water resource projects that provide resiliency to surface water and groundwater supply. It is anticipated that projects listed in the IRWM grant will be part of regional Projects to maintain and/or achieve sustainability in the Delta-Mendota Subbasin. The SLDMWA is acting as the Regional Water Management Group for the region and let the effort in the Delta-Mendota Subbasin for the 2018 Westside-San Joaquin IRWM Plan.

Since 1996, the CCID has prepared an annual Deep Well Study Summary of Central California Irrigation District Wells and Private Wells. Each year the results of the study were provided to KDSA for review. The annual deep well study works in conjunction with the SJRECWA AB 3030 GWMP. Water levels in each monitoring zone are reviewed to determine the status of the aquifer. In a few monitoring zones, where the aquifer is stressed during times of drought, trigger levels have been established for transferring groundwater out of the area. In the drought of 2014-2016, the water level in Monitoring Zones A and C were below the established trigger and therefore KDSA recommended restricting the transfer of groundwater from parts those areas. By 2017, the water levels in those areas had fully recovered and KDSA recommended allowing groundwater transfers from the area consistent with the CCID Rules Governing Pumping of Private Wells for Water Credits in Other Districts. This study and the resulting analysis have proven invaluable to the success of the groundwater management within the SJREC GSA.

The member agencies of the SJRECWA have taken an active role managing groundwater dating back to the 1950's. There is a deep understanding of the aquifer as a result of over 60 years of actively monitoring and managing groundwater through local independent assessments, to voluntary state legislative programs, to the landmark SGMA. The SJRECWA has proven success to sustainably manage groundwater and successful implementation of SGMA, in coordination with other monitoring and management programs, will continue through the SJREC GSA. The existing monitoring programs in place will be reviewed by a Hydrogeologist/Engineer and implemented into the SJREC GSP where applicable in analyzing potential impacts to the six Undesirable Results outlined in the SGMA.

The primary water supply to CCID, SLCC, FCWD and CCC (member agencies of the SJREC GSA) is surface water delivered as part of the CVP. However, the use of groundwater has proven an effective water management planning tool. The member agencies of the SJREC GSA and their landowners, own and operate a series of groundwater extraction wells. Typically, groundwater is used to meet peak demand, provide flexibility to operational delivery and provide additional supply during critically dry years. Pumping groundwater is also an effective tool to help control the migration of poor water quality in certain areas and can also relieve a perched water table. Groundwater recharge is vitally important to the sustainability within the SJREC GSA. The SJREC will continue to maintain groundwater management sustainability through a positive contribution to groundwater storage. The SJREC GSA, through the SJRECWA, is actively pursuing Projects to increase groundwater recharge. A more in depth analysis on Projects can be found in Section 4.0.

2.1.3 Land Use Elements or Topic Categories of Applicable General Plans

California state law requires each City and County to develop and adopt a general plan. The General Plan, amended from time to time, consists of the respective community's vision for the future. Some mandatory elements that are addressed in the plan include: land use planning, transportation, housing, conservation, open space, noise and safety. Of these, the most important elements that are directly relevant in SGMA are land use planning and population predictions. The SJREC GSA includes six City General Plans and four County General Plans. The SJREC GSA in coordination with other GSA's as part of the SJREC GSP group are working together to coordinate GSP development consistent with approved General Plans. Following is a table of current General Plans that are covered within this GSP.

Entity	Year Adopted or Last Amended	Planning Area
City of Newman	2016	City and unincorporated land north of W Stuhr Road to Lundy Road, Draper Road to Eastin Road, and south of Newman to the Newman Wasteway
City of Gustine	2017	City and 1/4 to 1/2 mile north of North Avenue, 1/4 mile east of East Avenue, Gun Club Road to the south, and Jensen Road to the west
City of Los Banos	2016	City and agricultural land and residential, commercial and industrial developments as well as public facilities, including parks, schools, and the Waste Water Treatment Plant
City of Dos Palos	2003	City and SOI north to Carmelia Road
City of Firebaugh	2016	City and approximately 3,410 acres outside City limits
City of Mendota	2016	City and approximately 2,500 acres outside City limits
County of Stanislaus	2016	County, including unincorporated land
County of Merced	2016	County, including unincorporated land
County of Madera	2015	County, including unincorporated land
County of Fresno	2016	County, including unincorporated land

Table 4 – Existing General Plans within the SJREC GSP Boundary

The existing land use designations are shown on Figure 7. The following categories, depicted on Figure 7, represent the zoning codes for land use descriptions.

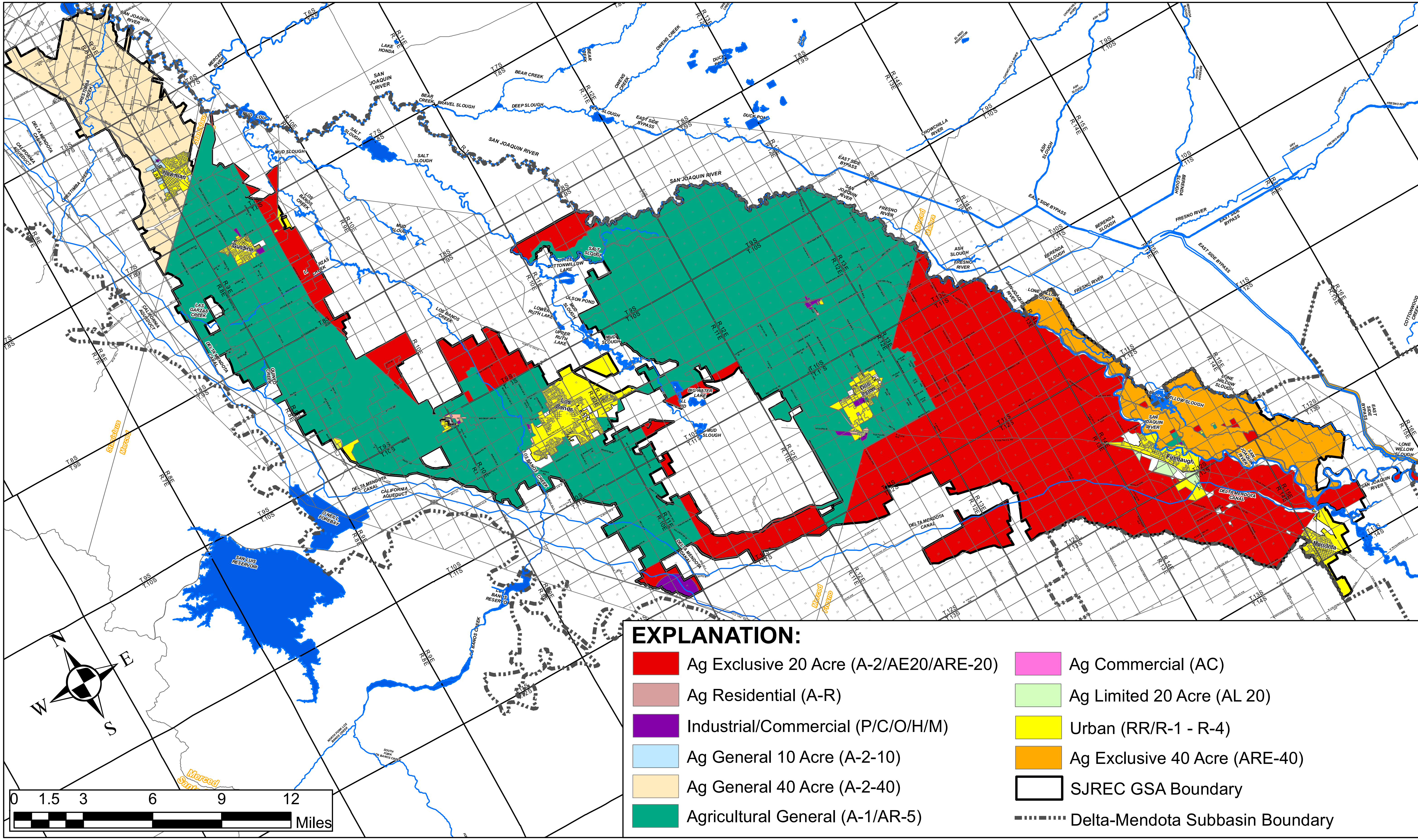

FIGURE 7 - 2018 LAND USE ZONING CODES

- **Ag Residential (A-R):** The purpose of the agricultural-residential zone is to provide areas for rural residential development, hobby farming and limited animal raising operations with less than a full range of urban services. It is intended that this zone typically serve as a transitional area between more dense urban communities and agricultural uses with the option of allowing either one unit or three units per acre.
- **Urban/Residential (R-#, RR):** The purpose of the Residential Zone is to provide a full range of urban services and reserve appropriately located areas for family living at a range of low, medium (up to 15 dwellings per acre), and high (up to 33 dwellings per acre) population densities consistent with sound standards of public health, welfare, and safety. It is the intent of this zone to protect the residential characteristics of an area.
- **Ag Exclusive 20 Acre (A-2, AE20, ARE-20):** The purpose of the exclusive agricultural zone (A-2) is to allow for considerably expanded agricultural enterprises, due mainly to the requirement of larger size land parcels which are more economically suitable to support farming activities occurring in the area. The district shall be accompanied by an acreage designation which establishes the minimum size lot that may be created within the District. Acreage designations of 640, 320, 160, 80, 40, 20, 5 are provided for this purpose.
- **Industrial/Commercial (P, C, O, H, M):** The purpose of the commercial-professional office zone (C, P) is to provide areas for development and operation of professional and administrative offices and personal services rather than retail trade. Typical uses in this zone include medical/dental offices, insurance/travel agencies, government offices, and banks and savings and loans offices. This zone is intended for smaller scale developments that are compatible with residential zoning. The purpose of the highway interchange center zone (H) is to provide areas for commercial uses adjacent to highway interchanges oriented almost exclusively to serve the needs of travelers. The purpose of the general manufacturing zone (M) is to provide for all types of manufacturing, distribution and storage uses.
- **Ag General 40 Acre (A-2-40):** The purpose of the general agricultural zone is to provide areas where the forty (40) acre minimum parcel size of the zone allows for the widest variety of farming operations including agricultural commercial/industrial uses which are dependent on medium to higher quality soils, water availability and larger parcel sizes away from urban areas.
- **Ag General 10 Acre (A-2-10):** The purpose of the general agricultural zone is to provide areas where the ten (10) acre minimum parcel size of the zone allows for the widest variety of farming operations including agricultural commercial/industrial uses which are dependent on medium to higher quality soils, water availability and larger parcel sizes away from urban areas.
- **Agricultural General (A-1/AR-5):** The purpose of the general agricultural zone is to provide areas where an assigned parcel size of the zone allows for the widest variety of farming operations including agricultural commercial/industrial uses which are dependent on medium to higher quality soils, water availability and larger parcel sizes away from urban areas.
- **Ag Commercial (AC):** This district is intended to provide for the location of commercial centers within agricultural areas for the purpose of providing food and services to the surrounding farm community.
- **Ag Limited 20 Acre (AL 20):** It is intended to protect the general welfare of the agricultural community by limiting intensive uses in agricultural areas with a twenty (20) acre minimum parcel size where such uses may be incompatible with, or injurious to, other less intensive agricultural operations. The District is also intended to reserve and hold certain lands for future

urban use by permitting limited agriculture and by regulating those more intensive agricultural uses.

The SJREC GSP, consistent with local/state laws and regulations, will not preempt the City or County land use planning authorities. The SJREC GSA in coordination with the other GSA's as part of the SJREC GSP Group are establishing a plan to achieve and maintain groundwater sustainability. Implementation of this plan will be managed directly with the six cities and four counties in and around the SJREC GSP area. The City and County respective General Plans will require updates from time to time. As those General Plans are updated, close coordination with the SJREC GSP group will prove beneficial for the long-term sustainability of groundwater management in the area. Management actions and Projects are being analyzed to achieve/maintain sustainability for each GSA. As the demand for water changes in each respective GSA, the SJREC GSA will help lead a technical effort to analyze new management actions and/or projects to maintain sustainability. A more detailed description of water demands for projected water budgets for each GSA can be found in the respective Section in this GSP.

The GSA's in the Delta-Mendota Subbasin have been engaging with the neighboring subbasins to coordinate GSP assumptions and implementation of SMC. A successful plan to sustainably manage groundwater in the Delta-Mendota Subbasin requires public outreach to beneficial users of groundwater in those subbasins that are adjacent. The SJREC GSP Group is already successfully managing groundwater, within the boundaries of the plan, in a sustainable fashion. In addition, the SJRECWA has been actively involved to reduce and mitigate subsidence in the Chowchilla Subbasin. A more detailed description of the subsidence mitigation project can be found in Section 4.1.7 under the Red Top Subsidence Mitigation Project. It is anticipated that management actions in adjacent subbasins is unlikely to affect the ability of the SJREC GSP Group to maintain sustainability. Rather, the SJREC will continue efforts to work with the neighboring subbasins to help the region achieve sustainability through projects and management actions.

2.1.4 Additional GSP Elements

Well Permitting: California State requirements for the well permitting process must follow Article 3 of Division 7 of the California Water Code. This states that No person shall undertake to dig, bore, or drill a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, to deepen or re-perforate such a well, or to abandon or destroy such a well, unless the person responsible for that construction, alteration, destruction, or abandonment possesses a C-57 Water Well Contractor's License. Every person who digs, bores, or drills a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, abandons or destroys such a well, or deepens or re-perforates such a well, needs to file with the department a report of completion of that well within 60 days from the date its construction, alteration, abandonment, or destruction is completed. These reports must contain information regarding: 1) A description of the well site sufficiently exact to permit location and identification of the well. 2) A detailed log of the well. 3) A description of the type of construction. 4) The details of perforation. 5) The methods used for sealing off surface or contaminated waters. 6) The methods used for preventing contaminated waters of one aquifer from mixing with the waters of another aquifer. 7) The signature of the well driller. All of the information on these reports will be made available for the public and for governmental agencies. Merced, Fresno, Madera, and Stanislaus Counties all follow the requirements put in place by Article 3 of Division 7 of the California Water Code. Certain counties have more specific permitting details such as minimum requirements for well depth as well as timetables for that County, however all counties require action within 180 days of receiving a permit. For a full description refer to State and County Standards.

Well Construction: Chapter 2 of California Well Standards Bulletin 74-81/90 define that any well that is to be constructed must follow guidelines with respect to; 1) well location around pollutants and contaminants, 2) sealing the upper annular space, 3) surface construction features, and 4) well casing.

1) Well location: All water wells shall be located an adequate horizontal distance from known or potential sources of pollution and contamination. Such sources include; sewers, septic tanks, waste ponds, barnyard and stable areas, feedlots, solid waste disposal sites, above and below ground petroleum tanks, and storage of pesticides and fertilizers. For required distances from potential sources of contaminants for Merced, Fresno, Stanislaus, and Madera counties refer to Table 5. Where possible a well shall be located up the groundwater gradient from potential sources of pollution or contamination. Locating wells up gradient from pollutant and contaminant sources can provide an extra measure of protection for a well. If possible, a well should be located outside areas of flooding. The top of the well casing shall terminate above grade and above known levels of flooding caused by drainage or runoff from surrounding land. All wells shall be located an adequate distance from buildings and other structures to allow access for well modification, maintenance, repair, and destruction, unless otherwise approved by the enforcing agency.

	Merced County		**Madera County**			**Fresno County**	**Stanislaus County**
Potential Pollution Source	**Water Well**	**Public Well**	**Ag Well**	**Domestic Well**	**Public Well**	**General Wells**	**General Wells**
Agricultural	300	300	-	300	300	-	-
Areas of intense animal confinement	100	150	100	100	100	100	100
Leach line or disposal field	100	150	150	100	150	100	100
Seepage pit or cesspool	150	200	150	150	150	150	150
Septic tank	50	100	150	100	150	100	100
Sewer line	-	-	50	50	50	50	50
Unlined canals, drainage water pond	100	100	-	-	-	-	-
Swimming pool	10	10	-	-	-	-	-

Table 5 - Well Setback Requirements from Potential Contamination Sources

2) Sealing upper Annular Space: The space between the well casing and the wall of the drilled hole, often referred to as the annular space, shall be effectively sealed to prevent it from being a preferential pathway for movement of poor-quality water, pollutants, or contaminants. The most common sealing material is cement, which consists of several types; neat cement, sand cement, concrete, or mixing cement. To see adequate annular seal depths and corresponding well types for Merced, Fresno, Stanislaus, and Madera counties refer to Table 6.

Minimum Depth of Annular Seal Below Ground Surface (in feet)				
Type of Well	**Fresno County**	**Merced County**	**Madera County**	**Stanislaus County**
Community Water Supply	50	50	50	50
Industrial	50	50	50	50
Individual Domestic	20	50	20	20
Agricultural	20	50	20	20
Air-Conditioning	20	-	20	20
Dairy	20	50	100	20
Drainage	20	-	20	20
Cathodic Projection	20	20	20	20
Observation/ monitoring	20	20	20	20

Table 6 - Well Annular Seal Depths

3) Surface Construction Features: Openings into the top of the well which are designed to provide access to the well, i.e., for measuring, chlorinating, adding gravel, etc., shall be protected against entrance of surface waters or foreign matter by installation of watertight caps or plugs. Access openings designed to permit the entrance or egress of air or gas (air or casing vents) shall terminate above the ground and above known flood levels and shall be protected against the entrance of foreign material by installation of down-turned and screened "U" bends. All other openings (holes, crevices, cracks, etc.) shall be sealed. A "sounding tube", tap hole with plug, or similar access for the introduction of water level measuring devices shall be affixed to the casing of all wells.

A concrete base or pad will be constructed at ground surface around the top of the well casing and contact the annular seal, unless the top of the casing is below the ground surface; see Table 7 for concrete surface seal standards. The use of well pits, vaults, or equivalent features to house the top of a well casing below ground surface shall be avoided, if possible, because of their susceptibility to the entrance of poor-quality water, contaminants and pollutants. Well pits or vaults can only be used if approval is obtained from the enforcing agency. Pump blow offs, air vents, and backflow prevention devices will be constructed on wells to help minimalize the possibility of contamination from flooding events or changes in atmospheric pressure within well piping.

	Merced County	**Fresno County**	**Madera County**	**Stanislaus County**
Minimum thickness	6 in.	4 in.	4 in.	4 in.
Minimum depth below surface	2 in.	-	1 in.	-
Radial distance (all directions)	2 ft.	2 ft.	2 ft.	2 ft.
Seal gradient distance	1 ft.	-	1 ft.	-

Table 7 - Surface Seal Standards

4) Well Casing: Well casing shall be strong and tough enough to resist the force imposed on it during installation and those forces which can normally be expected after installation. Several types of well casing include; steel, plastic, and concrete. Steel is the material most frequently used for well casing, especially in drilled wells. Two basic types of plastic are commonly used for

plastic well casing: thermoplastics and thermosets. The most common thermoplastic used for well casing is PVC within the state of California. Thermoset plastics are commonly used for well casing fiberglass, due to it holding its shape after being heated.

Well Destruction: In accordance with California Well Standards Bulletins 74-81 and 74-90, a well may be destroyed if it is considered ‘abandoned’. A well is considered 'abandoned' or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use the well again. In accordance with Section 24400 of the California Health and Safety Code, the well owner shall properly maintain an inactive well as evidence of intention for future use in such a way that the following requirements are met: 1) The well shall not allow impairment of the quality of water within the well and ground water encountered by the well. 2) The top of the well or well casing shall be provided with a cover, that is secured by a lock or by other means to prevent its removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. The cover shall be watertight if the well is inactive for more than five consecutive years. 3) The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well. 4) The area surrounding the well shall be kept clear of brush, debris, and waste materials. A monitoring well shall be investigated before it is destroyed to determine its condition and details of its construction. The well shall be sounded immediately before it is destroyed to make sure no obstructions exist that will interfere with filling and sealing. The well shall be cleaned before destruction as needed so that all undesirable materials, including obstructions to filling and sealing, debris, oil from oil-lubricated pumps, or pollutants and contaminants that could interfere with well destruction, are removed for disposal. The enforcing agency shall be notified as soon as possible if pollutants or contaminants are known or suspected to be present in a well to be destroyed. A monitoring well shall be destroyed by removing all material within the original borehole, including the well casing, filter pack, and annular seal; and the created hole completely filled with appropriate sealing material. For a full description of well destruction practices refer to State and County Standards.

Saline Water Intrusion: The Counties of Stanislaus, Merced, Madera and Fresno recognize the significance of saline groundwater intrusion. However, the proximal distance from the Pacific Ocean is great enough to negate the possibility of seawater intrusion to the underlying aquifers. In the event that saline water intrusion becomes a problem, an amendment to the General Plan will be prepared to address the concern. Although the counties have not adopted protocols in their respective General Plans to control saline water intrusion, the SJRECWA has been engaged in mitigating the migration of shallow saline water from upslope areas (south and west of the SJREC GSA boundary) primarily in Fresno County. The migration of poor quality water is further detailed in Section 3 in the discussion about drainage from upslope lands.

Migration of Contaminated Groundwater: The SJREC GSA has historically been engaged with analyzing the potential migration of contaminated groundwater. A more detailed description establishing SMC to control the migration of contaminated groundwater can be found in Section 3 addressing the Degraded Water Quality Undesirable Result.

The SJREC GSA manages a sustainable interaction of surface water supplies and groundwater extraction. While surface water is the primary source of water supply, groundwater is conjunctively used to meet peak demand, provide operational flexibility and provide additional supply during dry years. The underground storage has been sustainably managed primarily though replenishment of groundwater extractions. Groundwater recharge is generally recharged through seepage from earthen lined canals and deep percolation from irrigation. In addition, the SJRECWA has an active Water Resource Management Plan to construct recharge ponds and directly recharge the groundwater and recover the water at a later date consistent with implementation of management actions in the SJREC GSP. Recharge of the aquifer is further analyzed in the Water Budget Section of this Plan.

Wellhead protection: The California Well Standards Bulletin 74, published by DWR, addresses several vulnerabilities for potential groundwater contamination due to improper design of the wellhead. The four primary concerns are: 1) the well is located too close to a known source of pollution, 2) the annular space is not sealed adequately, 3) intrusion through the pump head into the well and 4) direct connection to the well casing. The Counties of Stanislaus, Merced, Madera and Fresno have adopted the standards set forth in Bulletin 74 or provided more restrictive guidelines for well head protection. These standards provide a required setback distance from a specific potential contaminated source. The standards also provide what type of seal and what depth of seal is required for adequate sealing of the well annular space. To prevent intrusion into the pump, a watertight seal is placed between the pump head and the wellhead support. A concrete slab should be constructed around the top of the well casing to provide a weatherproof and watertight seal between the pump head and the top of the well casing to prevent contaminants entering the well. Table 8 summarizes setback distances regarding the state and County standards for wellhead protection.

Potential Contamination	DWR Bulletin 74	Stanislaus County	Fresno County	Merced County	Madera County
Subsurface sewage leaching field	100 feet	100 feet	100 feet	100 feet (Ag) 150 feet (public)	100 feet (domestic) 150 feet (Ag & public)
Cesspool or seepage pit	150 feet	150 feet	150 feet	150 feet (Ag) 200 feet (public)	150 feet
Animal or fowl enclosure	100 feet	100 feet	100 feet	100 feet (Ag) 150 feet (public)	100 feet
Septic tank	50 feet	50 feet	50 feet	50 feet (Ag) 100 feet (public)	100 feet (domestic) 150 feet (Ag & public)
Sewer line	50 feet	50 feet	50 feet	50 feet (Ag) 100 feet (public)	50 feet
Unlined canals, surface body or course or drainage	-	-	-	100 feet	-
Swimming pool	-	-	-	10 feet	-
Agricultural wells	-	-	-	300 feet	300 feet

Table 8 – Summary of setback distances for wellhead protection

The member agencies of the SJREC GSA invests in local conservation projects for district facilities and also on farm projects. Some types of districtwide conservation projects include automated water control structures, spill reduction, recapture pumps and canal lining. On farm conservation projects include district funded grants and also a low interest loan program to increase water use efficiency through installing highly efficient irrigation systems and lining irrigation channels. While lining irrigation channels increases the instantaneous water use efficiency, the SJREC GSA is actively analyzing the need to keep some channels earth lined to maintain a sustainable aquifer through channel seepage. Since this area is primarily conjunctive use, the best way to conserve water is to reduce spills leaving the area. The SJREC GSA members have primarily accomplished this through construction of in-line regulating reservoirs and canal automation using Supervisory Control And Data Acquisition (SCADA) to better manage flows in the canals.

The SJREC GSA members have worked with state and federal regulating agencies through compliance with California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) for implementation of Projects. Oftentimes, construction of Projects requires compliance with certain permitting requirements. Following is a list of agencies and the associated permits necessary for certain construction projects: CVRWQCB Section 401 Permit, CDFW Section 1600 Permit, California State Lands Commission Lease, Central Valley Flood Protection Board Encroachment Permit, and USACE Section 404

Permit. The SJREC GSA has also worked directly with CDFW and USFWS for ESA compliance. The SJREC GSA has a strong working relationship with the USBR for administration of CVP water supply.

A description of the beneficial users of groundwater can be found in Section 2.1.5. One such type of user of groundwater are Groundwater Dependent Ecosystems (GDE's). The SGMA requires each GSP to identify and consider impacts to GDE's as the SMC is being developed. The Nature Conservancy reviewed and compiled historical datasets to be used by GSA's to aid in identifying potential GDE's. Figures 8 and 9 show some potential GDE's. The potential GDE's on the map have not been field surveyed to ensure that the GDE exists and actual vegetation matches with the type of vegetation described. The SJREC GSA has been sustainably managing groundwater for decades and is highly unlikely to have any impacts to GDE's through implementation of the SJREC GSP. In the event the SJREC GSA notices impacts to GDE's, an in-depth review to mitigate those impacts will be initiated. The Natural Communities Commonly Associated with Groundwater (NCCAG) Dataset Viewer was reviewed for the potential of GDE's in the SJREC GSP Group area. The SJREC GSP Group has several vegetation types that have the potential to have dependency on groundwater none of which are listed under CESA as threatened or Endangered: Allenrolfea Occidentalis (Iodine Bush), Artemisia Douglasiana (Douglas' Wormwood), Arundo Donax (Giant Reed), Atriplex Lentiformis (Quailbush), Elymus (leymus) Triticoides (Creeping Wildrye), Juglans Hindsii and Hybrids (Northern California Black Walnut), Populus Fremontii (Fremont Cottonwood), Quercus Lobata (Valley Oak), Rubus Armeniacus (Himalayan Blackberry), Salix Exigua (Narrowleaf Willow), Salix Gooddingii (Gooding's Willow), Salix Laevigata (Red Willow), Salix Lasiolepis (Arroyo Willow), Schoenoplectus (acutus, californicus) (Hardstem Bulrush), Suaeda Monquinii (Shrubby Seepweed), and Typha (Angustifolia, domengensis, Latifolia) (Narrowleaf Cattail). The state and federally listed endangered, threatened and rare plants of California updated from the State of California DFW California Natural Diversity Database (CNDDB) as updated on August 6, 2018.

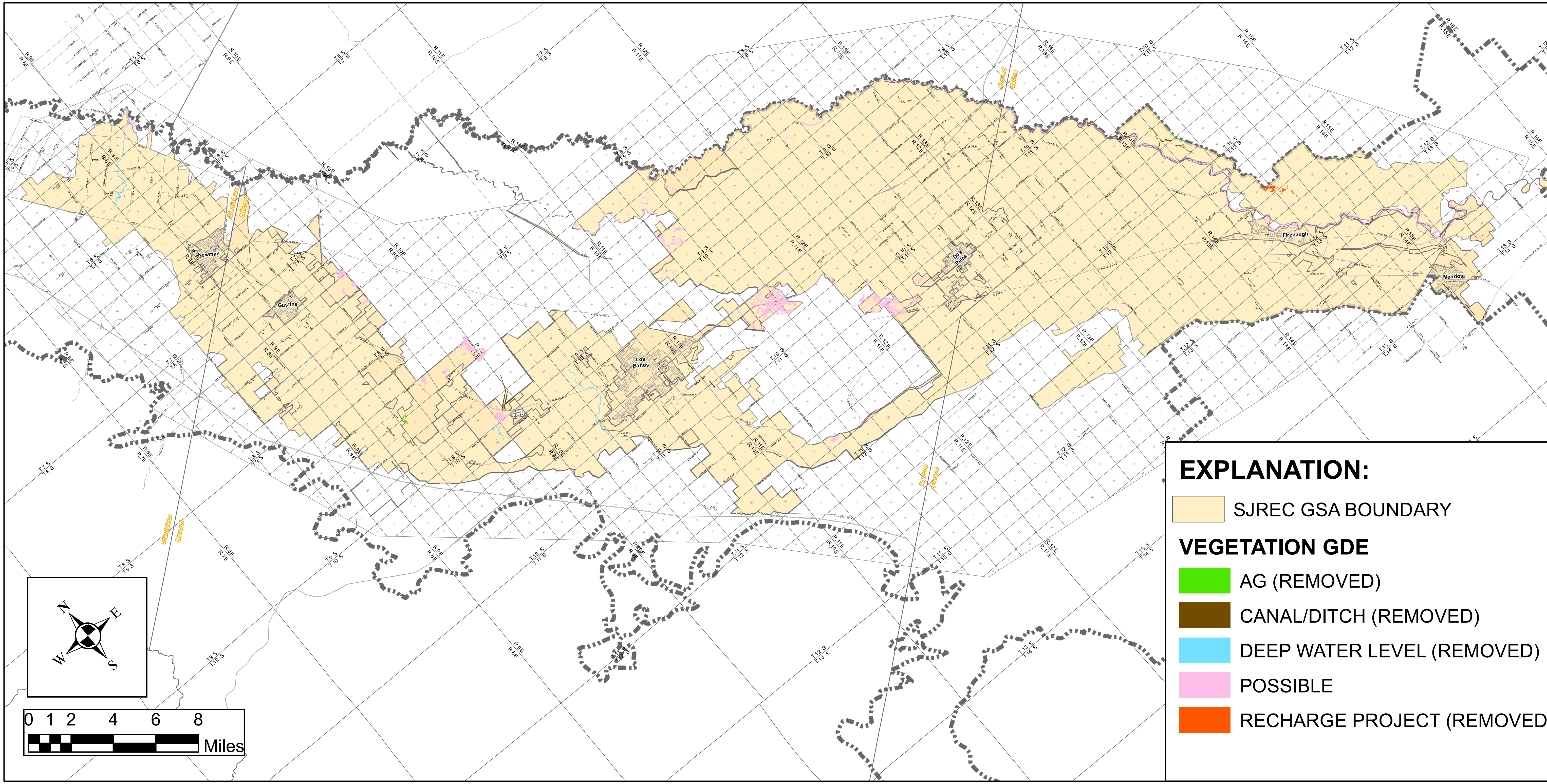

FIGURE 8 - VEGETATION GROUNDWATER DEPENDENT ECOSYSTEMS

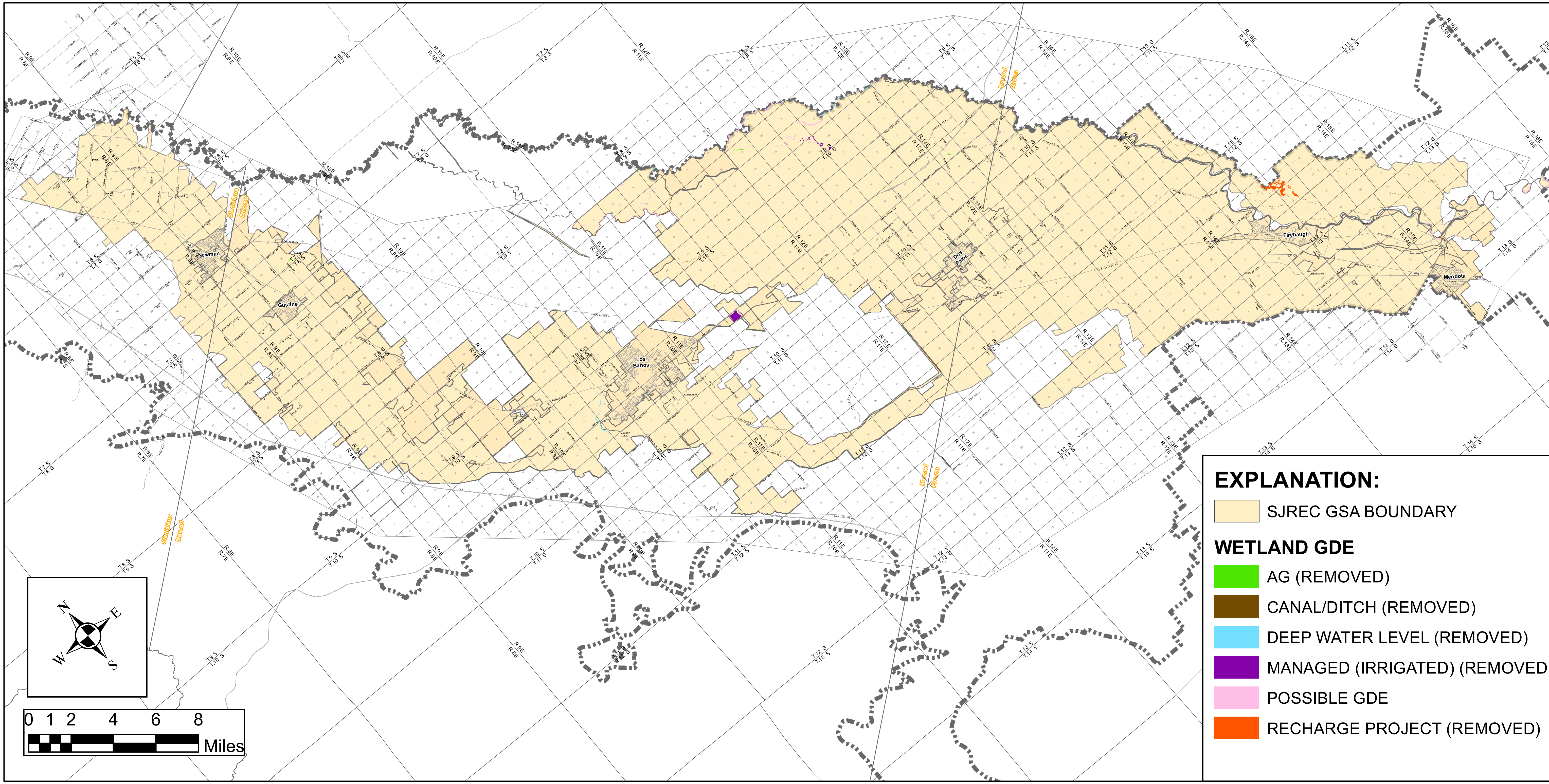

FIGURE 9 - WETLAND GROUNDWATER DEPENDENT ECOSYSTEMS

2.1.5 Notice and Communication

There are several types of beneficial uses and users of groundwater including: agriculture, domestic wells, municipal wells, public water systems, environment, surface water users where there is a connection to groundwater, federal interests, DAC and Industrial wells. Of these various types of uses, over 95% (88% is in the SJREC GSA) of the SJREC GSP area is designated as holders of overlying groundwater rights for agriculture and domestic groundwater use. There are six GSA's in the SJREC GSP that cover municipal water supply. Currently the City of Dos Palos relies on treated surface water for municipal supply. The other five City GSA's in this plan rely solely on groundwater for municipal supply. Newman, Gustine and Los Banos are primarily DAC's, whereas Firebaugh and Mendota are Severely DAC's. These communities, including the City of Dos Palos GSA comprise about 4% of the plan area. These communities are actively involved in development and implementation of this GSP. The remaining less than 1% consists mostly of Industrial and Environmental uses. The following processing plants are a majority of the Industrial uses of groundwater: Leprino Foods Company, Saputo Cheese USA, Hill View Packing Company, Ingomar Packing Company, Liberty Packing, Morning Star Packing, Kagome USA, and Tomatek. The Environmental uses are primarily through managed duck clubs or GDE's.

The Board of Directors for the SJREC GSA are the decision-making body for the GSA. Each Director was appointed from the home Board of Directors from their respective member agencies (CCID, SLCC, FCWD and CCC). Each Board member is elected by the landowners. While the Board of Directors were elected to be the decision makers, the organizational hierarchy is as follows starting at the top of the chart: Landowners, Board of Directors, General Manager, staff and consultants. The Board of Directors acts as the voice for the people they represent and strive to serve those interests to the best of their ability. All decisions are weighed based on supporting data from staff, consultants and the public. Ultimately these decisions require a majority (3/4) vote to approve. The SJREC have a long standing partnership with the other GSA's in the SJREC GSP. Most of the basin setting and groundwater management of this plan were in place prior to the SGMA. Numerous reports on groundwater conditions in and around the cities and the SJREC service area were completed in the 1990's. Additionally, most of the management actions and projects described in Sections 3 and 4 of this GSP were in place or under development prior to the SGMA. These reports, projects and management actions were adopted through public involvement to ensure a broad range of ideas and strategies to successfully manage groundwater. Much of this plan is merely an extension of historical practices that have been in place with public involvement and groundwater management has been successfully operating under these conditions. Each City and County has been involved in the development of this plan and has relied heavily on the trust developed over years of a great partnership with the SJREC to lead the effort developing this GSP.

The best decisions are made through public engagement as groundwater management strategies are under development and during implementation. All of the SJREC GSA meetings are posted consistent with the Brown Act. Interested parties may participate in the planning and development of the GSP by attending the SJREC GSA monthly board meetings held on the first Friday of the month beginning at 8:30 am. The meetings are held at the SJRECWA office located at 541 H Street, Los Banos, CA 93635. In addition, any interested party may refer to the contact information in Section 1.3.1 of this Plan.

The majority of beneficial users of groundwater in the area covered by the SJREC GSP lie within the SJREC GSA. Each member of the SJREC GSA holds annual shareholder meetings and discuss the SGMA and the development of the GSP. At these meetings, the shareholders (beneficial users) are encouraged to participate in the development of the GSP and are also given an opportunity to ask questions. This process is vital to ensure that the shareholders' interests are included in the development of the plan. These same shareholders, in addition to other interested parties, are encouraged to attend Subbasin meetings where coordination of methodologies for the various plans in the Delta-Mendota Subbasin is discussed. There are three primary committees that meet monthly and post notification of the meetings consistent with Brown Act requirements. These committees are the Coordination, Technical and Communication committees and respectively meet the 2nd Monday, 3rd Tuesday and 4th Tuesday of the month; located at 842 6th Street, Los Banos, California. More information on regional coordination in the Delta-Mendota Subbasin can be found at www.deltamendota.org. Each month, the Communications Committee prepares a newsletter that is shared on the SJRECWA website. One of the first committee tasks was to prepare a Communications Plan for the Delta-Mendota Subbasin; refer to Appendix G for this report. Consistent with the public outreach requirements in SGMA, the Communication Committee for the Delta-Mendota Subbasin has hosted several public workshops geared toward outreaching to DAC's. These meetings are included in the list of public meetings in Appendix E. Anyone who has reached out to the SJREC GSA as an interested party is added to the public outreach contact list in Appendix F. In addition, the SJREC GSA submitted a formal letter to DWR, Appendix D, regarding the Notice of Intent to Develop a GSP and how interested parties may participate in the planning and development of the GSP.

In addition to holding public committee meetings for the Delta-Mendota Subbasin development of GSP's, the Communications Subcommittee hosted a series of public workshops. Each set of workshops were held in various locations across the subbasin to reduce travel time for interested parties. Flyers for the workshops were prepared in English and Spanish and also in a standard letter size and a 1/3 sheet mailer for ease of transmittal. There was a total of four sets of workshops to introduce the public to the SGMA requirements and GSP development in the Delta-Mendota Subbasin. All of the public meetings encouraged public engagement in the planning and development process. The presentations were presented in English with a Spanish translation through headsets. There is a large population of Spanish speakers and having a translator at the public workshops offered SGMA updates to a greater number of beneficial users.

The Delta-Mendota Subbasin worked with CDFW, The Nature Conservancy and the Audubon Society at a public workshop on August 24, 2018 to discuss managing GDE's as a beneficial user of groundwater. The SJREC also gave a presentation at the 57th Annual California Irrigation Institute Conference, the 2018 Merced County Farm Bureau Water Symposium and the 2019 Merced County Farm Bureau Water Symposium respectfully on: February 5, 2019, March 1, 2018 and February 21, 2019. The SJREC also participated in the Fresno County School Outreach hosted by Self-Help Enterprises on September 29, 2018. Furthermore, the SJREC participated in an interview with a student from the University of Massachusetts who is studying SGMA and the effects of plan development with a particular interest in public involvement.

In addition to the meetings directly with each GSA in this GSP, the SJREC GSP participated in several other outreach events. The SJREC participated in several Central Valley Basin meetings hosted by the Delta-Mendota Subbasin on the dates as follows: October 20, 2017, January 29, 2018, April 2, 2018 and June 8, 2018. The primary function of these Central Valley Basin meetings was to establish a contact for each GSP within each subbasin so further coordination discussions could materialize. The SJREC participated in a meeting with Westland Water District (WWD) representing the Westside Subbasin on April 4, 2019 to discuss plan development. The SJREC also participated in a meeting with the Turlock Subbasin on June 19, 2019 to discuss plan development. The Turlock Subbasin is particularly interested in the development of the GSP's in the Delta-Mendota Subbasin since the Turlock Subbasin is not in critical overdraft and has until 2022 to submit their plan. The SJREC and the Delta-Mendota Subbasin have been reached out to the Chowchilla and Madera Subbasin in an attempt to setup a meeting to discuss plan development.

The development of the SJREC GSP was a collaborative process where discussions of the GSP planning process encouraged an iterative procedure to determine appropriate groundwater management. Most of the groundwater monitoring and management in the SJREC area was in place prior to the signing of the SGMA in 2014. Additional coordination meetings with neighboring subbasins is anticipated after the public hearing to adopt this plan and the SJREC are hopeful these meetings will continue through the planning and implementation horizon.

2.1.5.1 Adoption of Plan Following a Public Hearing

The California Water Code, Section § 10728.4 states: A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing, held at least 90 days after providing notice to a City or County within the area of the proposed plan or amendment. The groundwater sustainability agency shall review and consider comments from any City or County that receives notice pursuant to this section and shall consult with a City or County that requests consultation within 30 days of receipt of the notice.

The SJREC GSP Group will notify the following cities and counties of the proposed public hearing to adopt the SJREC GSP at least 90 days prior to the public hearing: City of Newman, City of Gustine, City of Los Banos, City of Dos Palos, City of Firebaugh, City of Mendota, County of Stanislaus, County of Merced, County of Fresno and County of Madera. Any comments received will be included as in Appendix H of this plan.

2.2 Basin Setting

Refer to the Hydrogeologic Conceptual Model and Groundwater Conditions Report for an in-depth description of the Basin in and around the SJREC GSP Group. The DWR has provided a more general description of the basin settings in the state through periodic updates to Bulletin 118. Bulletin 118 is California's official publication on the occurrence and nature of groundwater statewide. Bulletin 118 defines the boundaries and describes the hydrologic characteristics of California's groundwater basins and provides information on groundwater management and recommendations for the future. Bulletin 118 provides the following information for the San Joaquin Valley Groundwater Basin – Delta-Mendota Subbasin 5-22.07:

Basin Boundaries and Hydrology:

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

The Delta-Mendota Subbasin is in the San Joaquin Valley Groundwater Basin, located along the western edge of the San Joaquin Valley, and includes portions of San Joaquin, Stanislaus, Merced, Fresno, and Madera Counties. The Delta-Mendota subbasin is bounded on the west by the Tertiary and older marine sediments of the Coast Ranges. The northern boundary begins just south of Tracy in San Joaquin County. The eastern boundary generally follows the San Joaquin River and Fresno Slough; except it follows the Columbia Canal Company and Aliso Water District Boundaries on the east side of the San Joaquin River. The southern boundary is near the small town of San Joaquin. Average annual precipitation is nine to 11 inches, increasing northwards.

Hydrogeologic Information:

The San Joaquin Valley represents the southern portion of the Great Central Valley of California. The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains, respectively. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. This depositional axis is below to slightly west of the series of rivers, lakes, sloughs, and marshes, which mark the current and historic axis of surface drainage in the San Joaquin Valley.

Water Bearing Formations:

The geologic units that comprise the ground water reservoir in the Delta-Mendota subbasin consist of the Tulare Formation, terrace deposits, alluvium, and flood-basin deposits. The Tulare Formation is composed of beds, lenses, and tongues of clay, sand, and gravel that have been alternately deposited in oxidizing and reducing environments (Hotchkiss 1971). The Corcoran Clay Member of the formation underlies the basin at depths ranging about 100 to 500 feet and acts as a confining bed (DWR 1981).

Terrace deposits of Pleistocene age lie up to several feet higher than present streambeds. They are composed of yellow, tan, and light-to-dark brown silt, sand, and gravel with a matrix that varies from sand to clay (Hotchkiss 1971). The water table generally lies below the bottom of the terrace deposits. However, the relatively large grain size of the terrace deposits suggests their value as possible recharge sites.

Alluvium is composed of interbedded, poorly to well-sorted clay, silt, sand, and gravel and is divided based on its degree of dissection and soil formation. The flood-basin deposits are generally composed of light-to-dark brown and gray clay, silt, sand, and organic materials with locally high concentrations of salts and alkali. Stream channel deposits of coarse sand and gravel are also included.

Groundwater in the Delta-Mendota subbasin occurs in three water-bearing zones. These include the lower zone, which contains confined fresh water in the lower section of the Tulare Formation, an upper zone which contains confined, semi-confined, and unconfined water in the upper section of the Tulare Formation and younger deposits, and a shallow zone which contains unconfined water within about 25 feet of the land surface (Davis 1959).

The estimated specific yield of this subbasin is 11.8 percent (based on DWR San Joaquin District internal data and Davis 1959). Land subsidence up to about 16 feet has occurred in the southern portion of the basin due to artesian head decline (Ireland 1964).

2.2.1 Hydrogeologic Conceptual Model

The Hydrogeologic Conceptual Model (HCM) is a description of the SJREC GSP Group Area based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems. The SJREC GSP Group used the HCM BMP provided by DWR and updated to meet the needs of the GSA's in this plan. Refer to Appendix J for the BMP on the HCM. The HCM, Groundwater Conditions and Water Budget Report was prepared by KDSA in coordination with the SJREC GSP Group; refer to Appendix I for this report.

2.2.2 Current and Historical Groundwater Conditions

A description of the historical and current groundwater conditions is included in Appendix I. In general, this report will discuss groundwater conditions related to Undesirable Results.

2.2.3 Water Budget Information

The SJREC GSA's member agencies hold senior water rights on the San Joaquin River. Through an Agreement with the Federal Government, the predecessors of the SJRECWA exchanged the point of diversion to receive their water. In non-critical Shasta years, the SJRECWA receives up to 840,000 acre-feet. In critical Shasta years, the SJRECWA receives a 77% allocation or 650,000 acre-feet. This water is delivered through the DMC when available and down the San Joaquin River during those times when conveyance down the DMC cannot meet the obligations set forth in the "Exchange and Purchase Contracts". Another major surface water supply for the region is precipitation that can be used to meet evapotranspiration or can be captured and diverted into conveyance channels to be used to meet demand. In addition, there are ephemeral streams and the San Joaquin River that carry flood flows to and through the area. These flood flows provide recharge to the aquifer and can also be captured in the conveyance channels and diverted to beneficial use in the area. All of these surface water supplies are collectively used to maintain a healthy and sustainable aquifer through direct, in-direct and in-lieu recharge.

The member agencies of the SJREC are conjunctive use districts and rely on groundwater to provide operational flexibility and to meet peak demand. CCC has lined a majority of their canals to reduce seepage on sandy soils and have subsequently reduced groundwater extractions by keeping a majority of their water in the system. FCWD, due to the upslope drainage problem, overlies groundwater classified as a salt sink. FCWD has lined a majority of their canals to prevent the loss of surface water to the salt sink, thereby increasing how much water is put to beneficial use. Both CCID and SLCC primarily have unlined major canals. The major canals in CCID and SLCC contribute to about 100 TAF of recharge per year to the upper aquifer. This canal seepage has help maintain a healthy aquifer in and around the SJREC service area.

The Historical, Current and Projected Water Budgets were prepared primarily by the SJREC GSA Staff and KDSA in close coordination with the other GSP groups in the Delta-Mendota Subbasin to ensure that each GSP uses the same data and methodologies. Coordinating GSP elements across the subbasin was the primary task of the Delta-Mendota Technical Subcommittee. The Technical Subcommittee recommended the Historic Water Budget be from 2003-2012 and the Current Water Budget for 2013. Refer to Appendix I for groundwater conditions pertaining to Water Budgets. The SJREC GSP Group used the Water Budget BMP and Modeling BMP provided by DWR and updated to meet the needs of the GSA's in this plan. Refer to Appendices K and L for the BMP on the Water Budget and Modelling, respectively.

DWR has provided a monthly climate summary for the San Joaquin Region. The table below shows the mean temperature data for each month for water years 2007-2017. All values below are reported as average temperature for the month in degrees Fahrenheit.

MONTH	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
October	54.1	54.1	58.3	53.6	53.6	53.4	55	51.1	57.1	56.8	51.7
November	46.6	48.7	49.8	46.9	40.3	40.2	44.7	44.6	45.7	38.5	44.4
December	46.6	37.2	38.6	38	37.4	37.2	35.5	38.2	39.3	32.9	37.3
January	36.7	37.4	42.8	26.4	38.1	40.9	36.9	36.9	43.1	36.9	33.9
February	42.1	41.6	42.6	29.3	35.3	37.9	37.6	41.2	45.8	45.4	37.7
March	49.9	47	46.6	45.1	38.8	40.1	45.2	44.5	49	43.4	44.5
April	52.6	51.2	50.5	46.4	43.7	46.4	49.6	49.1	48.3	49.3	45.6
May	59.6	58.3	63.5	52.8	47.2	55.5	55.7	55.9	51.8	53.9	54.8
June	66.5	67.2	63.9	65.7	57.3	61.2	64.5	65	67.6	65.9	64.5
July	71.9	72.8	74.3	72.7	65.9	67.7	71.5	71.8	68.2	70.4	72
August	71.2	72.9	70.6	68.8	67.2	71.9	67.2	67.8	69.7	69.7	71.3
September	62	68.2	69.1	66.3	64.7	68.1	61.1	64.4	65.5	63	61.1
DWR Water Year Avg.	**55.0**	**54.7**	**55.9**	**51.0**	**49.1**	**51.7**	**52.0**	**52.5**	**54.3**	**52.2**	**51.6**

Table 9 - WY 2007-2017 Mean Monthly Temperatures (°F)

2.2.3.1 Historic Water Budget for SJREC GSA

The following data was used to analyze the Historic Water Budget for the SJREC GSA:

<u>Water Year Type:</u>

The local water year type was based on the DWR San Joaquin Valley Index; 1) Wet, 2) Above Normal, 3) Below Normal, 4) Dry, 5) Critically Dry. The surface water allocation for the SJREC is dependent on the Full Natural Flow (FNF) on the Sacramento River at Shasta, as defined in the Exchange Contract. The Water Year Type listed in the water budget is based on the San Joaquin Valley Index with the exception of a critical year under the Exchange Contract (Shasta Critical). A Shasta Critical year typically coincides with a critically dry year type in the San Joaquin Valley but has added surface water delivery restrictions to the SJRECWA and also to other CVP contractors in the Delta-Mendota Subbasin. As a result, an additional Water Year Type is needed to reflect changes in the water budget parameters during Shasta Critical years under the Exchange Contract; 6) Shasta Critical.

A Shasta Critical Year under the Exchange Contract is defined as 1) if the forecasted full natural inflow to Shasta Lake for the current water year is less than 3.2 MAF or 2) the total accumulated actual deficiencies (full natural inflow to Shasta) below 4.0 MAF in the immediately prior water year or series of successive prior water years, each of which had inflows of less than 4.0 MAF, together with the forecasted deficiency for the current water year exceeds 0.8 MAF.

YEAR	WATER YEAR TYPE (SJV)		YEAR	WATER YEAR TYPE (SJV)		YEAR	WATER YEAR TYPE (SJV)
1901	Wet		1940	Above Normal		1979	Above Normal
1902	Above Normal		1941	Wet		1980	Wet
1903	Above Normal		1942	Wet		1981	Dry
1904	Wet		1943	Wet		1982	Wet
1905	Above Normal		1944	Below Normal		1983	Wet
1906	Wet		1945	Above Normal		1984	Above Normal
1907	Wet		1946	Above Normal		1985	Dry
1908	Dry		1947	Dry		1986	Wet
1909	Wet		1948	Below Normal		1987	Critically Dry
1910	Above Normal		1949	Below Normal		1988	Critically Dry
1911	Wet		1950	Below Normal		1989	Critically Dry
1912	Below Normal		1951	Above Normal		1990	Critically Dry
1913	Critically Dry		1952	Wet		1991	Critically Dry (Shasta Critical)
1914	Wet		1953	Below Normal		1992	Critically Dry (Shasta Critical)
1915	Wet		1954	Below Normal		1993	Wet
1916	Wet		1955	Dry		1994	Critically Dry (Shasta Critical)
1917	Wet		1956	Wet		1995	Wet
1918	Below Normal		1957	Below Normal		1996	Wet
1919	Below Normal		1958	Wet		1997	Wet
1920	Below Normal		1959	Dry		1998	Wet
1921	Above Normal		1960	Critically Dry		1999	Above Normal
1922	Wet		1961	Critically Dry		2000	Above Normal
1923	Above Normal		1962	Below Normal		2001	Dry
1924	Critically Dry		1963	Above Normal		2002	Dry
1925	Below Normal		1964	Dry		2003	Below Normal
1926	Dry		1965	Wet		2004	Dry
1927	Above Normal		1966	Below Normal		2005	Wet
1928	Below Normal		1967	Wet		2006	Wet
1929	Critically Dry		1968	Dry		2007	Critically Dry
1930	Critically Dry		1969	Wet		2008	Critically Dry
1931	Critically Dry		1970	Above Normal		2009	Below Normal
1932	Above Normal		1971	Below Normal		2010	Above Normal
1933	Dry		1972	Dry		2011	Wet
1934	Critically Dry		1973	Above Normal		2012	Dry
1935	Above Normal		1974	Wet		2013	Critically Dry
1936	Above Normal		1975	Wet		2014	Critically Dry (Shasta Critical)
1937	Wet		1976	Critically Dry		2015	Critically Dry (Shasta Critical)
1938	Wet		1977	Critically Dry (Shasta Critical)		2016	Dry
1939	Dry		1978	Wet		2017	Wet

Table 10 - San Joaquin Valley Water Year Type Index

Surface Water Allocation and Surface Water Delivery:

The Surface water allocation is determined based on the FNF at Shasta per the Exchange Contract. All historic water years from 1939 – 2018 were non-critical (100% allocation) with the exception of 1977, 1991, 1992, 1994, 2014, and 2015. Actual surface water deliveries are measured consistent with industry standards and requirements. Surface Water Deliveries are reported in total acre-feet.

WATER YEAR	SHASTA WATER YEAR DESIGNATION	SURFACE WATER ALLOCATION	SURFACE WATER DELIVERY (AF)
2003	Non-Critical	100%	788,000
2004	Non-Critical	100%	776,000
2005	Non-Critical	100%	731,000
2006	Non-Critical	100%	761,000
2007	Non-Critical	100%	804,000
2008	Non-Critical	100%	753,000
2009	Non-Critical	100%	756,000
2010	Non-Critical	100%	743,000
2011	Non-Critical	100%	753,000
2012	Non-Critical	100%	795,000
Avg.		***100%***	***766,000***

Table 11 – Historic Surface Water Allocation and Delivery

Groundwater Extractions:
Each year the Exchange Contractors prepare a report on well pumping inside the entities and includes pumping from the surrounding area. The total groundwater pumping came from those reports. Groundwater extractions from the Lower Aquifer are estimated at 10% of the total pumping. The cost to drill and pump a well in the upper aquifer is significantly cheaper when compared to a well pumping from the lower aquifer. In most areas of the SJREC GSA, the upper aquifer provides good quality and quantity of groundwater which has limited the number of wells drilled to extract from the lower aquifer. This assumption is consistent with the known data from the SJREC member entity owned wells. The change in groundwater storage was calculated as the physical loss in groundwater storage in the lower aquifer caused by inelastic land subsidence. Based on these results, the following table summarizes groundwater extractions from the upper aquifer and the lower aquifer. Groundwater pumping is reported in total acre-feet.

WATER YEAR	UPPER AQUIFER GROUNDWATER EXTRACTION (AF)	LOWER AQUIFER GROUNDWATER EXTRACTION (AF)	TOTAL GROUNDWATER EXTRACTION (AF)
2003	104,000	12,000	116,000
2004	127,000	14,000	141,000
2005	61,000	7,000	68,000
2006	50,000	6,000	56,000
2007	164,000	18,000	182,000
2008	146,000	16,000	162,000
2009	148,000	16,000	164,000
2010	68,000	8,000	76,000
2011	73,000	8,000	81,000
2012	129,000	14,000	143,000
Avg.	***107,000***	***12,000***	***119,000***

Table 12 – Historic Groundwater Extractions

Precipitation:
The National Weather Service Station in Los Banos, located at the CCID office, was used to represent average precipitation for the area. The total precipitation that infiltrates was calculated using the DWR method for the relationships for calculation of effective rainfall on a monthly basis in San Joaquin Valley. The equation described in Table 3-6 of the following report was used: MacGillivray, N.A. and M.D. Jones, 1989, "Effective Precipitation", California Department of Water Resources to determine the gross rainfall that infiltrates. This value contributes to meet evapotranspiration of precipitation water (ET_{Precip}). Precipitation was collected from the Los Banos NWS station in inches/day and was converted to total acre-feet for the water budget.

WATER YEAR	PRECIPITATION (inches)	TOTAL PRECIPITATION (AF)	EFFECTIVE PRECIPITATION (ET_{precip})	NON-EFFECTIVE PRECIPITATION
2003	8.5	182,000	81,000	101,000
2004	8.5	182,000	109,000	73,000
2005	15	319,000	163,000	156,000
2006	10.8	230,000	106,000	124,000
2007	4.5	96,000	15,000	81,000
2008	6.2	131,000	76,000	55,000
2009	6	129,000	72,000	57,000
2010	11.2	238,000	129,000	109,000
2011	12.6	269,000	151,000	118,000
2012	5.1	108,000	20,000	88,000
Avg.	***8.9***	***188,000***	***92,000***	***96,000***

Table 13 – Historic Precipitation

<u>Streamflow Recharge:</u>
San Joaquin River Losses: The Mendota Pool has been historically wet year-round. The total seepage in Mendota Pool equates to about 80 acre-feet per day. The SJREC GSA has about a 3-mile boundary around the Mendota Pool which has a total boundary of about 17-miles. Accordingly, the SJREC has 3/17 of the total recharge per day or about 5 TAF per year. The CDEC Stations in the San Joaquin River at Mendota Dam (MEN) and South Dos Palos (SDP) were used to determine river losses through this stretch of the river after accounting for diversions to SLCC at Sack Dam. There is about 25 cfs loss per day in Reach 3 (MEN to SDP) under normal conditions which equates to about 18 TAF per year of recharge that leaves the SJREC area towards the east side of the river. In wet years, there are additional flows in the river that contribute to additional recharge in this stretch at approximately 100 cfs (75 cfs additional) loss per day for a total of 100 days or about 15 TAF in wet years. The recharge benefit to the SJREC from the San Joaquin River is limited by the direction of groundwater flow and only water recharging in the Mendota Pool is recharging the SJREC area. Recharge from the San Joaquin River is reported in acre-feet.

Ephemeral Streams: The following ephemeral streams flow through the SJREC GSA area: Orestimba Creek, Garzas Creek, Quinto Creek, Romero Creek, Los Banos Creek and Panoche Creek. The Los Banos Creek provides the greatest contribution of aquifer recharge. During a flood release from the Los Banos Detention Reservoir, CCID measured the flow rate in the creek at various locations. This study indicated that there are 25 CFS losses in the Los Banos Creek within the SJREC GSA. This recharge rate was used and compared to actual releases from the Los Banos Creek Detention Reservoir to determine the total volume of recharge in Los Banos Creek. The USACE Water Control Data System was used to determine Los Banos Creek Detention Reservoir releases. The Orestimba Creek also provides aquifer recharge at an assumed rate of about 5 CFS during creek flows. The CDEC station Orestimba Creek near Newman (ORE) was used to determine when there was runoff from the watershed resulting in creek flows. The recharge rate from the other creeks is assumed to be comparably low and was neglected in this water budget resulting in a more conservative estimate of net recharge from local streams. Recharge from ephemeral streams is reported in acre-feet.

WATER YEAR	WATER YEAR TYPE	SAN JOAQUIN RIVER RECHARGE (AF)	LOS BANOS AND ORESTIMBA CREEKS RECHARGE (AF)	TOTAL STREAM RECHARGE (AF)
2003	Below Normal	5,000	1,000	6,000
2004	Dry	5,000	0	5,000
2005	Wet	5,000	2,000	7,000
2006	Wet	5,000	1,000	6,000
2007	Critically Dry	5,000	0	5,000
2008	Critically Dry	5,000	1,000	6,000
2009	Below Normal	5,000	0	5,000
2010	Above Normal	5,000	1,000	6,000
2011	Wet	5,000	2,000	7,000
2012	Dry	5,000	0	5,000
Avg.	***Drier than avg.***	***5,000***	***1,000***	***6,000***

Table 14 – Historic Stream Recharge

Recharge Projects:

The SJREC GSA is working on several recharge projects that are further described in Section 4.0 of this plan. None of the projects mentioned in Section 4.0 were operational during the Historic and Current Water Budget timeframes. These projects will be included in the Projected Water Budget and reported in acre-feet.

Surface Water and Groundwater Outflow:
The SJREC GSA has measured and estimated how much surface water spills from the area. These spills include outflow from tile drained fields, canal spills, field runoff and precipitation runoff. The amount of surface water outflow is reported in acre-feet.

WATER YEAR	PRECIPITATION OUTFLOW (AF)	TILE DRAIN OUTFLOW (AF)	OUTFLOW AND SPILLS (AF)	TOTAL OUTFLOW (AF)
2003	101,000	3,000	138,000	242,000
2004	73,000	3,000	133,000	209,000
2005	156,000	3,000	121,000	280,000
2006	124,000	2,000	117,000	243,000
2007	81,000	3,000	123,000	207,000
2008	55,000	2,000	108,000	165,000
2009	57,000	2,000	104,000	163,000
2010	109,000	2,000	117,000	228,000
2011	118,000	2,000	127,000	247,000
2012	88,000	2,000	103,000	193,000
Avg.	***96,000***	***2,000***	**119,000**	***217,000***

Table 15 – Historic Total Surface Water Outflow

Evapotranspiration:
The largest outflow for the water budget is the evapotranspiration (consumptive use) of crops. The SJRECWA worked with ITRC to conduct a study to determine the crop coefficients within their service area in 2008. The method followed the revised FAO-24 procedure outlined in *Crop Evapotranspiration; Guidelines for Computing Crop Water Requirements* – FAO-56. This approach is based on the dual crop coefficient procedure detailed in the FAO-56 publications with some modifications made by the ITRC that are outlined in the Evaporation from Irrigated Agricultural Land in California Study (Burt et. al., 2002). The revised FAO-24 procedure calculated the crop coefficient (K_c) on a daily basis. The basal crop coefficient (K_{cb}) is adjusted depending on climatic conditions (wind speed, relative humidity, etc.) and crop stress (K_s). The procedure also adjusts for evaporation from the upper soil profile after irrigation and rainfall events (K_e). The calculations for K_c, K_e, K_s, K_{cb}, and ET_c were done using the Modified ITRC/FAO-56 Model. The program automatically calculated each crop coefficient component on a daily basis. These established crop coefficients were used to determine ET during the historic water budget timeframe of 2003-2008, based on the 2008 study.

The SJREC GSA worked with the Irrigation Training and Research Center (ITRC) at California Polytechnic State University, San Luis Obispo to determine the actual ET of the crops for the years 2009-2016. For ET data from 2009-2016, ITRC used a modified Mapping of Evapotranspiration with Internal Calibration (METRIC) procedure to compute actual ET using LandSAT Thematic Mapper data. For more details on the ITRC-METRIC process refer to: http://www.itrc.org/papers/pdf/METRICgroundwater.pdf. The ITRC-METRIC data included evaporation form canal surfaces and also ET from phreatophytes. These values have been included in the water budget under ET_{misc}. It should be noted that some agriculture fields were included in the ITRC-METRIC as non-agriculture fields. For this reason, the miscellaneous ET from 2009-2016 was higher since it also included some agriculture fields but doesn't have an impact on the water budget since both ET_c, ETi_w, and ET_{misc} are net outflows. All ET values are reported in acre-feet.

WATER YEAR	ET_C (AF)	ET_{iw} (AF)	ET_{misc} (AF)	Total ET (AF)
2003	719,000	638,000	20,000	740,000
2004	740,000	631,000	20,000	761,000
2005	707,000	544,000	20,000	726,000
2006	704,000	598,000	20,000	723,000
2007	709,000	694,000	20,000	731,000
2008	713,000	637,000	21,000	735,000
2009	665,000	593,000	67,000	732,000
2010	575,000	446,000	56,000	631,000
2011	628,000	477,000	66,000	694,000
2012	618,000	598,000	62,000	680,000
Avg.	***678,000***	***586,000***	***37,000***	***715,000***

Table 16 – Historic Evapotranspiration (Consumptive Use)

Lateral Inflow and Outflow of Groundwater:

The lateral inflow and outflow of groundwater in the SJREC area was determined using measured aquifer characteristics. Transmissivity values were determined from aquifer tests and localized deep well pumping tests. Water level maps for wet, normal and dry water year types were prepared to determine the elevation and direction of groundwater flow for both the Upper and Lower Aquifers. KDSA reviewed the water elevation maps and determined the transects and gradient of groundwater flow. Darcy's Law was used to determine groundwater flows where the total flow equals the product of the transmissivity, gradient and transect. These maps were used to determine the volume of groundwater inflow and outflow from the SJREC under those respective water year types. The data generated for normal conditions was used as a surrogate for Water Year Types designated as Above Normal and Below Normal. The data generated for dry conditions was used as a surrogate for Water Year Types designated as Dry and Critically Dry. This is a common method to determine actual groundwater flows and is a consistent method used in the various GSP's in the Delta-Mendota Subbasin. All values are reported in acre-feet.

WATER YEAR	GROUNDWATER INFLOW (Upper Aquifer)	GROUNDWATER OUTFLOW (Upper Aquifer)	GROUNDWATER INFLOW (Lower Aquifer)	GROUNDWATER OUTFLOW (Lower Aquifer)	GROUNDWATER SEEPAGE THROUGH CORCORAN CLAY
2003	71,000	53,000	18,000	47,000	45,000
2004	44,000	69,000	14,000	73,000	45,000
2005	73,000	40,000	18,000	24,000	45,000
2006	73,000	40,000	18,000	24,000	45,000
2007	44,000	69,000	14,000	73,000	45,000
2008	44,000	69,000	14,000	73,000	45,000
2009	71,000	53,000	18,000	47,000	45,000
2010	71,000	53,000	18,000	47,000	45,000
2011	73,000	40,000	18,000	24,000	45,000
2012	44,000	69,000	14,000	73,000	45,000
Avg.	***61,000***	***56,000***	***16,000***	***51,000***	***45,000***

Table 17 – Historic Lateral Groundwater Flows

Historic Water Budget Change in Groundwater Storage:

The Historic Water Budget defined from 2003-2012 was drier than the historical average and is likely to result with a change in groundwater storage that reflects the drier condition. The HCM defines two distinct aquifers, upper and lower, as separated by the Corcoran Clay. It should be noted that groundwater extraction from outside the SJREC area has an impact on lateral groundwater flow and stream recharge. For this reason, the SJREC have prepared a Free-Body Diagram to determine if our groundwater management efforts have a net positive impact on the aquifer (more surface water delivery than demand) which is indicative of sustainable groundwater management for aquifer storage.

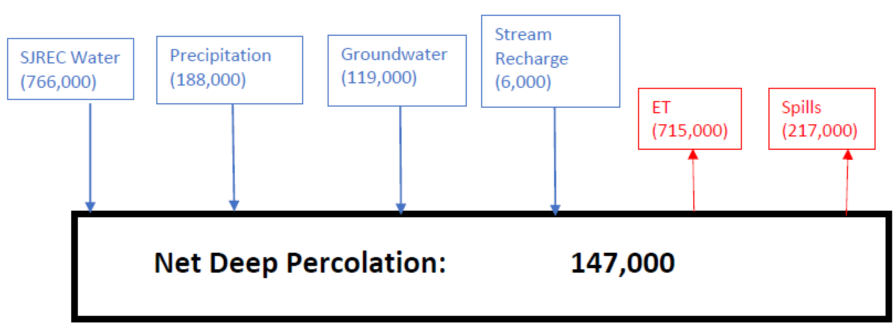

Figure 10 – Historic Free-Body Diagram for Surface Water Interaction

The result of the net deep percolation shows an average annual recharge from direct, in-direct and in-lieu recharge of 147 TAF/year. The recharge includes but is not limited to; deep percolation from irrigation, deep percolation of precipitation, stream seepage and canal seepage.

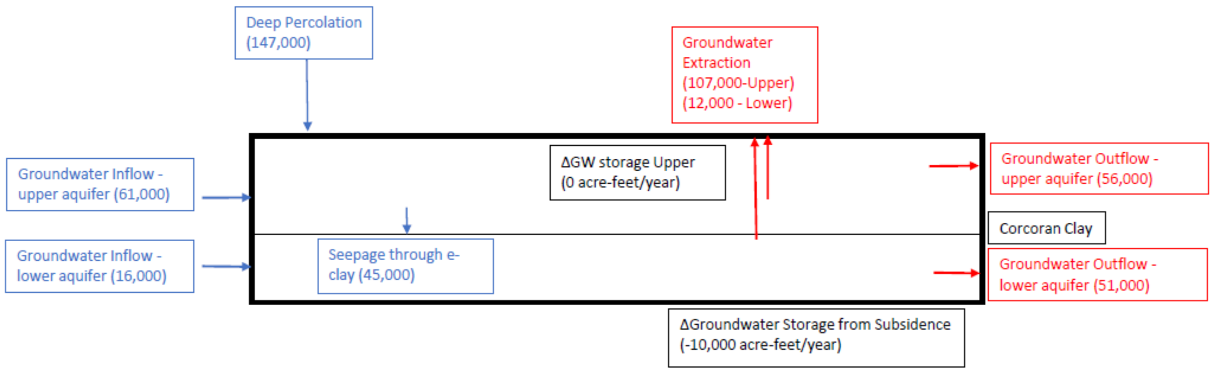

Figure 11 – Historic Free-Body Diagram for Groundwater Interaction

The results of the groundwater interaction show no change in the overall annual average change in storage in the upper aquifer. For the purpose of this analysis the upper aquifer is assumed to be in balance even through this slightly drier than average timeframe. The lower aquifer shows an average annual loss of 10 TAF in groundwater storage. The SJREC are extracting an average annual volume of 12 TAF from the lower aquifer which equates to an annual extraction of 0.05 AF/acre. It is reasonable to assert that any reduction in groundwater storage, is not principally caused by the extraction occurring with the SJREC GSA area. The primary cause of the reduction in groundwater storage in the lower aquifer is large lateral groundwater outflow particularly in dry and critically dry water years. The large groundwater outflow is indicative of over-drafting occurring outside the GSA boundary which has caused inelastic land subsidence.

The actual change in groundwater storage in the lower aquifer is primarily due to compaction caused by inelastic land subsidence resulting from groundwater extractions and subsurface groundwater flow. The negative effects of over extraction from the lower aquifer can have residual effects of land subsidence. In other words, land subsidence can continue to occur even after groundwater pumping has stopped. It is for this reason, that the following table and charts are using the approximate change in groundwater storage from the lower aquifer caused in that year and it is further assumed, for illustration purposes, that there was not any land subsidence in wet years.

YEAR	UPPER AQUIFER CHANGE IN STORAGE (AF)	LOWER AQUIFER CHANGE IN STORAGE (AF)
2003	-20,000	-2,000
2004	-62,000	-24,000
2005	45,000	0
2006	23,000	0
2007	-83,000	-24,000
2008	-63,000	-24,000
2009	-15,000	-2,000
2010	109,000	-2,000
2011	84,000	0
2012	-20,000	-24,000
Avg.	***0***	***-10,000***

Table 18 – Change in Groundwater Storage for the Historical Water Budget

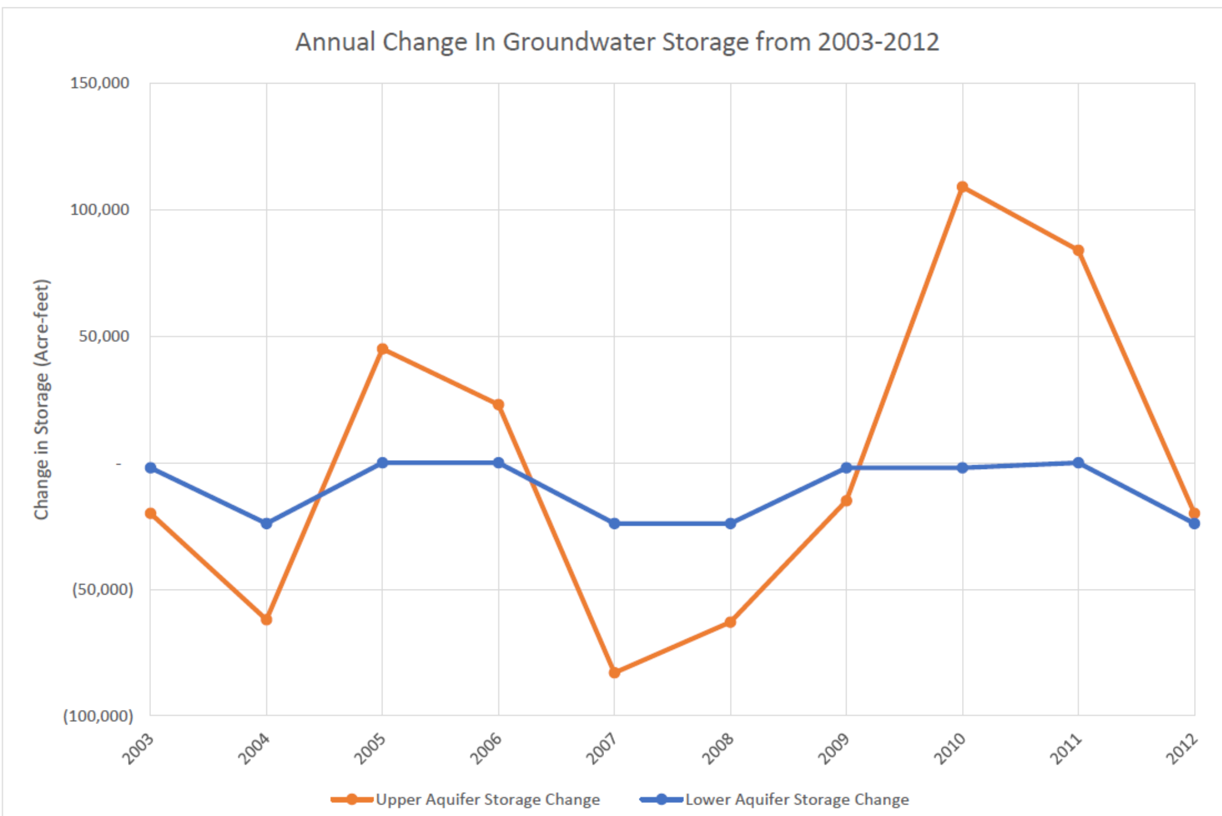

Figure 12 – Annual Historic Change in Groundwater Storage Graph

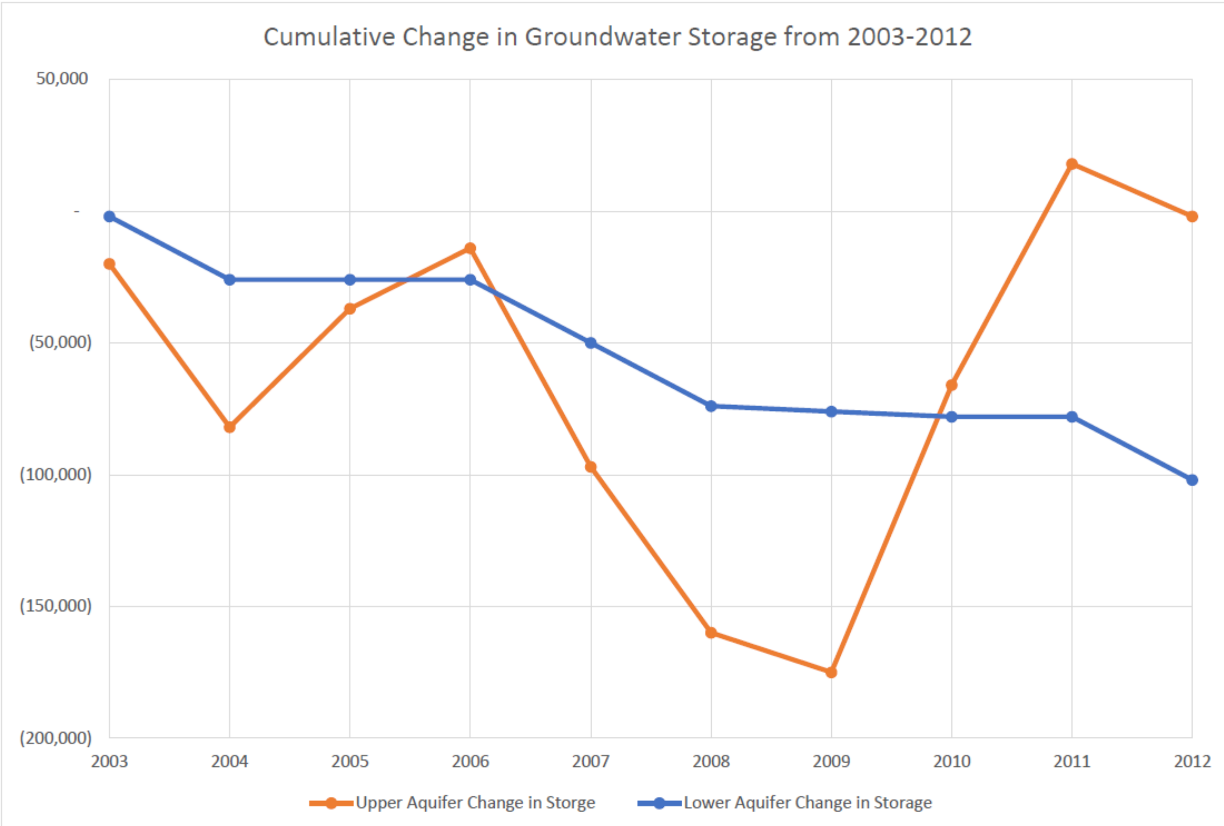

Figure 13 - Cumulative Historic Change in Groundwater Storage Graph

2.2.3.2 Current Water Budget for SJREC GSA

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

Surface Water Allocation and Surface Water Delivery:

WATER YEAR	SHASTA WATER YEAR DESIGNATION	SURFACE WATER ALLOCATION	SURFACE WATER DELIVERY (AF)
2013	Non-Critical	100%	748,000

Table 19 - Current Surface Water Allocation and Delivery

Groundwater Extractions:

WATER YEAR	UPPER AQUIFER GROUNDWATER EXTRACTION (AF)	LOWER AQUIFER GROUNDWATER EXTRACTION (AF)	TOTAL GROUNDWATER EXTRACTION (AF)
2013	161,000	18,000	179,000

Table 20 - Current Groundwater Extractions

Precipitation:

WATER YEAR	PRECIPITATION (inches)	TOTAL PRECIPITATION (AF)	EFFECTIVE PRECIPITATION (ET_{precip})	NON-EFFECTIVE PRECIPITATION
2013	5.4	115,000	52,000	63,000

Table 21 - Current Precipitation

Streamflow Recharge:

WATER YEAR	WATER YEAR TYPE	SAN JOAQUIN RIVER RECHARGE (AF)	LOS BANOS AND ORESTIMBA CREEKS RECHARGE (AF)	TOTAL STREAM RECHARGE (AF)
2013	Critically Dry	5,000	1,000	6,000

Table 22 - Current Stream Recharge

Surface Water and Groundwater Outflow:

WATER YEAR	PRECIPITATION OUTFLOW (AF)	TILE DRAIN OUTFLOW (AF)	OUTFLOW AND SPILLS (AF)	TOTAL SWATER OUTFLOW (AF)
2013	63,000	2,000	108,000	173,000

Table 23 - Current Total Surface Water Outflow

Evapotranspiration:

WATER YEAR	ET_C (AF)	ET_{iw} (AF)	ET_{misc} (AF)	Total ET (AF)
2013	608,000	556,000	57,000	665,000

Table 24 - Current Evapotranspiration (Consumptive Use)

Lateral Inflow and Outflow of Groundwater:

WATER YEAR	GROUNDWATER INFLOW (Upper Aquifer)	GROUNDWATER OUTFLOW (Upper Aquifer)	GROUNDWATER INFLOW (Lower Aquifer)	GROUNDWATER OUTFLOW (Lower Aquifer)	GROUNDWATER SEEPAGE THROUGH CORCORAN CLAY
2013	44,000	69,000	14,000	73,000	45,000

Table 25 - Current Lateral Groundwater Flows

Current Water Budget Change in Groundwater Storage:

The change in groundwater storage for the upper aquifer is representative of a snapshot in time during a critically dry year. The upper aquifer fully recovered after the back-to-back critically dry years during the Historic Water Budget. While this shows a one-year reduction in groundwater storage, it is not indicative of average conditions and serves as a one-year representative of recent conditions. In fact, we have seen the upper aquifer recover even after going through the extended drought of 2013-2016. The change in groundwater storage in the Upper Aquifer, represents an average water level decline of less than 1 foot across the SJREC GSA area. The SJREC extracted 18 TAF from the lower aquifer which equates to an extraction of 0.07 AF/acre. The change in groundwater storage from the lower aquifer can be described similarly to the Historic Water Budget analysis.

YEAR	UPPER AQUIFER CHANGE IN STORAGE (AF)	LOWER AQUIFER CHANGE IN STORAGE (AF)
2013	-23,000	-24,000

Table 26 - Change in Groundwater Storage for the Current Water Budget

2.2.3.3 Projected Water Budget for SJREC GSA

Climate Change:

The SJREC GSP Group used the climate change data provided by DWR and based on the California Water Commission's Water Storage Investment Program (WSIP) climate change analysis results. Climate Change impacts need to be evaluated to determine the effects on precipitation, ET and streamflow. The gridded data provided monthly Climate Change factors on an approximately fifteen square mile grid for 2030 (representing years 2016-2045) and 2070 (representing years 2046-2085) for precipitation and ET. That data was gathered for each monitoring zone in the SJREC GSA. A weighted average based on acreage was then applied to provide an overall representative climate change factor across the SJREC GSA area for each month. The representative climate change factor for each month was used to determine the annual climate change factor. The 2030 annual climate change factors were used in the projected water budgets from 2018-2045 for precipitation and ET. The 2070 annual climate change factors were used in the projected water budgets from 2046-2070 for precipitation and ET. The Climate Change model also determined the effects on streamflow with factors for 2030 and 2070. Similarly to the Climate Change factors for precipitation and ET, the projected water budget used the 2030 streamflow factors for years 2018-2045 and the 2070 streamflow factor for years 2046-2070. The three main rivers that were reviewed for potential impacts to the Delta-Mendota Subbasin were the Sacramento, San Joaquin and Kings rivers. The Sacramento River Full Natural Flow was reviewed to determine which years would be classified as Shasta Critical under the Exchange Contract. The San Joaquin and Kings rivers were reviewed to determine the impacts to stream recharge and flood flows. The impacts of climate change are reported as dimensionless factors in the projected water budget.

For more details on the climate change modeling refer to the WSIP and the guidance document provided by DWR: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Climate-Change-Guidance_Final.pdf

Projected Water Year Type:

The GSA's in the Delta-Mendota Subbasin, through the Technical Subcommittee and approved by the Coordination Committee, agreed on the following approach for Projected Water Budgets and received confirmation from DWR on this approach. The Projected Water Budget has been determined to represent water years 2014-2070. It was decided at the Subbasin level to use actual data from water years 2014-2017. Furthermore, it was decided to replay the hydrology of 1965-2017 with the caveat that 1979 would represent the fifth year of the projection and following sequentially the historic water year 1965 would represent the forty-fourth year of the projection. Essentially, the subbasin is using a sequential fifty-three year hydrologic cycle but started in the middle of the cycle to more nearly mimic the most recent drought. The actual projected values would begin starting in 2018. A replay of historic hydrology was used where the hydrology from 1979 is representative of the water budget year 2018, or the fifth year in the projected water budget. The following year, 2019 or the sixth year, of the Projected Water Budget is a replay of the 1980 water year and so on for all subsequent years and having the water year 2057 represented by the historic hydrology from the year 1965. The historic and current water budgets are used as a baseline condition for the water budget entries based on the Water Year type. For example; Water Year 2010 was classified as Above Normal and the water budget values from 2010 will be used as a baseline for all Above Normal years in the projected water budget. This process has now established a baseline condition.

Actual Water Year	Historical Reference Used for Hydrology	Historical Reference for Water Delivery/Demand (surrogate year)	Shasta Water Year Designation	Water Year Type (SJ Valley)
2014	2014	2014	Critical	Shasta Critical
2015	2015	2015	Critical	Shasta Critical
2016	2016	2016	Non-Critical	Dry
2017	2017	2017	Non-Critical	Wet
2018	1979	2010	Non-Critical	Above Normal
2019	1980	2017	Non-Critical	Wet
2020	1981	2012	Non-Critical	Dry
2021	1982	2017	Non-Critical	Wet
2022	1983	2017	Non-Critical	Wet
2023	1984	2010	Non-Critical	Above Normal
2024	1985	2012	Non-Critical	Dry
2025	1986	2017	Non-Critical	Wet
2026	1987	2008	Non-Critical	Critically Dry
2027	1988	2008	Non-Critical	Critically Dry
2028	1989	2008	Non-Critical	Critically Dry
2029	1990	2008	Non-Critical	Critically Dry
2030	1991	Avg. 2014 & 2015	Critical	Shasta Critical
2031	1992	Avg. 2014 & 2015	Critical	Shasta Critical
2032	1993	2017	Non-Critical	Wet
2033	1994	2008	Non-Critical	Critically Dry
2034	1995	2017	Non-Critical	Wet
2035	1996	2017	Non-Critical	Wet
2036	1997	2017	Non-Critical	Wet
2037	1998	2017	Non-Critical	Wet
2038	1999	2010	Non-Critical	Above Normal
2039	2000	2010	Non-Critical	Above Normal
2040	2001	2012	Non-Critical	Dry
2041	2002	2012	Non-Critical	Dry
2042	2003	2003	Non-Critical	Below Normal
2043	2004	2004	Non-Critical	Dry
2044	2005	2005	Non-Critical	Wet
2045	2006	2006	Non-Critical	Wet
2046	2007	2007	Non-Critical	Critically Dry
2047	2008	2008	Non-Critical	Critically Dry
2048	2009	2009	Non-Critical	Below Normal
2049	2010	2010	Non-Critical	Above Normal
2050	2011	2011	Non-Critical	Wet
2051	2012	2012	Non-Critical	Dry
2052	2013	2013	Non-Critical	Critically Dry
2053	2014	2014	Critical	Shasta Critical
2054	2015	2015	Critical	Shasta Critical
2055	2016	2016	Non-Critical	Dry
2056	2017	2017	Non-Critical	Wet
2057	1965	2017	Non-Critical	Wet
2058	1966	2009	Non-Critical	Below Normal
2059	1967	2017	Non-Critical	Wet
2060	1968	2012	Non-Critical	Dry
2061	1969	2017	Non-Critical	Wet
2062	1970	2010	Non-Critical	Above Normal
2063	1971	2009	Non-Critical	Below Normal
2064	1972	2012	Non-Critical	Dry
2065	1973	2010	Non-Critical	Above Normal
2066	1974	2017	Non-Critical	Wet
2067	1975	2017	Non-Critical	Wet
2068	1976	Avg. 2014 & 2015	Critical	Shasta Critical
2069	1977	Avg. 2014 & 2015	Critical	Shasta Critical
2070	1978	2017	Non-Critical	Wet

Table 27 - Surrogate Water Years

Surface Water Allocation and Surface Water Delivery:

The surface water allocation to the SJREC is determined based on the FNF at Shasta per the Exchange Contract. The result of the WSIP program was used to determine what the projected FNF into Shasta would be after accounting for climate change. As shown above, historic water deliveries based on water year type were used as surrogates to project future water supply allocations and deliveries. As an example, the historic water year ‘1984’ was classified as an above normal water year for the San Joaquin Valley. Similarly 2010, in our historic water budget, was an above normal water year, and surface water deliveries in the projected water budget will mimic what was delivered in 2010 in all water years designated as above normal. This process was used to determine surface water deliveries for all water year types. The climate change model provided projected inflows using 2030 and 2070 factors for Water Years 1922-2003. In order to simulate climate change impacts to stream flow from 2004-2017, the following years were respectively used as surrogates: 2002, 2002, 1998, 1992, 1992, 2002, 2003, 1997, 1992, 1992, 1976, 1977, 2002, 1998. This method was discussed and approved by both the Delta-Mendota Coordination Committee and DWR. Table 27 describes which historic years are used when determining projected deliveries, with the exception of the streamflow from 2004-2017 as listed above. Projected surface water deliveries are assumed to follow historic patterns resulting in projecting surface water deliveries based on established data from 2003-2017. Projected surface water deliveries are reported in total acre-feet.

WATER YEAR	SHASTA WATER YEAR DESIGNATION	WATER YEAR TYPE (SJ VALLEY)	SURFACE WATER ALLOCATION	SURFACE WATER DELIVERY (AF)
2014	Critical	Shasta Critical	77%	501,000
2015	Critical	Shasta Critical	77%	447,000
2016	Non-Critical	Dry	100%	646,000
2017	Non-Critical	Wet	100%	756,000
2018	Non-Critical	Above Normal	100%	743,000
2019	Non-Critical	Wet	100%	756,000
2020	Non-Critical	Dry	100%	795,000
2021	Non-Critical	Wet	100%	756,000
2022	Non-Critical	Wet	100%	756,000
2023	Non-Critical	Above Normal	100%	743,000
2024	Non-Critical	Dry	100%	795,000
2025	Non-Critical	Wet	100%	756,000
2026	Non-Critical	Critically Dry	100%	753,000
2027	Non-Critical	Critically Dry	100%	753,000
2028	Non-Critical	Critically Dry	100%	753,000
2029	Non-Critical	Critically Dry	100%	753,000
2030	Critical	Shasta Critical	77%	590,000
2031	Critical	Shasta Critical	77%	590,000
2032	Non-Critical	Wet	100%	756,000
2033	Non-Critical	Critically Dry	100%	753,000
2034	Non-Critical	Wet	100%	756,000
2035	Non-Critical	Wet	100%	756,000
2036	Non-Critical	Wet	100%	756,000
2037	Non-Critical	Wet	100%	756,000
2038	Non-Critical	Above Normal	100%	743,000
2039	Non-Critical	Above Normal	100%	743,000
2040	Non-Critical	Dry	100%	795,000
2041	Non-Critical	Dry	100%	795,000
2042	Non-Critical	Below Normal	100%	788,000
2043	Non-Critical	Dry	100%	776,000
2044	Non-Critical	Wet	100%	731,000
2045	Non-Critical	Wet	100%	761,000
2046	Non-Critical	Critically Dry	100%	804,000
2047	Non-Critical	Critically Dry	100%	753,000
2048	Non-Critical	Below Normal	100%	756,000
2049	Non-Critical	Above Normal	100%	743,000
2050	Non-Critical	Wet	100%	753,000
2051	Non-Critical	Dry	100%	795,000
2052	Non-Critical	Critically Dry	100%	748,000
2053	Critical	Shasta Critical	77%	590,000
2054	Critical	Shasta Critical	77%	590,000
2055	Non-Critical	Dry	100%	646,000
2056	Non-Critical	Wet	100%	756,000
2057	Non-Critical	Wet	100%	756,000
2058	Non-Critical	Below Normal	100%	756,000
2059	Non-Critical	Wet	100%	756,000
2060	Non-Critical	Dry	100%	795,000
2061	Non-Critical	Wet	100%	756,000
2062	Non-Critical	Above Normal	100%	743,000
2063	Non-Critical	Below Normal	100%	756,000
2064	Non-Critical	Dry	100%	795,000
2065	Non-Critical	Above Normal	100%	743,000
2066	Non-Critical	Wet	100%	756,000
2067	Non-Critical	Wet	100%	756,000
2068	Critical	Shasta Critical	77%	590,000
2069	Critical	Shasta Critical	77%	590,000
2070	Non-Critical	Wet	100%	756,000
Avg:				**729,000**

Table 28 - Projected Surface Water Delivery

Projected Groundwater Extractions:

The SJREC GSA has been sustainably managing groundwater extractions and plans to continue the groundwater extractions, based on water year type, in the same quantities to meet demand. Projected groundwater extractions are assumed to follow historic patterns resulting in projecting groundwater extractions based on established data from 2003-2017. Projecting the amount of groundwater extractions uses the same method as projecting surface water deliveries as described above; use historic surrogate years based on water year type to project how much groundwater will be pumped. All groundwater extractions are reported in acre-feet.

WATER YEAR	UPPER AQUIFER GROUNDWATER EXTRACTIONS (AF)	LOWER AQUIFER GROUNDWATER EXTRACTIONS (AF)	TOTAL GROUNDWATER EXTRACTION (AF)
2014	169,000	19,000	188,000
2015	228,000	25,000	253,000
2016	59,000	6,000	65,000
2017	22,000	2,000	24,000
2018	68,000	8,000	76,000
2019	22,000	2,000	24,000
2020	59,000	6,000	65,000
2021	22,000	2,000	24,000
2022	22,000	2,000	24,000
2023	68,000	8,000	76,000
2024	59,000	6,000	65,000
2025	22,000	2,000	24,000
2026	146,000	16,000	162,000
2027	146,000	16,000	162,000
2028	146,000	16,000	162,000
2029	146,000	16,000	162,000
2030	166,000	18,000	184,000
2031	163,000	18,000	181,000
2032	22,000	2,000	24,000
2033	146,000	16,000	162,000
2034	22,000	2,000	24,000
2035	22,000	2,000	24,000
2036	22,000	2,000	24,000
2037	22,000	2,000	24,000
2038	68,000	8,000	76,000
2039	68,000	8,000	76,000
2040	59,000	6,000	65,000
2041	59,000	6,000	65,000
2042	104,000	12,000	116,000
2043	59,000	6,000	65,000
2044	22,000	2,000	24,000
2045	22,000	2,000	24,000
2046	161,000	18,000	179,000
2047	161,000	18,000	179,000
2048	148,000	16,000	164,000
2049	68,000	8,000	76,000
2050	22,000	2,000	24,000
2051	59,000	6,000	65,000
2052	161,000	18,000	179,000
2053	166,000	18,000	184,000
2054	163,000	18,000	181,000
2055	59,000	6,000	65,000
2056	22,000	2,000	24,000
2057	22,000	2,000	24,000
2058	148,000	16,000	164,000
2059	22,000	2,000	24,000
2060	59,000	6,000	65,000
2061	22,000	2,000	24,000
2062	68,000	8,000	76,000
2063	148,000	16,000	164,000
2064	59,000	6,000	65,000
2065	68,000	8,000	76,000
2066	22,000	2,000	24,000
2067	22,000	2,000	24,000
2068	166,000	18,000	184,000
2069	163,000	18,000	181,000
2070	22,000	2,000	24,000
Average:	**81,000**	**9,000**	**90,000**

Table 29- Projected Groundwater Extractions

Projected Precipitation:

Historical data from the National Weather Service Station in Los Banos, located at the CCID office, was used to establish a baseline for projecting future annual precipitation. Data was collected from this station from 1961-2017 as a baseline for over 50 years of historical precipitation. Refer to Table 27 for a historical reference for water year based on hydrology. Data from this historical record was used as a baseline prior to adding climate change factors (CCF). The CCF's for precipitation were provided in a gridded format, by DWR, for approximately each 15 square miles. The value of each grid cell that overlaid the SJREC GSP Group was averaged to determine the overall factor for this area. The CCF for precipitation for each year was applied to baseline condition for each year to estimate the projected precipitation to be expected at the Los Banos weather station. As described previously, actual data was used for water years 2014-2017 in the projected water budget. The 2030 CCF's were used for water years 2018-2045 and the 2070 CCF's were used for water years 2046-2070. The climate change model provided projected precipitation using 2030 and 2070 factors for Water Years 1915-2011. In order to simulate climate change impacts to precipitation from 2011-2017, the following years were respectively used as surrogates: 2001, 1992, 1976, 1977, 2002, and 2011. This method was discussed and approved by both the Delta-Mendota Coordination Committee and DWR. The results of the climate change modeling shows minor fluctuations above and below historic average conditions. The long-term average change shows a reduction in precipitation of less than one percent for this area.

WATER YEAR	PRECIPITATION (inches)	TOTAL PRECIPITATION (AF)	CLIMATE CHANGE FACTOR	EFFECTIVE PRECIPITATION (ET_{precip})	NON-EFFECTIVE PRECIPITATION
2014	6.86	93,000	1.000	23,000	70,000
2015	10.18	142,000	1.000	81,000	61,000
2016	10.39	281,000	1.000	140,000	141,000
2017	5.04	286,000	1.000	166,000	120,000
2018	10.75	200,000	0.996	108,000	92,000
2019	8.75	209,000	0.992	108,000	101,000
2020	11.31	130,000	0.965	57,000	73,000
2021	5.90	277,000	1.007	135,000	142,000
2022	15.53	332,000	1.037	169,000	163,000
2023	7.71	141,000	1.003	83,000	58,000
2024	7.82	148,000	0.989	67,000	81,000
2025	3.54	259,000	0.997	147,000	112,000
2026	14.47	166,000	1.022	88,000	78,000
2027	9.25	191,000	0.992	86,000	105,000
2028	9.41	139,000	1.026	31,000	108,000
2029	6.77	143,000	1.032	43,000	100,000
2030	5.11	151,000	1.008	55,000	96,000
2031	16.66	188,000	1.024	93,000	95,000
2032	9.40	281,000	0.992	181,000	100,000
2033	9.89	155,000	1.027	68,000	87,000
2034	6.34	289,000	0.976	163,000	126,000
2035	12.92	229,000	0.981	123,000	106,000
2036	15.05	263,000	1.027	187,000	76,000
2037	6.61	494,000	0.963	287,000	207,000
2038	7.00	147,000	0.983	49,000	98,000
2039	12.22	174,000	0.961	84,000	90,000
2040	7.65	192,000	1.016	86,000	106,000
2041	9.04	124,000	1.000	51,000	73,000
2042	6.36	189,000	1.055	86,000	103,000
2043	6.54	178,000	1.056	107,000	71,000
2044	7.07	336,000	1.011	179,000	157,000
2045	8.63	223,000	0.991	101,000	122,000
2046	13.31	90,000	0.955	16,000	74,000
2047	7.11	134,000	1.017	78,000	56,000
2048	13.89	118,000	0.931	55,000	63,000
2049	10.94	240,000	0.985	131,000	109,000
2050	12.06	256,000	0.957	144,000	112,000
2051	24.08	103,000	1.009	18,000	85,000
2052	7.03	114,000	0.988	52,000	62,000
2053	8.51	91,000	0.973	23,000	68,000
2054	8.88	137,000	0.970	78,000	59,000
2055	5.83	266,000	0.951	133,000	133,000
2056	8.44	273,000	0.957	159,000	114,000
2057	7.91	226,000	0.987	105,000	121,000
2058	15.59	180,000	0.969	108,000	72,000
2059	10.55	232,000	0.961	125,000	107,000
2060	4.42	116,000	0.925	39,000	77,000
2061	6.22	334,000	1.011	209,000	125,000
2062	5.96	156,000	0.948	69,000	87,000
2063	11.43	164,000	0.981	65,000	99,000
2064	12.60	70,000	0.929	23,000	47,000
2065	4.80	314,000	1.021	215,000	99,000
2066	5.38	195,000	0.989	87,000	108,000
2067	4.39	209,000	1.045	98,000	111,000
2068	6.65	140,000	0.973	22,000	118,000
2069	13.15	105,000	0.970	19,000	86,000
2070	13.40	354,000	0.998	225,000	129,000
Average:	**9.35**	**199,000**	**0.992**	**100,000**	**99,000**

Table 30 - Projected Precipitation

Projected Streamflow Recharge:

San Joaquin River Losses: The climate change model was used to project the FNF into Millerton Reservoir on the San Joaquin River. The average change during the projected water budget has a reduction of FNF into Millerton of about four percent. Under most year types, there was not any water in the SJREC area in the San Joaquin River that was released from Millerton during the Historic and Current Water Budget timeframes. Rather, the water that is in the San Joaquin River adjacent to the Exchange Contractors has typically been delivered via the DMC. There are a few exceptions when water is released from Millerton and is in the river adjacent to the Exchange Contractors. The first such year type is when the USBR is unable to meet the delivery obligations to the SJREC via the DMC. The operation does not result in an increase in recharge from the San Joaquin River for the stretch of river adjacent to the Exchange Contractors. The second type is during flood releases from Millerton which typically occurs during a Wet water year type. These releases increase recharge in the river and have been included in our Historic and Current Water Budget. The climate change model shows a reduction of FNF into Millerton during wet years by about seven percent. The climate change model provided projected inflows using 2030 and 2070 factors for Water Years 1922-2003. In order to simulate climate change impacts to stream flow from 2004-2017, the following years were respectively used as surrogates: 2002, 2002, 1998, 1992, 1992, 2002, 2003, 1997, 1992, 1992, 1976, 1977, 2002, 1998. This method was discussed and approved by both the Delta-Mendota Coordination Committee and DWR.

Another component that may increase the overall seepage occurring in the San Joaquin River is a resultant of the San Joaquin River Restoration Program (SJRRP) implemented by the USBR. The SJRRP is the direct result of the San Joaquin River Restoration Settlement. Under historic conditions, the San Joaquin River was dry downstream of Gravelly Ford except during flood releases. The San Joaquin River was wet, from deliveries to the Exchange Contractors via the DMC, from San Mateo Avenue down to Sack Dam. For more information about the SJRRP refer to: http://www.restoresjr.net/

There are two main factors mentioned that will have an impact on the potential recharge in the San Joaquin River; 1) Climate Change and 2) SJRRP. The results of the climate change model shows a slight reduction in the FNF of the river. The SJRRP, when implemented, will no doubt show an increase in seepage in the river primarily in the historically dry reaches of the river but may also increase the seepage in historically wet reaches of the river due to increased flow through those areas. With this and other potential uncertainties in mind, the SJREC GSP Group has elected to use a conservative approach by assuming the recharge in the San Joaquin River will mimic historical conditions and did not include additional recharge that may occur due to the SJRRP.

Ephemeral Streams: The flood water from ephemeral streams in the SJREC area is due to local precipitation. The CCF's for precipitation indicates a reduction of less than one percent. Additionally, the climate change modeling shows that there is a reduction of less than one percent precipitation in wet years which is typically when the flood flows on the streams occurs. The projected recharge from Ephemeral Streams is assumed to mimic historical conditions.

Recharge Projects:

The SJREC are developing several recharge projects that are further described in Section 4.0 of this plan. Actual data is used for water years 2014-2017. For water years 2018-2070, the average annual benefit of the projects is assumed. No water is recharged during Shasta Critical water years.

The SJREC has several projects that are discussed in Section 4.0 that will contribute additional recharge. The operations of these recharge projects will be different for GSA's in the Delta-Mendota Subbasin. For many of the other GSA's, intentional recharge projects will be used to offset groundwater extractions as a means to achieve sustainability. The SJREC GSA is already sustainable and these recharge projects are intended to help meet peak demand and provide an additional water supply during Shasta Critical years.

WATER YEAR	WATER YEAR TYPE (SJ VALLEY)	SAN JOAQUIN RIVER RECHARGE (AF)	LOS BANOS AND ORESTIMBA CREEKS RECHARGE (AF)	RECHARGE PROJECTS (AF)	TOTAL STREAM RECHARGE (AF)
2014	Shasta Critical	5,000	0	-	**5,000**
2015	Shasta Critical	5,000	1,000	-	**6,000**
2016	Dry	5,000	2,000	-	**7,000**
2017	Wet	5,000	3,000	6,000	**14,000**
2018	Above Normal	5,000	1,000	6,000	**12,000**
2019	Wet	6,000	2,000	6,000	**14,000**
2020	Dry	5,000	0	6,000	**11,000**
2021	Wet	6,000	2,000	6,000	**14,000**
2022	Wet	6,000	2,000	6,000	**14,000**
2023	Above Normal	5,000	1,000	6,000	**12,000**
2024	Dry	5,000	0	6,000	**11,000**
2025	Wet	6,000	2,000	6,000	**14,000**
2026	Critically Dry	5,000	1,000	6,000	**12,000**
2027	Critically Dry	5,000	1,000	6,000	**12,000**
2028	Critically Dry	5,000	1,000	6,000	**12,000**
2029	Critically Dry	5,000	1,000	6,000	**12,000**
2030	Shasta Critical	5,000	1,000	-	**6,000**
2031	Shasta Critical	5,000	1,000	-	**6,000**
2032	Wet	6,000	2,000	6,000	**14,000**
2033	Critically Dry	5,000	1,000	6,000	**12,000**
2034	Wet	6,000	2,000	6,000	**14,000**
2035	Wet	6,000	2,000	6,000	**14,000**
2036	Wet	6,000	2,000	6,000	**14,000**
2037	Wet	6,000	2,000	6,000	**14,000**
2038	Above Normal	5,000	1,000	6,000	**12,000**
2039	Above Normal	5,000	1,000	6,000	**12,000**
2040	Dry	5,000	0	6,000	**11,000**
2041	Dry	5,000	0	6,000	**11,000**
2042	Below Normal	5,000	1,000	6,000	**12,000**
2043	Dry	5,000	0	6,000	**11,000**
2044	Wet	5,000	2,000	6,000	**13,000**
2045	Wet	5,000	1,000	6,000	**12,000**
2046	Critically Dry	5,000	0	6,000	**11,000**
2047	Critically Dry	5,000	1,000	6,000	**12,000**
2048	Below Normal	5,000	0	6,000	**11,000**
2049	Above Normal	5,000	1,000	6,000	**12,000**
2050	Wet	5,000	2,000	6,000	**13,000**
2051	Dry	5,000	0	6,000	**11,000**
2052	Critically Dry	5,000	1,000	6,000	**12,000**
2053	Shasta Critical	5,000	0	-	**5,000**
2054	Shasta Critical	5,000	1,000	-	**6,000**
2055	Dry	5,000	2,000	6,000	**13,000**
2056	Wet	5,000	3,000	6,000	**14,000**
2057	Wet	6,000	2,000	6,000	**14,000**
2058	Below Normal	4,000	1,000	6,000	**11,000**
2059	Wet	6,000	2,000	6,000	**14,000**
2060	Dry	5,000	0	6,000	**11,000**
2061	Wet	6,000	2,000	6,000	**14,000**
2062	Above Normal	5,000	1,000	6,000	**12,000**
2063	Below Normal	4,000	1,000	6,000	**11,000**
2064	Dry	5,000	0	6,000	**11,000**
2065	Above Normal	5,000	1,000	6,000	**12,000**
2066	Wet	6,000	2,000	6,000	**14,000**
2067	Wet	6,000	2,000	6,000	**14,000**
2068	Shasta Critical	5,000	1,000	-	**6,000**
2069	Shasta Critical	5,000	1,000	-	**6,000**
2070	Wet	6,000	2,000	6,000	**14,000**
Average:		**5,000**	**1,000**	**5,000**	**11,000**

Table 31 - Projected Stream and Intentional Recharge

Surface Water and Groundwater Outflow:

The SJREC member entities have each worked on conservation projects to reduce losses and maintain great service to the growers. One way to reduce losses from the system is to construct regulating reservoirs to capture potential spills. Regulating reservoirs provide the operators flexibility to meet the fluctuations of demand. The entities have and continue to construct regulating reservoirs primarily to reduce spills while maintaining operational flexibility for our growers. Another type of conservation project the SJREC have implemented is a recapture facility to capture runoff and recirculate the water back into the system. These systems have also been effective in reducing losses for the districts. A reduction factor for surface outflow has been applied to the projected water budget. The districts have seen a drastic decrease in surface outflows leaving the area. It is unclear at the moment when the next conservation project will be constructed and the factors indicated are assumed to be a conservative estimate on the reductions.

Another source of surface water outflow is through the tile drainage systems. These tile drains are operated to mitigate shallow saline groundwater and are expected to mimic historic conditions.

WATER YEAR	TILE DRAIN OUTFLOW (AF)	SURFACE SPILL REDUCTION FACTOR	SURFACE WATER OUTFLOW AND SPILLS (AF)	TOTAL SURFACE WATER OUTFLOW (AF)
2014	2,000	1.00	48,000	**50,000**
2015	1,000	1.00	41,000	**42,000**
2016	2,000	1.00	60,000	**62,000**
2017	2,000	1.00	93,000	**95,000**
2018	2,000	1.00	112,000	**114,000**
2019	2,000	1.00	93,000	**95,000**
2020	3,000	1.00	94,000	**96,000**
2021	2,000	1.00	93,000	**95,000**
2022	2,000	1.00	93,000	**95,000**
2023	2,000	1.00	112,000	**114,000**
2024	3,000	1.00	94,000	**96,000**
2025	2,000	1.00	93,000	**95,000**
2026	3,000	0.85	81,000	**83,000**
2027	3,000	0.85	81,000	**83,000**
2028	3,000	0.85	81,000	**83,000**
2029	3,000	0.85	81,000	**83,000**
2030	2,000	0.85	38,000	**40,000**
2031	2,000	0.85	38,000	**40,000**
2032	2,000	0.85	79,000	**81,000**
2033	3,000	0.85	81,000	**83,000**
2034	2,000	0.85	79,000	**81,000**
2035	2,000	0.85	79,000	**81,000**
2036	2,000	0.85	79,000	**81,000**
2037	2,000	0.85	79,000	**81,000**
2038	2,000	0.85	95,000	**97,000**
2039	2,000	0.85	95,000	**97,000**
2040	3,000	0.85	80,000	**82,000**
2041	3,000	0.75	71,000	**73,000**
2042	3,000	0.75	95,000	**98,000**
2043	3,000	0.75	92,000	**95,000**
2044	3,000	0.75	84,000	**87,000**
2045	2,000	0.75	79,000	**81,000**
2046	3,000	0.75	82,000	**85,000**
2047	2,000	0.75	71,000	**73,000**
2048	2,000	0.75	71,000	**73,000**
2049	2,000	0.75	84,000	**86,000**
2050	2,000	0.75	92,000	**94,000**
2051	2,000	0.75	71,000	**73,000**
2052	2,000	0.75	74,000	**76,000**
2053	2,000	0.75	36,000	**38,000**
2054	1,000	0.75	31,000	**32,000**
2055	2,000	0.75	45,000	**47,000**
2056	2,000	0.60	56,000	**58,000**
2057	2,000	0.60	56,000	**58,000**
2058	3,000	0.60	56,000	**58,000**
2059	2,000	0.60	56,000	**58,000**
2060	3,000	0.60	56,000	**58,000**
2061	2,000	0.60	56,000	**58,000**
2062	2,000	0.60	67,000	**69,000**
2063	3,000	0.60	56,000	**58,000**
2064	3,000	0.60	56,000	**58,000**
2065	2,000	0.60	67,000	**69,000**
2066	2,000	0.60	56,000	**58,000**
2067	2,000	0.60	56,000	**58,000**
2068	2,000	0.60	27,000	**29,000**
2069	2,000	0.60	27,000	**29,000**
2070	2,000	0.60	56,000	**58,000**
Average:	**2,000**	**0.8**	**71,000**	**73,000**

Table 32 - Projected Total Surface Outflow

Projected Evapotranspiration:

The SJREC GSA area is sustainable and does not anticipate any significant deviation from historical conditions. The area of the SJREC GSA is highly unlikely to expand and may even reduce the footprint as cities around CCID annex land into the City limits. Refer to Table 27 for a historical reference for water year based on hydrology. Data from this historical record was used as a baseline prior to adding climate change factors (CCF). The CCF's for ET were provided in a gridded format, by DWR, for approximately each 15 square miles. The value of each grid cell that overlaid the SJREC GSP Group was averaged to determine the overall factor for this area. The CCF for ET for each year was applied to baseline condition for each year to estimate the projected ET to be expected at the Los Banos weather station. As described previously, actual data was used for water years 2014-2017 in the projected water budget. The 2030 CCF's were used for water years 2018-2045 and the 2070 CCF's were used for water years 2046-2070. The climate change model provided projected ET using 2030 and 2070 factors for Water Years 1915-2011. In order to simulate climate change impacts to ET from 2011-2017, the following years were respectively used as surrogates: 2001, 1992, 1976, 1977, 2002, and 2011. This method was discussed and approved by both the Delta-Mendota Coordination Committee and DWR. The result of the climate change modeling shows an increase in crop consumptive use. The 2030 CCF indicates an increase of three percent and the 2070 CCF indicates an increase of eight percent with an overall average increase of about five percent. These factors were applied and the results are shown below.

WATER YEAR	PROJECTED ET_C	PROJECTED ET_{IW}	PROJECTED ET_{MISC}	CCF	PROJECTED ET_C W/ CLIMATE CHANGE	PROJECTED ET_{IW} W/ CLIMATE CHANGE	PROJECTED ET_{MISC} W/ CLIMATE CHANGE	TOTAL ET W/ CLIMATE CHANGE
2014	*560,000*	*537,000*	*56,000*	1.000	560,000	537,000	56,000	616,000
2015	*562,000*	*481,000*	*56,000*	1.000	562,000	481,000	56,000	618,000
2016	*584,000*	*444,000*	*59,000*	1.000	584,000	444,000	59,000	643,000
2017	*628,000*	*477,000*	*66,000*	1.000	628,000	462,000	66,000	694,000
2018	*575,000*	*446,000*	*56,000*	1.035	595,000	487,000	58,000	653,000
2019	*628,000*	*477,000*	*66,000*	1.035	650,000	542,000	68,000	719,000
2020	*618,000*	*598,000*	*62,000*	1.035	640,000	583,000	64,000	704,000
2021	*628,000*	*477,000*	*66,000*	1.033	649,000	514,000	68,000	717,000
2022	*628,000*	*477,000*	*66,000*	1.038	652,000	483,000	68,000	720,000
2023	*575,000*	*446,000*	*56,000*	1.030	592,000	509,000	58,000	650,000
2024	*618,000*	*598,000*	*62,000*	1.036	640,000	573,000	64,000	705,000
2025	*628,000*	*477,000*	*66,000*	1.040	653,000	506,000	69,000	722,000
2026	*713,000*	*637,000*	*21,000*	1.033	737,000	649,000	22,000	759,000
2027	*713,000*	*637,000*	*21,000*	1.034	737,000	651,000	22,000	759,000
2028	*713,000*	*637,000*	*21,000*	1.034	737,000	706,000	22,000	759,000
2029	*713,000*	*637,000*	*21,000*	1.028	733,000	690,000	22,000	754,000
2030	*561,000*	*509,000*	*56,000*	1.030	578,000	523,000	58,000	636,000
2031	*561,000*	*509,000*	*56,000*	1.033	579,000	486,000	58,000	637,000
2032	*628,000*	*477,000*	*66,000*	1.033	649,000	468,000	68,000	717,000
2033	*713,000*	*637,000*	*21,000*	1.033	737,000	669,000	22,000	758,000
2034	*628,000*	*477,000*	*66,000*	1.038	652,000	489,000	69,000	721,000
2035	*628,000*	*477,000*	*66,000*	1.031	648,000	525,000	68,000	716,000
2036	*628,000*	*477,000*	*66,000*	1.031	647,000	460,000	68,000	715,000
2037	*628,000*	*477,000*	*66,000*	1.035	650,000	363,000	68,000	718,000
2038	*575,000*	*446,000*	*56,000*	1.035	595,000	546,000	58,000	653,000
2039	*575,000*	*446,000*	*56,000*	1.035	595,000	511,000	58,000	653,000
2040	*618,000*	*598,000*	*62,000*	1.030	637,000	551,000	64,000	701,000
2041	*618,000*	*598,000*	*62,000*	1.032	638,000	587,000	64,000	702,000
2042	*719,000*	*638,000*	*20,000*	1.032	742,000	656,000	21,000	763,000
2043	*740,000*	*631,000*	*20,000*	1.030	762,000	655,000	21,000	783,000
2044	*707,000*	*544,000*	*20,000*	1.036	732,000	553,000	21,000	753,000
2045	*704,000*	*598,000*	*20,000*	1.035	728,000	627,000	21,000	749,000
2046	*709,000*	*694,000*	*20,000*	1.079	765,000	749,000	22,000	787,000
2047	*713,000*	*637,000*	*21,000*	1.080	770,000	692,000	23,000	792,000
2048	*665,000*	*593,000*	*67,000*	1.085	721,000	666,000	73,000	794,000
2049	*575,000*	*446,000*	*56,000*	1.086	625,000	494,000	61,000	685,000
2050	*628,000*	*477,000*	*66,000*	1.086	682,000	538,000	72,000	754,000
2051	*618,000*	*598,000*	*62,000*	1.075	664,000	646,000	67,000	731,000
2052	*608,000*	*556,000*	*57,000*	1.088	661,000	609,000	62,000	723,000
2053	*560,000*	*537,000*	*56,000*	1.086	608,000	585,000	61,000	669,000
2054	*562,000*	*481,000*	*56,000*	1.083	609,000	531,000	61,000	669,000
2055	*584,000*	*444,000*	*59,000*	1.082	632,000	499,000	64,000	696,000
2056	*628,000*	*477,000*	*66,000*	1.086	682,000	523,000	72,000	754,000
2057	*628,000*	*477,000*	*66,000*	1.086	682,000	577,000	72,000	753,000
2058	*665,000*	*593,000*	*67,000*	1.088	723,000	615,000	73,000	796,000
2059	*628,000*	*477,000*	*66,000*	1.087	682,000	557,000	72,000	754,000
2060	*618,000*	*598,000*	*62,000*	1.085	671,000	632,000	67,000	738,000
2061	*628,000*	*477,000*	*66,000*	1.087	683,000	474,000	72,000	754,000
2062	*575,000*	*446,000*	*56,000*	1.080	621,000	552,000	60,000	682,000
2063	*665,000*	*593,000*	*67,000*	1.091	726,000	661,000	73,000	799,000
2064	*618,000*	*598,000*	*62,000*	1.085	671,000	648,000	67,000	738,000
2065	*575,000*	*446,000*	*56,000*	1.083	622,000	407,000	61,000	683,000
2066	*628,000*	*477,000*	*66,000*	1.088	683,000	596,000	72,000	755,000
2067	*628,000*	*477,000*	*66,000*	1.088	683,000	585,000	72,000	755,000
2068	*561,000*	*509,000*	*56,000*	1.086	609,000	587,000	61,000	670,000
2069	*561,000*	*509,000*	*56,000*	1.083	608,000	589,000	61,000	668,000
2070	*628,000*	*477,000*	*66,000*	1.074	674,000	449,000	71,000	745,000
Average:	***628,000***	***528,000***	***54,000***	***1.053***	***661,000***	***560,000***	***57,000***	***718,000***

Table 33 - Projected Evapotranspiration

Projected Lateral Inflow and Outflow of Groundwater:

The SJREC have a net positive change in groundwater storage in the upper aquifer in the historic water budget. The SJREC GSA has worked with the GSA's in the Delta-Mendota Subbasin to determine projected lateral groundwater flows. Ken Schmidt prepared a report in 2015 (KDSA, 2015) analyzing the Groundwater Overdraft in the Delta-Mendota Subbasin and concluded that the subbasin was in balance for the Upper Aquifer for most of the subbasin with a few minor localized declining water levels. Additionally, the historic water budget for the Delta-Mendota Subbasin indicates an average annual overdraft of about 50 TAF which is equivalent to less than 0.07 AF/acre/year. The overdraft represents a drier than average cycle during our Historic Water Budget from 2003-2012. Given the minimal overdraft in the upper aquifer, the SJREC GSA has assumed that projected lateral groundwater flows in the upper aquifer will mimic historic conditions.

One Undesirable Result that is occurring in the Delta-Mendota Subbasin and is primarily caused from neighboring subbasins is Land Subsidence. The SJREC GSA is reducing lateral outflow from the lower aquifer as a means to mitigate subsidence originating from outside the SJREC GSP area. The lateral outflow in the Lower Aquifer in dry, critically dry and Shasta critical years needs to be reduced to near normal levels to mitigate land subsidence. A step-down reduction was assumed so as to not have a significant or unreasonable impact on the SJREC GSA area while allowing enough time for the neighboring GSP's to solve any subsidence problems occurring within their GSP area and account for subsidence lag time. Lateral groundwater inflow in the lower aquifer is significantly lower than the lateral outflow and is therefore assumed to mimic historic conditions. The lateral downward flow through the Corcoran Clay is assumed to reduce slightly over time as less pumping from the lower aquifer occurs and reduces the hydraulic gradient between the upper and lower aquifers.

WATER YEAR	GROUNDWATER INFLOW (Upper Aquifer)	GROUNDWATER OUTFLOW (Upper Aquifer)	GROUNDWATER INFLOW (Lower Aquifer)	ASSUMED REDUCTION IN LOWER AQUIFER OUTFLOW	GROUNDWATER OUTFLOW (Lower Aquifer)	SEEPAGE THROUGH CORCORAN CLAY
2014	44,000	69,000	14,000	0.00	115,000	45,000
2015	44,000	69,000	14,000	0.00	115,000	45,000
2016	44,000	69,000	14,000	0.00	73,000	45,000
2017	73,000	40,000	18,000	0.00	24,000	45,000
2018	71,000	53,000	18,000	0.00	47,000	45,000
2019	73,000	40,000	18,000	0.00	24,000	45,000
2020	44,000	69,000	14,000	0.00	73,000	45,000
2021	73,000	40,000	18,000	0.00	24,000	45,000
2022	73,000	40,000	18,000	0.00	24,000	45,000
2023	71,000	53,000	18,000	0.00	47,000	45,000
2024	44,000	69,000	14,000	0.20	73,000	45,000
2025	73,000	40,000	18,000	0.00	24,000	45,000
2026	44,000	69,000	14,000	0.25	73,000	45,000
2027	44,000	69,000	14,000	0.25	73,000	45,000
2028	44,000	69,000	14,000	0.25	73,000	45,000
2029	44,000	69,000	14,000	0.25	73,000	45,000
2030	44,000	69,000	14,000	0.38	72,000	40,000
2031	44,000	69,000	14,000	0.45	63,000	40,000
2032	73,000	40,000	18,000	0.00	24,000	40,000
2033	44,000	69,000	14,000	0.30	73,000	40,000
2034	73,000	40,000	18,000	0.00	24,000	40,000
2035	73,000	40,000	18,000	0.00	24,000	40,000
2036	73,000	40,000	18,000	0.00	24,000	40,000
2037	73,000	40,000	18,000	0.00	24,000	40,000
2038	71,000	53,000	18,000	0.05	45,000	40,000
2039	71,000	53,000	18,000	0.05	45,000	40,000
2040	44,000	69,000	14,000	0.33	73,000	40,000
2041	44,000	69,000	14,000	0.33	73,000	40,000
2042	71,000	53,000	18,000	0.05	45,000	40,000
2043	44,000	69,000	14,000	0.33	49,000	40,000
2044	67,000	48,000	18,000	0.00	24,000	40,000
2045	73,000	40,000	18,000	0.00	24,000	40,000
2046	44,000	69,000	14,000	0.33	49,000	40,000
2047	44,000	69,000	14,000	0.33	49,000	40,000
2048	71,000	53,000	18,000	0.05	45,000	40,000
2049	71,000	53,000	18,000	0.05	45,000	40,000
2050	73,000	40,000	18,000	0.00	24,000	40,000
2051	44,000	69,000	14,000	0.33	73,000	40,000
2052	44,000	69,000	14,000	0.33	49,000	40,000
2053	44,000	69,000	14,000	0.58	49,000	40,000
2054	44,000	69,000	14,000	0.58	49,000	40,000
2055	44,000	69,000	14,000	0.33	49,000	40,000
2056	73,000	40,000	18,000	0.00	24,000	40,000
2057	73,000	40,000	18,000	0.00	24,000	40,000
2058	71,000	53,000	18,000	0.05	47,000	40,000
2059	73,000	40,000	18,000	0.00	24,000	40,000
2060	44,000	69,000	14,000	0.33	73,000	40,000
2061	73,000	40,000	18,000	0.00	24,000	40,000
2062	71,000	53,000	18,000	0.05	45,000	40,000
2063	71,000	53,000	18,000	0.05	47,000	40,000
2064	44,000	69,000	14,000	0.33	73,000	40,000
2065	71,000	53,000	18,000	0.05	45,000	40,000
2066	73,000	40,000	18,000	0.00	24,000	40,000
2067	73,000	40,000	18,000	0.00	24,000	40,000
2068	44,000	69,000	14,000	0.58	49,000	40,000
2069	44,000	69,000	14,000	0.58	49,000	40,000
2070	73,000	40,000	18,000	0.00	24,000	40,000
Avg:	**59,000**	**56,000**	**16,000**	**-**	**48,000**	**41,000**

Table 34 - Projected Later Groundwater Flows

Projected Water Budget Change in Groundwater Storage:

The SJREC have prepared a Free-Body Diagram for surface water interaction. This data is primarily used to see if surface water supply is greater than demand.

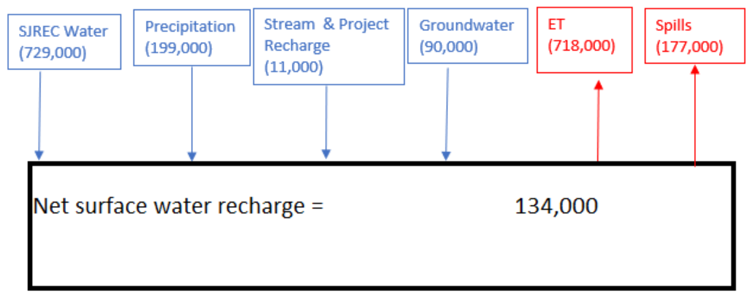

Figure 14 - Projected Free-Body Diagram for Surface Water Interaction

The results of the net surface water recharge shows an average annual recharge from direct, in-direct and in-lieu recharge of 134 TAF/year. The recharge includes but is not limited to; deep percolation from irrigation, deep percolation from precipitation, stream seepage, canal seepage and recharge projects.

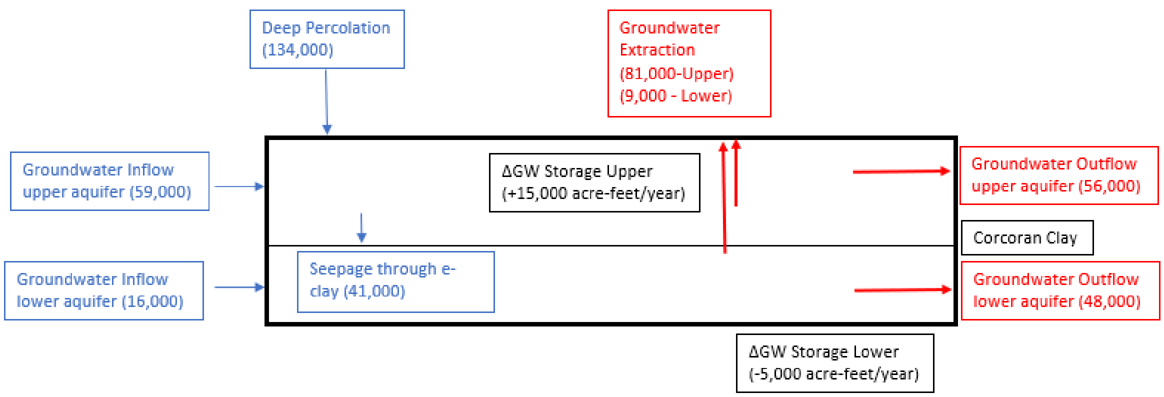

Figure 15 - Projected Free-Body Diagram for Groundwater Interaction

The results of the groundwater interaction show an overall annual average change in storage in the upper aquifer of +15 TAF/year. This indicates that the SJREC GSA will have a sustainable quantity of water in the upper aquifer through the year 2070. This positive change in groundwater storage is for the SJREC GSA only and does not account for groundwater extractions from the other GSA's in the SJREC GSP Group. Section 2.2.5 will describe the changes in groundwater storage for the entire SJREC GSP Group and will show a smaller increase in groundwater storage that is indicative of a reliable projection. The lower aquifer shows an average annual loss of 5 TAF in groundwater storage. The SJREC are extracting an average annual volume of 9 TAF from the lower aquifer which equates to an annual extraction of 0.04 AF/acre. It is reasonable to assert that any reduction in groundwater storage was caused by extractions occurring outside of the SJREC GSA area. The SJREC GSA has used a reduction in lateral groundwater outflow to indicate solving observed subsidence in the area. This equates to a total average subsidence across the SJREC GSP area of about 1.0’, most of which has been observed in the first four years of the projected water budget during dry period of 2014-2016. The assumptions made indicate minimal reductions in groundwater storage in the lower aquifer after 2025 and zero reductions after 2035 to account for some lag time of inelastic subsidence. The method of reviewing the change in storage for the lower aquifer is similar to the historic water budget.

WATER YEAR	UPPER AQUIFER CHANGE IN STORAGE (AF)	LOWER AQUIFER CHANGE IN STORAGE (AF)
2014	-199,000	-89,000
2015	-186,000	-89,000
2016	21,000	-24,000
2017	136,000	0
2018	72,000	-2,000
2019	53,000	0
2020	-4,000	-24,000
2021	82,000	0
2022	113,000	0
2023	50,000	-2,000
2024	5,000	-9,000
2025	89,000	0
2026	-53,000	-6,000
2027	-55,000	-6,000
2028	-110,000	-6,000
2029	-93,000	-6,000
2030	-83,000	-23,000
2031	-46,000	-14,000
2032	147,000	0
2033	-67,000	-2,000
2034	125,000	0
2035	90,000	0
2036	155,000	0
2037	252,000	0
2038	35,000	0
2039	70,000	0
2040	47,000	0
2041	20,000	0
2042	8,000	0
2043	-46,000	0
2044	63,000	0
2045	38,000	0
2046	-99,000	0
2047	-80,000	0
2048	-60,000	0
2049	96,000	0
2050	56,000	0
2051	-42,000	0
2052	-45,000	0
2053	-147,000	0
2054	-85,000	0
2055	-13,000	0
2056	111,000	0
2057	58,000	0
2058	6,000	0
2059	77,000	0
2060	-13,000	0
2061	161,000	0
2062	54,000	0
2063	-40,000	0
2064	-29,000	0
2065	199,000	0
2066	38,000	0
2067	49,000	0
2068	-139,000	0
2069	-140,000	0
2070	186,000	0
Average:	**15,000**	**-5,000**

Table 35 - Change in Groundwater Storage for the Projected Water Budget

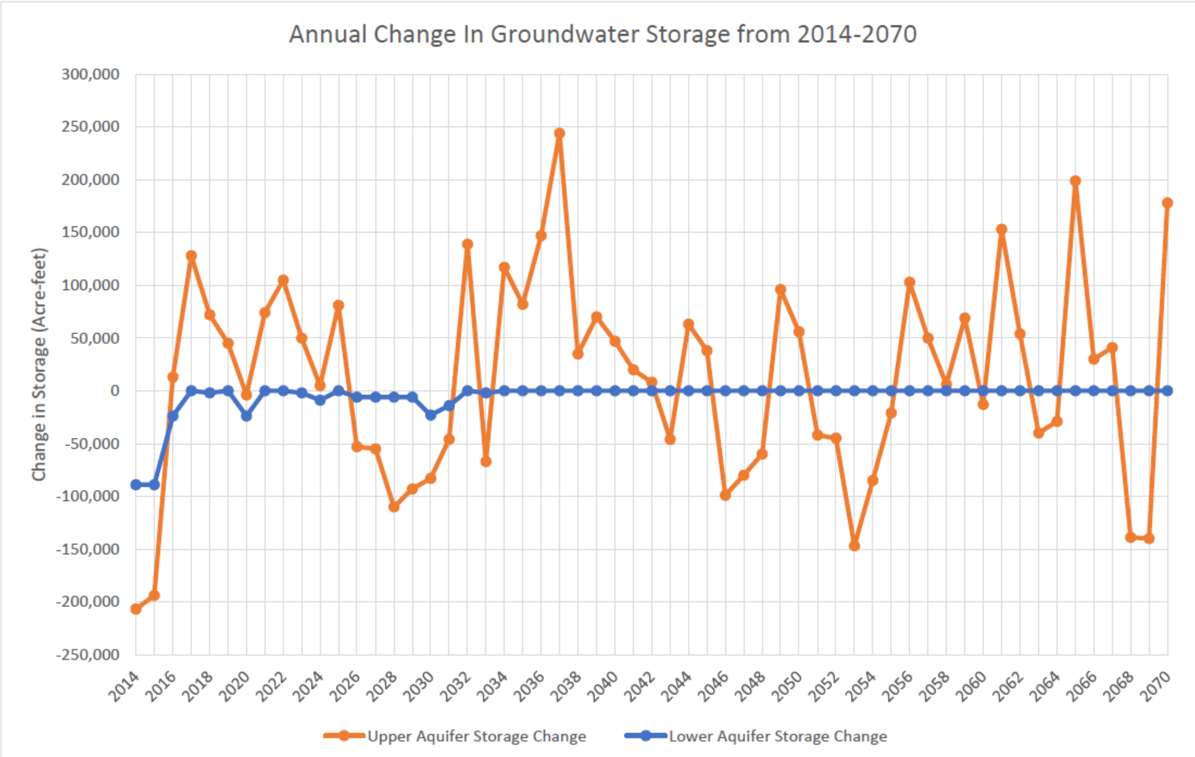

Figure 16 - Annual Projected Change in Groundwater Storage

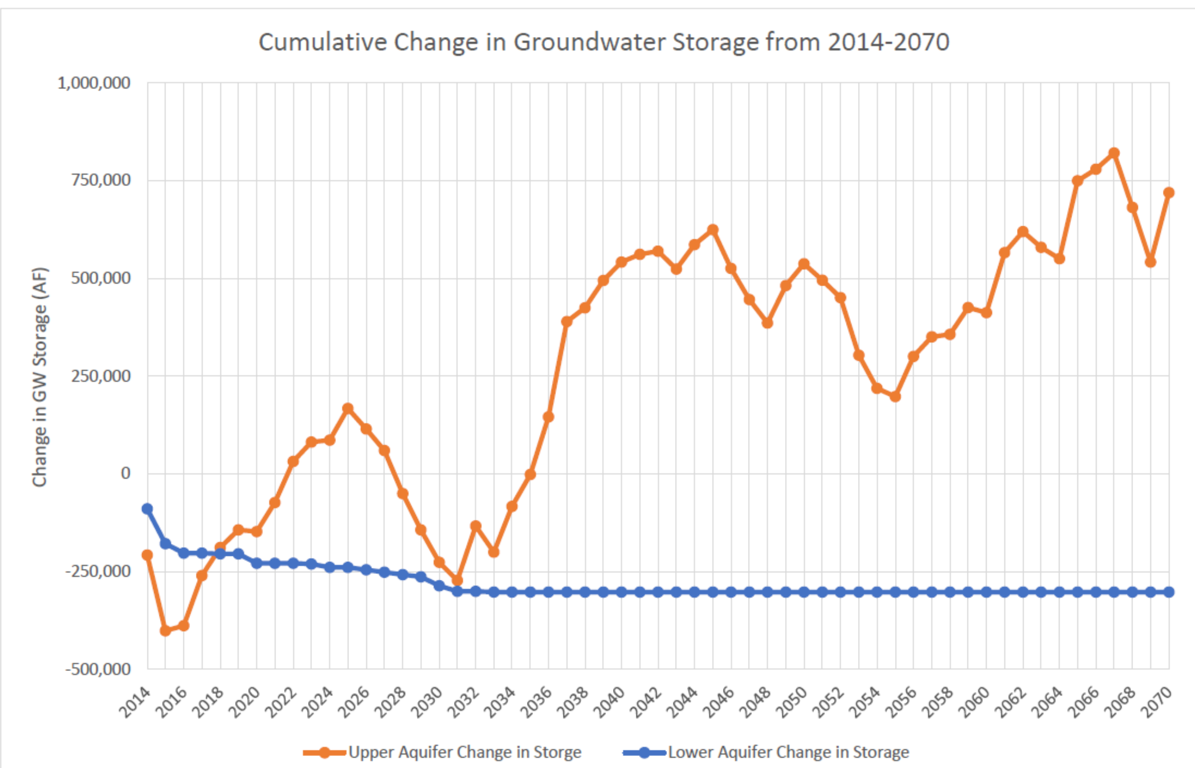

Figure 17 - Cumulative Projected Change in Groundwater Storage

2.2.4 Monitoring Zones

In 1997 Kenneth D. Schmidt and Associates (KDSA) prepared a report for CCID titled "Groundwater Conditions In and Near the Central California Irrigation District". Subsequent to the 1997 CCID report, the SJRECWA worked with KDSA to develop a study titled "Groundwater Flows in the San Joaquin River Exchange Contractors Service Area". Additionally in 1997, KDSA prepared the AB 3030 GWMP for the SJRECWA. These reports, collectively referred to as the 1997 reports herein, coupled together formed a discrete understanding of the groundwater conditions in and around the SJREC service area. From these analyses, KDSA recommended the formation of management areas defined by water supply, aquifer and drainage characteristics.

SGMA defines a management area as an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. Furthermore, water code section § 354.20. Management Areas allows for the creation of management areas to facilitate implementation of the plan. For the purposes of this plan, the historic reference to management areas originally established in 1997, will now be renamed and in the future referred to as "monitoring zone(s)".

2.2.4.1 Monitoring Zone A

This is the northernmost area in CCID comprising the communities of Crows Landing (DAC) and Newman (DAC). This area fully encompasses the Stanislaus County portion of CCID. The major geologic formation for this area is the Orestimba Creek. Monitoring Zone A is both based on the jurisdictional County boundary as well as similar aquifer response and well construction. CCID wholly encompasses the SJRECWA service area in Stanislaus County.

2.2.4.2 Monitoring Zone B

This area comprises the Gustine (DAC) area of CCID in Merced County. This area has the Stanislaus/Merced County boundary to the north and Henry Miller Road to the south. The Gustine Drainage District (GDD) operates a number of drainage wells and tile systems to lower shallow water levels in the region to below the effective root zone. The aquifer in this area must be actively pumped to maintain healthy soil, which is the primary reason for the creation of this Monitoring Zone. Some of the major geologic formations are the Garzas Creek, Quinto Creek, Romero Creek and San Luis Creek.

2.2.4.3 Monitoring Zone C

This area includes the communities of Volta (DAC) and Los Banos (DAC) area of CCID in Merced County. This area is generally bound by Henry Miller Road to the north and the contiguous southern boundary of Class 1 ground to the southeast of Los Banos adjacent to Monitoring Zone K. The primary geologic formation in this area is the Los Banos Creek. Additionally, Ortigalita Creek runs through the area.

2.2.4.4 Monitoring Zone D

This area includes the community of Dos Palos (SDAC) area of CCID in Merced County. This relatively small area encompasses the area surrounding Dos Palos in Merced County. The Dos Palos Drainage District (DPDD) operates several drainage facilities to lower shallow water levels in the region. In order to maintain healthy soils, this area must be actively managed. The area has been impacted by upslope drainage of poor quality groundwater. As a result, the City of Dos Palos worked with CCID to receive surface water for municipal use.

2.2.4.5 Monitoring Zone E

This area includes the southern portion of CCID east of Dos Palos, north of the CCID Main Canal and bordering the City of Firebaugh. This area is generally the Fresno/Merced County line eastward to the City of Firebaugh. Groundwater below the Corcoran Clay in this area is believed to be of poor quality and is generally not used for water supply. This Monitoring Zone was developed due to similar aquifer characteristics for both the upper and lower aquifers consistent with well construction in the area.

2.2.4.6 Monitoring Zone F

This area includes the Camp 13 Drainage District portion of CCID in Fresno County. This area has been significantly impacted from upslope drainage of poor quality groundwater. Tile drainage and groundwater extractions are a vital tool to improve the overall health of the soil in this area. The principal reason for the formation of this Monitoring Zone is related to drainage. Camp 13 is actively managing groundwater to help mitigate the migration of poor quality groundwater from outside the area. Point source control and tile drainage have proven effective to mitigate the problems associated with drainage.

2.2.4.7 Monitoring Zone G

This area comprises the communities of Firebaugh (SDAC) and Mendota (SDAC) area of CCID in Fresno County. This area is more generally described as the CCID land between Firebaugh and Mendota. Groundwater below the Corcoran Clay in this area is believed to be of poor quality. This area has the potential to be impacted directly by the groundwater extractions resulting from the Mendota Pool Group pumping program. This area was established based on hydrogeologic conditions in the area between the two communities.

2.2.4.8 Monitoring Zone H

This area fully encompasses the SLCC in Merced County and very small portion in Fresno County. SLCC is bound by CCID to the south and east, the San Joaquin River to the north and the greater Grasslands area to the west. The formation of Monitoring Zone H is both jurisdictional and also based on the hydrogeologic characteristics of the aquifer. This area has a very shallow water table and must actively manage the aquifer to maintain healthy soils and keep the water level below effective root zones. The characteristics of the aquifer in this area is similar to Monitoring Zone E.

2.2.4.9 Monitoring Zone I

This area fully encompasses the FCWD in Fresno County. Similar to Monitoring Zone F, this area has been significantly impacted from upslope drainage of poor quality groundwater. Tile drainage and groundwater extractions are a vital tool to improve the overall health of the soil in this area. The principal reason for the formation of this Monitoring Zone is related to drainage. FCWD is actively managing groundwater to help mitigate the migration of poor quality groundwater from outside the area. Point source control and tile drainage have proven effective to mitigate the problems associated with drainage.

2.2.4.10 Monitoring Zone J

This area fully encompasses the CCC in Madera and Fresno Counties. CCC wholly encompasses all of the SJRECWA service area in Madera County. CCC is separated from CCID by the San Joaquin River and is the only district in the SJRECWA service area east of the river. The formation of Monitoring Zone J is both jurisdictional and also based on the hydrogeologic characteristics of the aquifers.

2.2.4.11 Monitoring Zone K

Prior to the development of this plan, all other Monitoring Zones had already been established. Monitoring Zone K is the only new additional Monitoring Zone and was formed to include the CCID Class 2 lands between Monitoring Zones C and F. CCID Class 2 land receives water from CCID on a "if and when available" basis. These lands were historically served by the water rights developed by Henry Miller. The groundwater conditions in this area are similar to Monitoring Zone D.

2.2.5 Combined Water Budgets for the SJREC GSP Group

This section will describe the cumulative water budgets for the SJREC GSP Group. Sections 7 through 16 of this plan describe each respective GSA's water budget. In order to sustainably manage groundwater at the local level it is vitally important to understand the impact each GSA has on groundwater management. This section is provided to represent the GSP Group as a whole. The data from each GSA was used and combined into one water budget.

2.2.5.1 Combined Historic Water Budget for the SJREC GSP Group

Water Year	Shasta Water Year Designation	Water Year Type (SJ Valley)	Surface Water Delivery	Groundwater Extraction	Total Consumptive Use (ET_{iw})	Change in Groundwater Storage (Upper Aquifer)	Change in Groundwater Storage (Lower Aquifer)
2003	Non-Critical	Below Normal	788,000	142,000	760,000	-33,000	-2,000
2004	Non-Critical	Dry	776,000	170,000	782,000	-74,000	-24,000
2005	Non-Critical	Wet	731,000	94,000	746,000	34,000	0
2006	Non-Critical	Wet	761,000	83,000	743,000	12,000	0
2007	Non-Critical	Critical	804,000	215,000	752,000	-96,000	-24,000
2008	Non-Critical	Critical	753,000	193,000	756,000	-75,000	-24,000
2009	Non-Critical	Below Normal	756,000	194,000	755,000	-28,000	-2,000
2010	Non-Critical	Above Normal	743,000	104,000	652,000	96,000	-2,000
2011	Non-Critical	Wet	753,000	109,000	714,000	72,000	0
2012	Non-Critical	Dry	795,000	174,000	702,000	-34,000	-24,000

Table 36 - Combined SJREC GSP Group Historic Water Budget

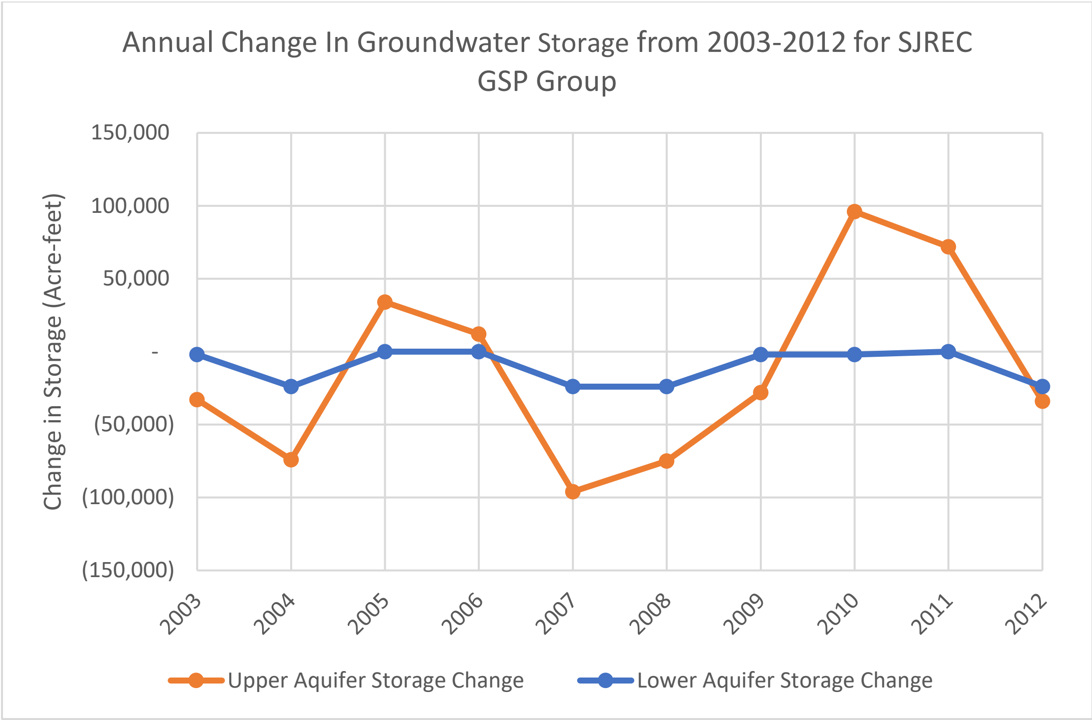

Figure 18 - Annual Historic Change in Groundwater Storage for SJREC GSP Group

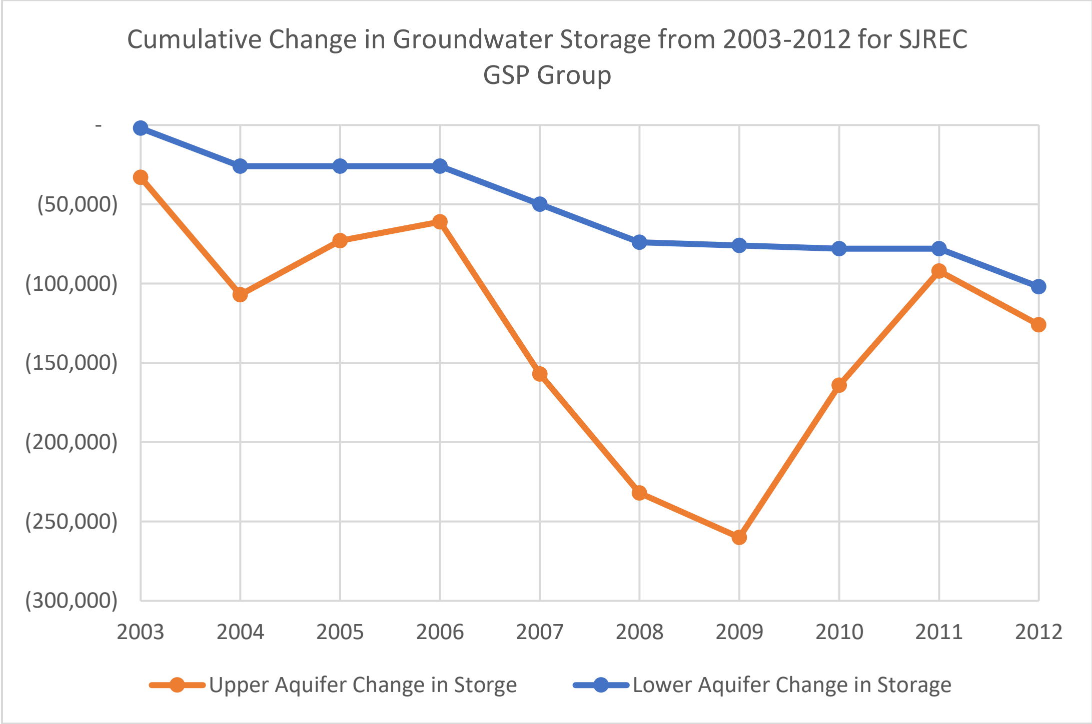

Figure 19 - Cumulative Historic Change in Groundwater Storage for SJREC GSP Group

2.2.5.2 Combined Current Water Budget for the SJREC GSP Group

Water Year	Shasta Water Year Designation	Water Year Type (SJ Valley)	Surface Water Delivery	Groundwater Extraction	Total Consumptive Use (ET_{iw})	Change in Groundwater Storage (Upper Aquifer)	Change in Groundwater Storage (Lower Aquifer)
2013	Non-Critical	Critical	748,000	210,000	687,000	-37,000	-24,000

Table 37 - Combined SJREC GSP Group Current Water Budget

2.2.5.3 Combined Projected Water Budget for the SJREC GSP Group

Water Year	Shasta Water Year Designation	Water Year Type (SJ Valley)	Surface Water Delivery	Groundwater Extraction	Total Consumptive Use (ET_{iw})	Change in Groundwater Storage (Upper Aquifer)	Change in Groundwater Storage (Lower Aquifer)
2014	Critical	Shasta Critical	501,000	219,000	638,000	-211,000	-89,000
2015	Critical	Shasta Critical	447,000	281,000	638,000	-199,000	-89,000
2016	Non-Critical	Dry	646,000	93,000	664,000	7,000	-24,000
2017	Non-Critical	Wet	756,000	52,000	713,000	121,000	0
2018	Non-Critical	Above Normal	743,000	105,000	673,000	59,000	-2,000
2019	Non-Critical	Wet	756,000	53,000	739,000	38,000	0
2020	Non-Critical	Dry	795,000	96,000	727,000	-17,000	-24,000
2021	Non-Critical	Wet	756,000	54,000	738,000	67,000	0
2022	Non-Critical	Wet	756,000	54,000	741,000	98,000	0
2023	Non-Critical	Above Normal	743,000	107,000	671,000	37,000	-2,000
2024	Non-Critical	Dry	795,000	98,000	729,000	-8,000	-9,000
2025	Non-Critical	Wet	756,000	55,000	743,000	74,000	0
2026	Non-Critical	Critically Dry	753,000	196,000	783,000	-65,000	-6,000
2027	Non-Critical	Critically Dry	753,000	196,000	783,000	-67,000	-6,000
2028	Non-Critical	Critically Dry	753,000	196,000	782,000	-122,000	-6,000
2029	Non-Critical	Critically Dry	753,000	197,000	778,000	-105,000	-6,000
2030	Critical	Shasta Critical	590,000	221,000	662,000	-95,000	-23,000
2031	Critical	Shasta Critical	590,000	217,000	661,000	-58,000	-14,000
2032	Non-Critical	Wet	756,000	58,000	739,000	132,000	0
2033	Non-Critical	Critically Dry	753,000	199,000	783,000	-79,000	-2,000
2034	Non-Critical	Wet	756,000	59,000	744,000	110,000	0
2035	Non-Critical	Wet	756,000	60,000	740,000	75,000	0
2036	Non-Critical	Wet	756,000	60,000	738,000	140,000	0
2037	Non-Critical	Wet	756,000	61,000	742,000	237,000	0
2038	Non-Critical	Above Normal	743,000	114,000	678,000	22,000	0
2039	Non-Critical	Above Normal	743,000	114,000	677,000	57,000	0
2040	Non-Critical	Dry	795,000	105,000	728,000	34,000	0
2041	Non-Critical	Dry	795,000	105,000	729,000	7,000	0
2042	Non-Critical	Below Normal	788,000	156,000	788,000	-5,000	0
2043	Non-Critical	Dry	776,000	107,000	810,000	-58,000	0
2044	Non-Critical	Wet	731,000	63,000	776,000	52,000	0
2045	Non-Critical	Wet	761,000	64,000	773,000	27,000	0
2046	Non-Critical	Critically Dry	804,000	224,000	816,000	-112,000	0
2047	Non-Critical	Critically Dry	753,000	224,000	820,000	-92,000	0
2048	Non-Critical	Below Normal	756,000	209,000	823,000	-73,000	0
2049	Non-Critical	Above Normal	743,000	121,000	713,000	83,000	0
2050	Non-Critical	Wet	753,000	69,000	782,000	44,000	0
2051	Non-Critical	Dry	795,000	113,000	763,000	-56,000	0
2052	Non-Critical	Critically Dry	748,000	228,000	755,000	-59,000	0
2053	Critical	Shasta Critical	590,000	235,000	702,000	-159,000	0
2054	Critical	Shasta Critical	590,000	231,000	700,000	-98,000	0
2055	Non-Critical	Dry	646,000	117,000	730,000	-27,000	0
2056	Non-Critical	Wet	756,000	74,000	785,000	96,000	0
2057	Non-Critical	Wet	756,000	75,000	785,000	43,000	0
2058	Non-Critical	Below Normal	756,000	217,000	829,000	-7,000	0
2059	Non-Critical	Wet	756,000	77,000	787,000	62,000	0
2060	Non-Critical	Dry	795,000	120,000	773,000	-26,000	0
2061	Non-Critical	Wet	756,000	78,000	787,000	146,000	0
2062	Non-Critical	Above Normal	743,000	132,000	716,000	41,000	0
2063	Non-Critical	Below Normal	756,000	222,000	835,000	-53,000	0
2064	Non-Critical	Dry	795,000	124,000	775,000	-42,000	0
2065	Non-Critical	Above Normal	743,000	135,000	718,000	186,000	0
2066	Non-Critical	Wet	756,000	84,000	791,000	23,000	0
2067	Non-Critical	Wet	756,000	85,000	792,000	34,000	0
2068	Critical	Shasta Critical	590,000	249,000	710,000	-151,000	0
2069	Critical	Shasta Critical	590,000	245,000	706,000	-152,000	0
2070	Non-Critical	Wet	756,000	88,000	783,000	171,000	0

Table 38 - Combined SJREC GSP Group Projected Water Budget

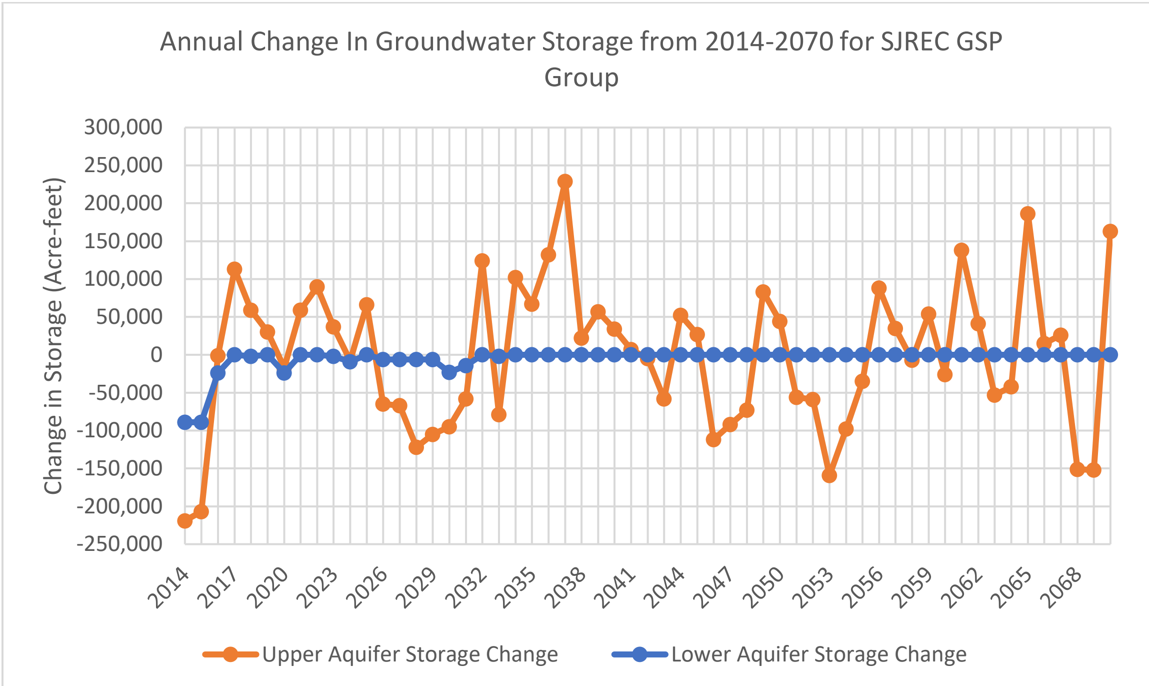

Figure 20 - Annual Projected Change in Groundwater Storage for SJREC GSP Group

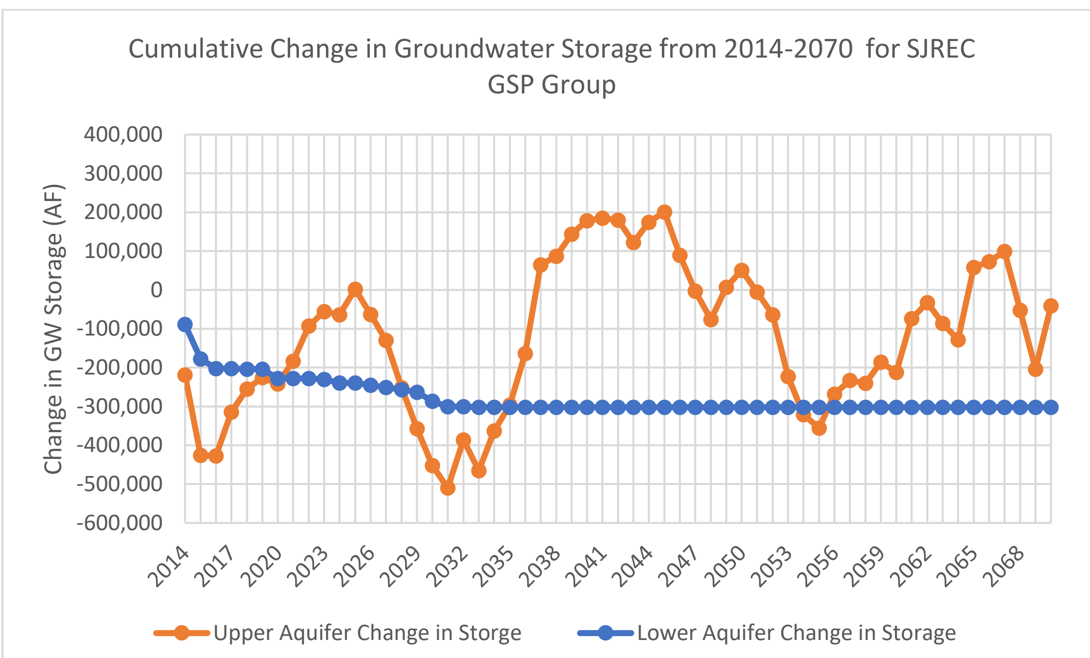

Figure 21 - Cumulative Projected Change in Groundwater Storage for SJREC GSP Group

3.0 SUSTAINABLE MANAGEMENT CRITERIA

This Section describes Sustainable Management Criteria (SMC). A monitoring network is used to establish a Sustainability Goal to avoid triggering Undesirable Results. Groundwater is managed with Measurable Objectives and Minimum Thresholds to ensure this plan operates within its sustainable yield. Appendix M provides the BMP for Sustainable Management Criteria. In response to the DWR deficiency letter, the Delta-Mendota Subbasin GSA's worked cooperatively and diligently to provide clarifications of actions to achieve and maintain sustainability. The coordinated SMC's are defined at the Subbasin level and can be appropriately found in Appendix B of the Common Chapter. Included in this GSP Section 3 is reference to the Appendix B with callouts to Tables CC 16-23 which can be found specifically in Appendix B.

3.1 Sustainability Goal

Sustainability Goal is defined as the existence and implementation of one or more GSP's that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin (or plan) is operated within its sustainable yield. Sustainable Yield is defined as managing groundwater that culminates in the absence of undesirable results by 2040. Additionally, the goal of the SJREC GSP is to work with neighboring GSA's and neighboring subbasin, where by 2040 there is an absence of undesirable results impacting the Delta-Mendota Subbasin based on groundwater management within the Delta-Mendota Subbasin and in an adjacent Subbasin. The sustainability goal for each sustainability indicator is defined at the subbasin level and can be found in Tables CC-16 through CC-23 in Appendix B Delta-Mendota Subbasin Common Chapter.

Sustainability goal for each indicator is defined as follows:

- Chronic lowering of groundwater Levels: Maintain groundwater levels that are comparable to existing conditions (historic low conditions as of Water Year 2016) in order to continue meeting the demand of beneficial uses and users of groundwater and prevent a trend of decreasing groundwater levels. The Delta-Mendota Subbasin will continue successful and ongoing coordination with neighboring Subbasins to address chronic lowering of groundwater levels caused by pumping from outside of the Subbasin.
- Reduction in groundwater storage: Maintain historic groundwater storage volumes in order to continue meeting the demand of beneficial uses and users of groundwater and to provide a 3-year drought buffer. Minimize reductions in groundwater storage during extended dry periods. Work with neighboring Subbasins to address reduction in groundwater storage caused by pumping from outside of the Subbasin.
- Degraded water quality: Minimize further impairment of water supplies resulting from groundwater management activities that cause the migration or concentration of contaminant plumes or the increased rate of movement or concentrations of constituents of concern. Coordinate and support compliance with existing regulatory groundwater quality orders and objectives for drinking water, agricultural irrigation and managed wetlands water, which are described in the Groundwater Sustainability Plan Common Chapter. Work with neighboring Subbasins to address existing or potential impairments of groundwater quality in the Subbasin caused by groundwater management activities from outside the Subbasin.

- Land Subsidence: Minimize inelastic land subsidence by ramping down allowable subsidence caused by groundwater extraction in the Subbasin, with no additional subsidence after 2040. Work with neighboring Subbasins to address inelastic land subsidence caused by groundwater extraction from outside of the Subbasin.
- Interconnected surface water: Maintain interconnected surface waters comparable to existing conditions (historic low conditions as of Water Year 2016) in order to prevent a trend of increasing interconnected surface water losses from the San Joaquin River. Work with neighboring Subbasins to address increased interconnected surface water losses caused by pumping from outside of the Subbasin.

3.1.1 Upper Aquifer Sustainable Yield

The Delta-Mendota Subbasin has defined the Sustainable Yield for the Upper Aquifer as the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing Undesirable Results. It is important to note that the overall groundwater management strategy for the Delta-Mendota Subbasin is to not have water levels decline below historic low water levels. This management strategy is fairly progressive and protective of the beneficial user and users of groundwater. More details on the Sustainable Yield for the Subbasin can be found in Section 4.3.4 in Appendix B. The calculation to determine the Sustainable Yield for the Subbasin is defined as:

Upper Aquifer SY = Pumping + Change in Storage + Subsurface Outflow – Subsurface Inflow

The SJREC GSP Group has established a methodology to determine how much water can be extracted from the upper aquifer as a tool to help manage groundwater within the GSP area. . During the historic water budget timeframe from 2003-2012, the average annual groundwater extractions from the upper aquifer was 122 TAF/year. The SJREC GSP Group had 40 TAF/year surface water delivery in excess of direct demand, which contributed to additional recharge in the area. The SJREC GSP Group has been managing a sustainable aquifer through each agency's various conservation and management efforts. Additionally, 27 TAF/year of the lateral outflow of groundwater from the SJREC GSP Group area could be conserved by capturing some canal seepage. Thus, the allowable extraction of the upper aquifer for the SJREC GSP Group is 189 TAF/year. Sustainable management criteria described in Sections 3.2 – 3.5 will be used to achieve sustainability. In 2015, the SJREC GSP group extracted 268 TAF without any lasting impacts to the aquifer. Moreover, the average groundwater extractions from the upper aquifer in 2014 & 2015 averaged 236 TAF. These values are important when managing groundwater impacts through the planning and implementation horizon. Based on current data the average annual allowable extractions from the upper aquifer has been determined at 189 TAF with a one year extraction of at least 268 TAF. Any future projects and management actions will respectively increase the sustainable yield for the subbasin. The Sustainable Yield for the Subbasin is 403,000 acre-feet.

3.1.2 Lower Aquifer Sustainable Yield

The SJREC GSP Group has established a methodology consistent with the entire Subbasin as outlined in the Technical Memorandum #3 as part of the Delta-Mendota Subbasin Coordination Agreement (Appendix B) to determine the lower aquifer sustainable yield. The lower aquifer sustainable yield is primarily driven by avoiding an Undesirable Result for land subsidence. As discussed, the SJREC GSP Group is not principally causing subsidence and have been working with landowners in impacted areas outside the SJREC service area, to mitigate/solve subsidence. The key to stopping subsidence is to reduce or eliminate groundwater extractions from the lower aquifer.

The Delta-Mendota Subbasin, in responding to comments from DWR on the initial submittal of the GSP's, has elected to redefine the Sustainable Yield for the Lower Aquifer to be more restrictive than originally proposed. The overall subbasin sustainable yield has been reduced from 250,000 AF down to 101,000 AF. This sustainable yield calculation is coordinated with the sustainability indicators to not cause significant overdraft or inelastic land subsidence. Further details on the updated Sustainable Yield Calculation can be found in Section 4.3.4 of the Appendix B. Review of the historic, current and projected water budget indicates the SJREC GSP had a one year maximum extraction from the lower aquifer of 29 TAF which equates to only 0.10 AF/acre. The lower aquifer sustainable yield is used as a guide to achieve sustainability for all six sustainability indicators and primarily stopping land subsidence.

The lower aquifer responds drastically different than the upper aquifer. Due to the elastic nature of the upper aquifer subsidence characteristics, it can operate with successive years contributing to the overall average conditions without causing undesirable results. In other words, in the unconfined upper aquifer extractions for one year above the sustainable yield can be offset by a subsequent year with extractions less than the sustainable yield. The lower aquifer, however, cannot rely on averaging extractions above the sustainable yield to meet an average condition. Overdraft in the lower aquifer has the potential to instantly trigger inelastic land subsidence. The lower aquifer sustainable yield must be managed annually and more importantly site specifically to ensure significant and/or unreasonable land subsidence does not result from the overdraft.

3.2 Measurable Objectives

Measurable objectives refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin (or plan). Measurable objectives shall provide a reasonable margin of operational flexibility.

3.2.1 Chronic Lowering of Groundwater Levels

The SJREC GSA has been sustainably managing groundwater levels for decades. As discussed in this GSP, the SJREC have prepared annual groundwater studies since the 1990's. Each year the district staff collects information on groundwater conditions for the previous year and consolidates the information into an annual report. This annual report is subsequently reviewed by KDSA who provides an analysis of the effects of the previous year's pumping. Monitoring Zones are established and groundwater triggers implemented in impacted regions within and adjacent to the SJREC service area.

The management strategy for the SJREC GSP Group is to manage to avoid shallow groundwater while maintaining groundwater levels above the minimum threshold,since the SJREC is already sustainably managing groundwater levels. Interim milestones were established across the subbasin to help fill data gaps while using the best available data to adaptively manage groundwater; see Table CC-16 in Appendix B.

The Measurable Objective has been defined at the subbasin level, see Table CC-16 in the Appendix B, and is defined as follows. Maintain seasonal high groundwater levels at an elevation that is at or above the Water Year 2015 seasonal high at more than 50% of representative monitoring sites in a GSP area. The Water Year 2015 seasonal high is a fixed elevation at each site, based on available groundwater level data. If data are unavailable for Water Year 2015 at a representative monitoring site, either a Water Year 2014 or Water Year 2016 Seasonal High will be used. To account for future year-to-year variations in hydrology, compliance with the fixed seasonal high threshold will be compared with a 4-year rolling average of annual groundwater level measurements. Groundwater levels are measured as water surface elevation ("WSE"). Each GSP area includes multiple representative monitoring sites ("RMS") to which the measurable objective applies. See Table CC-17 for numeric MOs.

3.2.2 Reduction of Groundwater Storage

Similar to the discussion in Section 3.2.1, the SJREC are sustainably managed groundwater storage through management of regional water levels to maintain adequate storage. The management strategy for the SJREC GSP Group is to manage to avoid shallow groundwater while maintaining groundwater levels above the minimum threshold for each monitoring zones which will preserve groundwater storage, since the SJREC are already sustainably managing groundwater levels. Interim milestones were established across the subbasin to help fill data gaps while using the best available data to adaptively manage groundwater; see Table CC-18 in Appendix B.

The Measurable Objective has been defined at the subbasin level, see Table CC-18 in the Appendix B, and is defined as follows. For the Upper Aquifer, maintain groundwater levels in accordance with the measurable objectives set for Chronic Lowering of Groundwater Levels. For the Lower Aquifer, minimize loss of groundwater storage caused by inelastic land subsidence.

3.2.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. Similar to § 354.28.e for minimum thresholds, the presence of an undesirable result for seawater intrusion is not likely to occur and therefore no measurable objectives have been established for this sustainability indicator.

3.2.4 Degraded Water Quality

The management strategy for the SJREC GSP Group is to mitigate the impacts of the migration of high salinity groundwater from lands upslope of the SJREC GSA. Intercepting moderate to high salinity groundwater that is moving to the northeast in the area above the Corcoran Clay has proven feasible as further described in 4.2.4. Groundwater quality monitoring has been conducted for both the pumped wells and a number of wells in the SJREC GSA to the northeast. These results are reviewed and evaluated about every three years. The strategy is to maintain soil health from poor quality groundwater migrating into the SJREC GSP area from upslope lands. Water quality concerns are from the migration of saline water from outside the SJREC GSA. Interim milestones were established across the subbasin to provide consistency between SGMA and other water quality management requirements outside of SGMA; see Table CC-19 in Appendix B.

The Measurable Objective has been defined at the subbasin level, see Table CC-19 in the Appendix B, and is defined as follows. The measurable objective for salinity will be concentrations less than 1,000 mg/L TDS.

3.2.5 Land Subsidence

The SJREC GSP Group has extracted very minimal amounts of groundwater from the lower aquifer and are pumping significantly below the extraction limits set across the subbasin. The management strategy of the SJREC GSP Group is to continue working with landowners in areas known to cause subsidence to reduce the compaction of the soils. Interim milestones were established across the subbasin to ramp down the observed subsidence; see Table CC-21 in Appendix B.

The Measurable Objective has been defined at the subbasin level, see Table CC-21 in the Appendix B, and is defined as minimizing inelastic land subsidence attributable to groundwater extraction within the Delta-Mendota Subbasin, with no additional subsidence after 2040.

3.2.6 Depletions of Interconnected Surface Water

The goal of the SJREC GSP Group is to mitigate observed reductions of interconnected surface and groundwater in the San Joaquin River due to pumping in the SJREC GSP Group Area. The Interim milestones for each five year increment is to collect and analyze additional data to ensure an Undesirable Result for depleted surface water does not occur and is further defined in Table CC-23 in Appendix B.

The Measurable Objective for Interconnected Surface Water is as of present not finalized due to an identified data gap at the Subbasin level. As an interim measurable objective, the Chronic Lowering of Groundwater Level Measurable Objective will be used as a proxy for interconnected surface waters (see Section 3.2.1). The subbasin will be utilizing grant funds to fill this data gap and refine the Measurable Objective for this criteria.

3.3 Minimum Thresholds

This Section will describe minimum thresholds for each sustainability indicator. Minimum Threshold refers to a numeric value for each sustainability indicator used to define undesirable results.

3.3.1 Chronic Lowering of Groundwater Levels

The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation, for a given area, that indicates a depletion of supply that may lead to undesirable results. The minimum threshold must be supported by historical trends of groundwater elevation without causing potential negative effects on the other sustainability indicators. The SJREC have established Monitoring Zones, as described in Section 2.2.4, to sustainably manage our aquifers. Each monitoring zone has a representative well whose groundwater levels are reviewed annually to determine if a given area is experiencing chronic lowering of groundwater levels. Long-term hydrographs (Refer to Appendix I for more details) are used to establish water level trend over time and trigger levels. Historically, the SJREC have developed detailed hydrogeologic analyses in areas impacted by overdraft in and adjacent to the SJREC member entities. Monitoring Zones A and C have been impacted during extended dry periods and trigger water levels at representative sites were established to maintain a healthy aquifer. The established trigger level curtailed groundwater extractions from leaving the defined monitoring zone. This management action stopped the transfer of groundwater out of the sub-area. Extraction limits were not established for groundwater use on over-lying land.

Monitoring Zone G has historically been impacted by regional pumping. The response of a three-day aquifer test from a few wells in monitoring zone G indicated that the aquifer responded as a confined aquifer. Due to this, setting triggers based solely on winter/spring water level measurements is not advisable. Pumping for transfer from this area is annually analyzed and based on anticipated pumpage, drawdown and timing of extractions to determine the potential effects.

Most recently in the drought of 2013-2016, water elevations at the representative sites were below the established trigger. Subsequently, groundwater was prohibited from leaving the sub-area. As a result of the management action alone, the aquifers have recovered by 2018 and no long-term significant or unreasonable impacts were experienced. This highlights the engagement and experience of the SJREC successfully managing groundwater levels for the beneficial users in the area. In the remaining Monitoring zones (B, C outside of the Los Banos Creek Sub-area, D, E, F, H, I, J, K), in order to comply with SGMA, a water level threshold was established using the historical low water level. Many of these monitoring zones are impacted by shallow groundwater and some pumping is encouraged to keep from inundating the root zone. The established trigger water level is intended to curtail transfer pumping before an undesirable result would ever occur by limiting the transfer of groundwater from outside the monitoring zone.

As highlighted in the SJREC Water budget in Section 2.2.3, the SJREC have and continue to manage a sustainable aquifer specifically addressing the potential of chronic lowering of water levels. Figure 22 shows the locations of the Representative monitor sites established for the undesirable result of chronic lowering of groundwater levels. It is further anticipated that areas outside of the SJREC will resolve overdraft within their respective areas leading to even more stable water level elevations in the SJREC service area. Table 39 shows the water level trigger for each representative well. The established trigger levels are designed to not impact a neighboring GSP's ability to achieve sustainability. The SJREC have historically managed groundwater levels sustainably and are proposing additional extraction limitations, as necessary, to avoid any impacts to an adjacent GSP. Groundwater levels will be monitored and managed consistent with the other sustainability indicators and the more restrictive management will be implemented to ensure this plan area is absent of any undesirable results. The minimum threshold for chronic lowering of groundwater levels will be periodically reviewed and updated by a Professional Engineer/Geologist as needed or to propose additional triggers and thresholds. If the SJREC notice a negative impact on the aquifer, an interim plan update will be initiated to update trigger water levels to maintain a healthy aquifer.

Minimum threshold has been defined at the subbasin level, see Table CC-16 in the Appendix B; the groundwater elevation indicating a chronic lowering of groundwater levels that may lead to undesirable results is an elevation that is lower than the historical seasonal low. The historic seasonal low is a fixed elevation at each site, based on available groundwater level data prior to the end of Water Year 2016. To account for future year-to-year variations in hydrology, compliance with the fixed historic seasonal low threshold will be compared with a 4-year rolling average of annual groundwater level measurements.

Shorter-term ("acute") groundwater elevation thresholds will also be established at each representative monitoring site by 2025 using a coordinated methodology across the subbasin. Acute thresholds will be established at levels that are intended to avoid short-term undesirable results, particularly for domestic water wells, groundwater dependent ecosystems, and interconnected surface waters where present in the Upper Aquifer, and for subsidence in the Lower Aquifer. Each year, both the historic seasonal low and the acute groundwater elevation thresholds will apply, whichever is more protective. Groundwater levels are measured as water surface elevation ("WSE"). Each GSP area includes multiple representative monitoring sites ("RMS") to which the minimum threshold applies. See Table CC-17 for numeric MTs at the subbasin level. See Table 39 below for SMC's for the SJREC GSP Group.

Section 4.0 discusses additional Projects and Management Actions that will promote a healthy aquifer and increase groundwater levels.

WELL NUMBER	AQUIFER	Monitoring Zone	REFERENCE POINT ELEVATION	MEASURABLE OBJECTIVE (WSE)	MINIMUM THRESHOLD (WSE)
1002 (CCID Well #2)	Upper	A	107.5	48.47	23.99
1014 (CCID Well #14)	Upper	B	114.5	98.23	76.72
1008 (CCID Well #8)	Upper	C	146.5	92.64	78.71
1006 (CCID Well #6)	Upper	D	103.4	92.22	81.31
1011 (CCID Well #11)	Upper	E	123.7	106.17	92.24
1043 (CCID Well #43)	Upper	F, I, K	128.5	98.50	73.50
1005 (CCID Well #5)	Upper	G	153.1	125.67	96.45
2410 (SLCC Well T-02)	Upper	H	112.447	98.45	70.45
3199 (Well 1199)	Upper	J	147.8	120.20	102.30
1050 (CCID Well #50)	Lower		112.20	35.02	-48.80
1027 (CCID Well #27)	Lower		140.40	57.37	38.07
1056 (CCID Well #56)	Lower		122.05	14.81	-33.00

Table 39 - Water Level Triggers for Chronic Lowering of Groundwater Levels

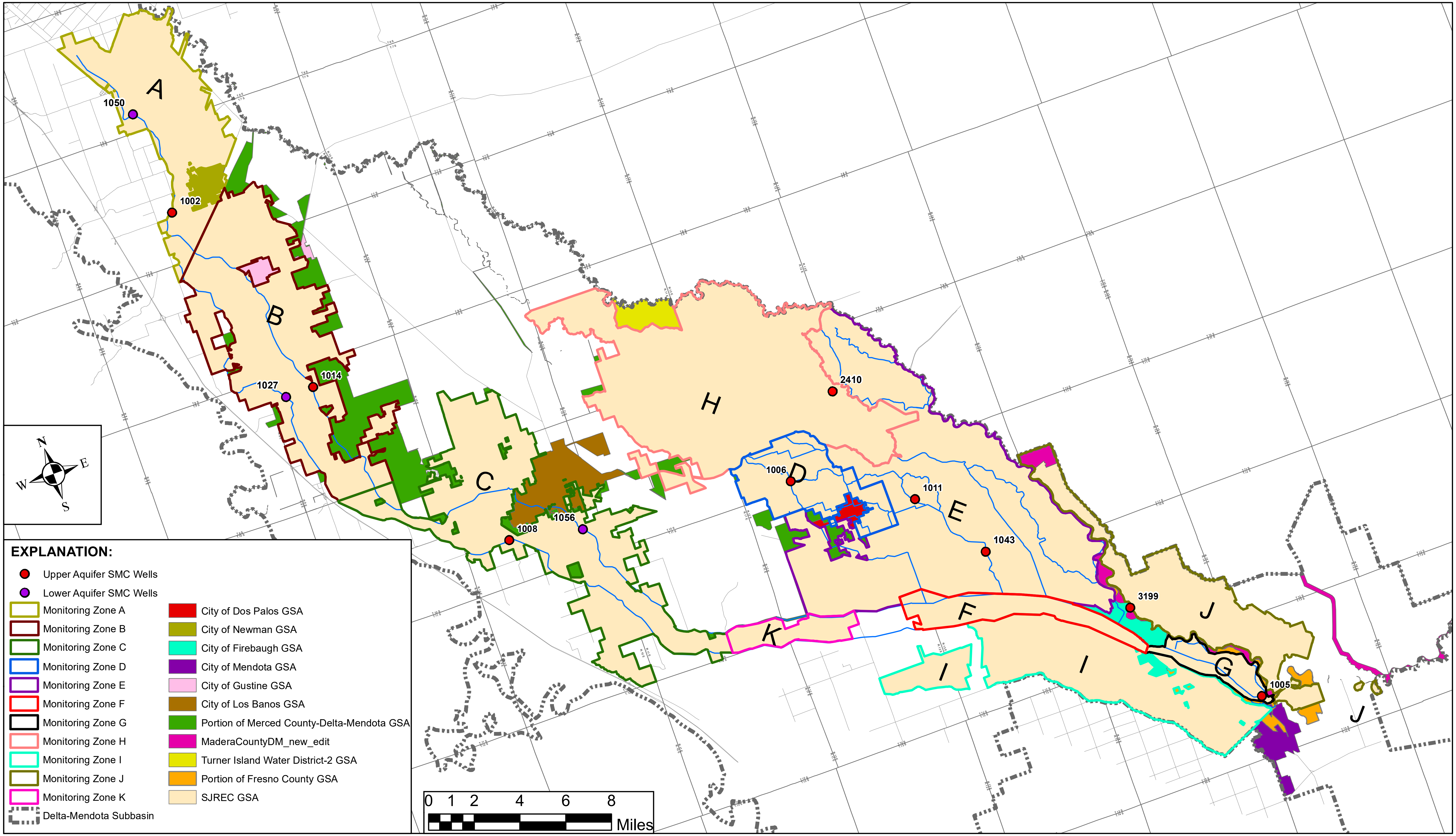

FIGURE 22 - MONITOR LOCATIONS FOR CHRONIC LOWERING OF GROUNDWATER LEVELS AND WATER QUALITY

3.3.2 Reduction of Groundwater Storage

The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from this GSP area without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of this plan, calculated based on historical trends, water year type and projected water use in the plan area.

The SJREC have implemented management strategies to maintain groundwater storage by using groundwater levels as a proxy in the upper aquifer. While there is a difference between managing chronic lowering of groundwater levels and managing a reduction in groundwater storage, the SJREC plan to implement SMC consistent for both of these criteria. Refer to Section 3.3.1 for details on establishing trigger levels and management actions to ensure any reduction in groundwater storage will not result in undesirable results. As discussed in Appendix I, each monitoring zone has a specific yield provided in the USGS Water Supply Paper 1469. The most accurate method to estimate changes in groundwater storage is to evaluate water level trends and specific yields for the upper aquifer, and can be used as a cross-check to water budget calculations. The change in groundwater storage will be monitored and managed consistent with the other sustainability indicators and the more restrictive management will be implemented to ensure this plan area is absent of any undesirable results. The minimum threshold for reduction in groundwater storage will be periodically reviewed and updated by a Professional Engineer/Geologist as needed or to propose additional triggers and thresholds. Any reduction in groundwater storage in the lower aquifer is caused by inelastic land subsidence. Refer to Section 3.3.5 for an explanation on Minimum Thresholds for Land Subsidence and the criteria will be the same for changes in groundwater storage for the lower aquifer.

Minimum threshold has been defined at the subbasin level, see Table CC-18 in the Appendix B; for the Upper Aquifer, as a reasonable proxy for an individual groundwater storage threshold, maintain groundwater levels in accordance with the minimum threshold set for Chronic Lowering of Groundwater Levels. For the Lower Aquifer, correlating the SMCs for inelastic land subsidence with the reduction in groundwater storage that would cause undesirable results, provides an estimated 1.1 million acre-feet of storage loss by 2040 attributable to groundwater extraction in the Subbasin, with no loss of storage after 2040.

Section 4.0 discusses additional Projects and Management Actions that will promote a healthy aquifer and increase groundwater storage.

3.3.3 Seawater Intrusion

The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. As defined in § 354.28. Minimum Thresholds: part (e) An Agency has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators. For these reasons, the SJREC GSP Group has not established any triggers for this sustainability indicator.

3.3.4 Degraded Water Quality

There are generally four types of groundwater quality problems that are important to the SJREC GSP Group. Refer to Appendix I for more details on managing groundwater quality and a map of known contamination sites. See Figure 22 for locations of monitoring locations for water quality.

1. Naturally occurring chemical constituents: Most of these constituents are important when developing public and domestic supply wells. Typically, a test well is drilled and vertical water quality trends are determined. The well is ultimately constructed to mitigate naturally occurring groundwater quality concerns. No Minimum Threshold is recommended for this type.
2. Point source contamination: These contaminated sites are typically defined as long and narrow and fall under the jurisdiction of the CVRWQCB. It is recommended that this plan does not implement its own independent cleanup requirements that may contradict existing orders. Rather, the SJREC GSP Group will continue to work with the CVRWQCB through the normal public process. No Minimum Threshold is recommended for this type.
3. Non-point source contamination: This type of contamination is typical of surface application of constituents including soil amendments and fertilizers. The CVRWQCB has implemented the Irrigated Lands Regulatory Program (ILRP) to address water quality concerns. This type of contamination is not directly related to the groundwater management described in the SGMA and in this plan. The SJREC GSA will continue to work with landowners to comply with ILRP. No Minimum Threshold is recommended for this type.
4. Hydrogeologic modification: The SJREC GSP Group can develop independent groundwater management to mitigate the migration of poor quality groundwater (saline) in the upper aquifer. The poor quality groundwater is migrating northeasterly. A minimum threshold is recommended for this type. The SJREC GSP Group cannot stop the migration of poor quality water from moving into the SJREC GSA and must implement management strategies to mitigate the potential damage. The minimum threshold described here is not intended to define an undesirable result for the SJREC GSP Group since the saline groundwater has originated from upslope lands and has migrated due to irrigation of the upslope lands. This minimum threshold is intended to signify when an adjacent GSP is having a negative impact on this GSP's ability to maintain healthy soils and a sustainable aquifer

Minimum threshold has been defined at the subbasin level, see Table CC-19 in the Appendix B; the minimum threshold for salinity is 1,000 mg/L total dissolved solids (TDS). For representative monitoring sites that currently exceed the minimum threshold, existing regulatory water quality compliance and remediation programs will apply, including but not limited to, the CV-SALTS Salt Control Program, the Irrigated Lands Regulatory Program, the County Drought Plan requirements for State Small Water Systems and Domestic Wells (SB 552), and the Safe and Affordable Funding for Equity and Resilience (SAFER) program. For any RMS without data prior to the end of Water Year 2016, current (ambient) groundwater quality will be established using data collected during the first five years of monitoring following Water Year 2016 or following construction of the well.

For representative monitoring sites that do not currently exceed the minimum threshold, but are found to exceed minimum thresholds in the future, the applicable GSP group will conduct and publish an assessment of the effect of groundwater management activities on the documented exceedance, and propose timely actions to manage groundwater differently, if needed, to avoid exacerbating the exceedance. The applicable GSP group will also coordinate with the appropriate regulatory program to address the impact. Table 40 below defines the SMC's for the SJREC GSP Group.

WELL NUMBER	AQUIFER	Monitoring Zone	MEASURABLE OBJECTIVE (TDS)	MINIMUM THRESHOLD (TDS)
1002 (CCID Well #2)	Upper	A	<1,000	1,000
1014 (CCID Well #14)	Upper	B	<1,000	1,000
1008 (CCID Well #8)	Upper	C	<1,000	1,000
1006 (CCID Well #6)	Upper	D	N/A	N/A
1011 (CCID Well #11)	Upper	E	N/A	N/A
1043 (CCID Well #43)	Upper	F, I, K	N/A	N/A
1005 (CCID Well #5)	Upper	G	<1,000	1,000
2410 (SLCC Well T-02)	Upper	H	<1,000	1,000
3199 (Well 1199)	Upper	J	<1,000	1,000
1050 (CCID Well #50)	Lower		<1,000	1,000
1027 (CCID Well #27)	Lower		<1,000	1,000
1056 (CCID Well #56)	Lower		N/A	N/A

Table 40 – SMC's for Groundwater Quality

3.3.5 Land Subsidence

The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds shall be supported by maps and graphs showing the extent and rate of subsidence and the potential impact to land use and property interests. There are two types of subsidence observed in this area; elastic and inelastic. Elastic subsidence is typically on a significantly smaller magnitude than its inelastic counterpart. Elastic subsidence also doesn't typically have major impacts to infrastructure. For the purposes of this plan and addressing SMC for significant and unreasonable land subsidence, the focus will be on inelastic land subsidence.

Land subsidence is described as a gradual or instantaneous sinking of the earth's surface. The Delta-Mendota Subbasin has two major principal aquifers defined as the Upper and Lower aquifers. Separating the two aquifers is a thick bluish colored clay termed the Corcoran Clay. The Corcoran Clay is mapped and further defined in Appendix I. Land subsidence in the Delta-Mendota Subbasin is typically caused from groundwater extractions from the lower aquifer. The Corcoran Clay confines the lower aquifer creating a pressurized zone. As groundwater pumping is initiated, the water level in the well and surrounding area declines creating a decrease in pressure. This decrease may lead to inelastic land subsidence.

As mentioned previously in Section 2.2.3, the SJREC have very limited groundwater extractions which are well below the Delta-Mendota Subbasin sustainable yield. Additionally, maps depicting the extent and magnitude of land subsidence indicate that most, if not all, of the land subsidence observed is a result of groundwater extractions from outside the SJREC GSA boundary.

While the SJREC may not be causing subsidence, arresting observed subsidence in and around the Delta-Mendota Subbasin has proven an important task. CCID and SLCC are working with the Triangle T Water District (Chowchilla Subbasin 5-022.05) to establish a shallow recharge and recovery aquifer to reduce their dependence on groundwater pumping from the lower aquifer. This project is further detailed in Section 4.1.8 of this plan. As a result of completing about 50% of the project, the observed subsidence at the Sack Dam has reduced by about 66%. The SJREC will continue to reach out and help the neighboring areas mitigate subsidence.

Setting minimum thresholds requires a certain amount of data that needs to be analyzed by a certified Engineer/Geologist. There is lack of data in the SJREC area regarding water levels in the lower aquifer. The lack of data is not resultant of lack of monitoring on existing sites. The lack of data truly stems from very few wells perforated below the Corcoran Clay which is another indicator of sustainably managing groundwater in the area.

The SJREC will continue to work with the counties to ensure that new wells will be constructed consistent with SMC for our area.

The SJREC have already been majorly impacted by subsidence originating outside of its boundaries. SLCC had lost 30% of its capacity to deliver surface water to its growers by 2017. The groundwater will be impacted if surface water deliveries are impacted. CCID has also lost significant conveyance capacity in its canals and has gone through efforts to restore capacity. Millions of dollars have been spent internally to mitigate the damage caused from subsidence due to groundwater extractions outside of this GSA. The SJREC has zero tolerance from impacts caused by subsidence to its infrastructure, without appropriate mitigation. The management strategy for land subsidence for the SJREC GSP Group is that which doesn’t reduce our conveyance capacity without appropriate mitigation and/or damage to other critical infrastructure without appropriate mitigation.

Minimum threshold has been defined at the subbasin level, see Table CC-21 in the Appendix B; at representative monitoring sites, the change in ground surface elevation that would cause undesirable results is up to 2 feet of additional inelastic land subsidence through 2040 attributable to groundwater extraction in the Subbasin. Prevent subsidence caused by groundwater extractions in the Delta-Mendota Subbasin that exceeds corrective design standards or established triggers for critical infrastructure including the Delta-Mendota Canal, California Aqueduct, and roads and bridges.

The member entities of the SJRECWA will continue to perform surveys to determine conveyance capacity through the canals. Additionally, the publicly accessible data sets will be used to monitor subsidence so appropriate measures can be taken to mitigate potential damages. Land subsidence will be monitored and managed consistent with the other sustainability indicators and the more restrictive management will be implemented to ensure this plan area is absent of any undesirable results.

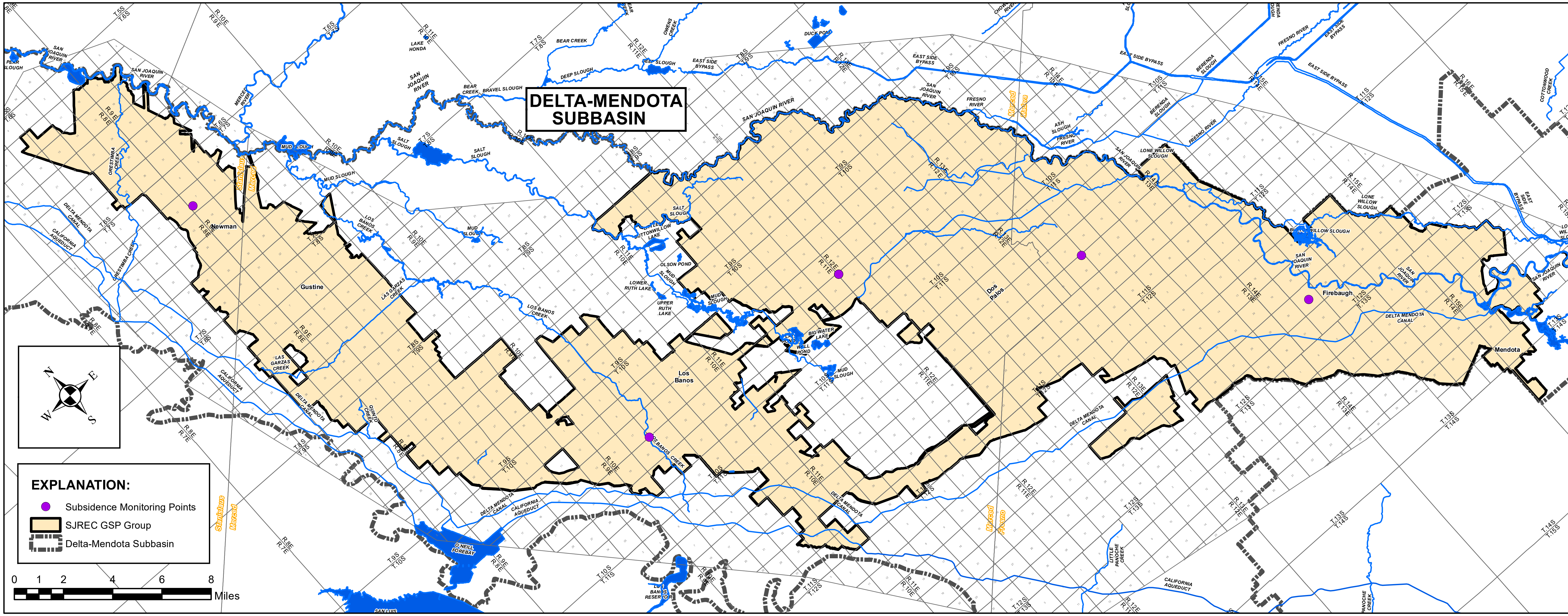

FIGURE 23 - MONITORING SITES FOR LAND SUBSIDENCE

3.3.6 Depletions of Interconnected Surface Water

The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established shall support the location, quantity and timing of potential depletions of interconnected surface water.

The SJRRP and the SJREC have established a series of shallow monitor wells near the San Joaquin River as part of the Seepage Management Plan for the Program. Data from these wells were used to determine the location of potentially connected surface water and groundwater. Figure 52 in Appendix I has a map that shows the potential locations of the interconnected portions of the San Joaquin River. The SJREC will continue to monitor water levels near the San Joaquin River and expand the understanding of the shallow groundwater in the area.

The San Joaquin River has historically been referred to as the trough of the valley. At this location some fined grained materials have been deposited creating a separation of groundwater adjacent to the river and the zone that is actively pumped. This separation of the two zones provides disconnection from the interconnected surface water and the zone of the aquifer where extractions occur. The SJREC intends to work with the various counties to establish criteria consistent with the County well construction procedures, that requires the wells drilled within a certain distance of the San Joaquin River, as recommended by KDSA, to have the first encountered perforations be deep enough limit the connection with surface waters.

This management technique will not only ensure that *significant and unreasonable* depletions of interconnected surface water are avoided but also mitigates the potential to have any direct depletion of surface water. This is consistent with maintaining the viability of those beneficial users, primarily GDE's, along the riparian corridor of the San Joaquin River. This management is also consistent with the long standing Herminghaus Agreement in Reach 2 (Gravelly Ford to Mendota Dam) of the San Joaquin River which put a prohibition on perforating any wells above the constricting clay layer in the area referred to as the A-Clay. Monitoring and management of this sustainability indicator over the next five years will provide essential information to maintain historical water levels. Depletions of interconnected surface water will be monitored and managed consistent with the other sustainability indicators and the more restrictive management will be implemented to ensure this plan area is absent of any undesirable results.

Minimum threshold has been defined at the subbasin level, see Table CC-23 in the Appendix B; interconnected Surface Water is an identified data gap in the Delta-Mendota Subbasin. As an interim minimum threshold, use the Chronic Lowering of Groundwater Level Minimum Threshold as a proxy for impacts to interconnected surface waters (see section 3.3.1).

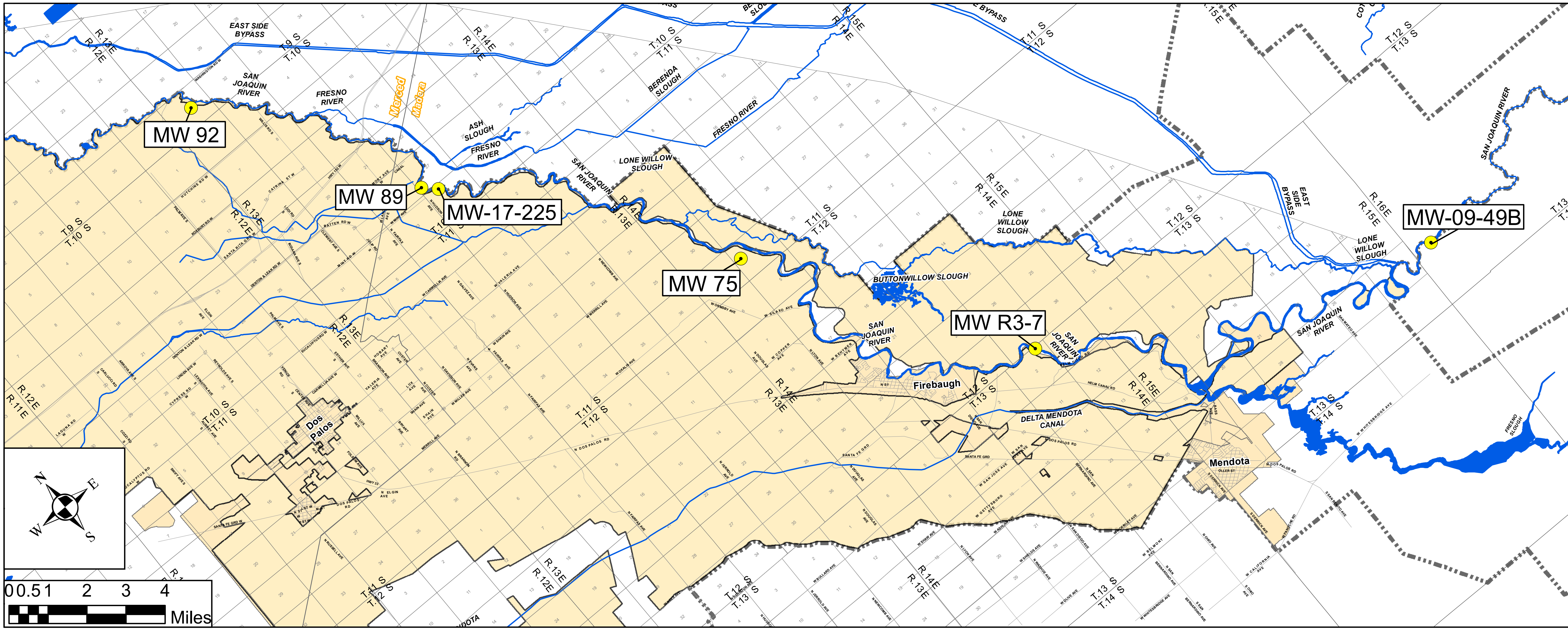

FIGURE 24 - MONITORING SITES FOR DEPLETIONS OF INTERCONNCETED SURFACE WATER

3.4 Undesirable Results

This section describes undesirable results for each sustainability indicator. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions throughout the basin. Groundwater conditions were analyzed to determine the potential effects on beneficial uses and users of groundwater. An Undesirable Result must be defined at the Subbasin level. The SJREC worked with the other GSA's in the Delta-Mendota Subbasin to define Undesirable Results for each sustainability indicator.

3.4.1 Chronic Lowering of Groundwater Levels

An undesirable result for chronic lowering of groundwater levels is defined as: chronic changes in groundwater levels that diminish access to groundwater, causing significant and unreasonable impacts to beneficial uses and users of groundwater.

The SJREC GSP Group does not experience and is not likely to experience a significant and unreasonable lowering of groundwater levels. Even so, sustainable management criteria have been established for this sustainability indicator. The SJREC GSP Group recharges more water than is extracted. Trigger levels have been established to recover aquifer water levels before nearing an Undesirable Result. Significant and unreasonable impacts to beneficial uses and users of groundwater are substantially increased costs associated with higher total pumping lift, lowering pumps, drilling deeper wells or otherwise modifying wells to access groundwater, securing alternative water sources, or required mitigation of groundwater dependent ecosystems. Significant and unreasonable is quantitatively defined as exceeding the MT at more than 50% of representative monitoring sites by aquifer in a GSP area.

3.4.2 Reduction of Groundwater Storage

An undesirable result for reduction of groundwater storage is defined as: a chronic decrease in groundwater storage that causes a significant and unreasonable impact to the beneficial uses and users of groundwater.

The SJREC GSP Group does not experience and is not likely to experience a significant and unreasonable reduction of groundwater storage. Even so, sustainable management criteria have been established for this sustainability indicator. The SJREC GSP Group recharges more water than is extracted. As mentioned previously, reduction in groundwater storage will be managed consistent with the sustainability indicator for chronic lowering of water levels. See Section 3.4.1 for details on what constitutes significant and unreasonable for reduced groundwater storage. This section will be periodically reviewed and updated with the best available information. A significant and unreasonable impact to beneficial uses and users of groundwater is insufficient water storage to maintain beneficial uses and natural resource areas in the Subbasin, including the conjunctive use of groundwater.

3.4.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. As defined in § 354.26. Undesirable Results: part (d) An agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators. For these reasons, the SJREC GSP Group has not established any triggers for this sustainability indicator.

3.4.4 Degraded Water Quality

An undesirable result for degraded water quality is defined as: Degradation of groundwater quality as a result of groundwater management activities that causes significant and unreasonable impacts to beneficial uses and users of groundwater. Significant and unreasonable degraded water quality is defined as impacts to beneficial uses and users of groundwater as a result of groundwater management activities are the migration of contaminant plumes or elevated concentrations of constituents of concern that reduce groundwater availability, and the degradation of surface water quality as a result of groundwater migration that substantially impair an existing beneficial use. Significant and unreasonable is quantitatively defined as exceeding the MT at more than 50% of representative monitoring sites by aquifer in a GSP area where current groundwater quality (as established in the Subbasins GSPs) does not exceed 1,000 mg/L TDS.The biggest groundwater quality concern for the SJREC is the migration of saline water from upslope drainage areas. As mentioned previously, this Undesirable Result is indicative of a neighboring GSP's inability to not impact another GSP's ability to achieve sustainability and will serve as an indicator of enhanced monitoring and management collaboration.

3.4.5 Land Subsidence

An undesirable result for land subsidence is defined as: Changes in ground surface elevation that cause damage to critical infrastructure, including significant and unreasonable reductions of conveyance capacity, impacts to natural resource areas, or conditions that threaten public health and safety.

An Undesirable Result for the SJREC GSP Group is highly unlikely to occur as a direct result of groundwater extractions from the lower aquifer from the GSA's in the SJREC GSP Group. This sustainability indicator is more likely to highlight a neighboring GSP's impact of land subsidence and their need to address the concern. Significant and unreasonable land subsidence is defined as Significant and unreasonable damage to conveyance capacity from inelastic land subsidence is structural damage that creates an unmitigated and unmanageable reduction of design capacity or freeboard. Significant and unreasonable impacts to natural resource areas from inelastic land subsidence are unmitigated decreases in the ability to flood or drain such areas by gravity. Significant and unreasonable threats to public health and safety from inelastic land subsidence are those that cause an unmitigated reduction of freeboard that causes flooding, or unmitigated damage to roads and bridges. The SJREC are committed to working with the neighboring GSA/GSP to arrest subsidence affecting infrastructure. Refer to Section 4.0 for more details on how the SJREC are working to solve regional subsidence stemming from groundwater extractions outside the Delta-Mendota Subbasin.

3.4.6 Depletions of Interconnected Surface Water

An undesirable result of depletions of interconnected surface water is defined as: depletions of interconnected surface water as a direct result of groundwater pumping that cause significant and unreasonable impacts on natural resources or downstream beneficial uses and users..

Significant and unreasonable depletion of interconnected surface water occurs when groundwater extraction from the SJREC GSP Group decreases streamflow to a significant and unreasonable level for beneficial users in a stretch of the San Joaquin River that was historically losing (seeping from the river). Significant and unreasonable impacts on natural resources or downstream beneficial uses and users of groundwater are a reduction in available surface water supplies for natural resource areas, and reductions in downstream water availability as a result of increased streamflow depletions along the San Joaquin River when compared to similar historic water year types.

3.5 Monitoring Network

The monitoring network shall be developed including monitoring objective, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the plan and evaluate changing conditions that occur through implementation of the plan.

3.5.1 Description of Monitoring Network

Some water level monitoring sites have continuous monitoring while most of the other sites are either measured in the field every month or quarterly. Water quality samples are taken at least annually in agriculture wells and significantly more frequently in the small community supply wells. The SJRRP conducts semi-annual land subsidence surveys. This monitoring network has proven vital for successful implementation of this plan. Long-term hydrographs (over 20 years) and water quality trends over time are reviewed each year to determine seasonal conditions, short-term hydrologic cycle conditions and long-term impacts on groundwater.

The shallow monitor wells near the San Joaquin River will be used to determine groundwater and surface water related conditions and the potential impact to interconnected water. The goal of this plan is to mitigate the potential to impact interconnected waters through well construction standards. This management is preferable to the long-term sustainability of the San Joaquin River by mitigating the risk in advance.

The current monitoring network and associated management strategies worked through the drought of 2013-2016 to protect the local beneficial users of groundwater. The SJREC GSP Group has annually collected data necessary to prepare annual updates to the water budget including the annual change in groundwater storage.

Representative sites have been chosen for each monitoring zone to determine if chronic lowering of groundwater levels or significant reduction in groundwater storage has occurred. The wells used for these representative sites typically have water level readings each month. Seawater Intrusion is not likely to occur in the Delta-Mendota Subbasin. The Camp 13 area and FCWD have an elaborate groundwater management program to help control the migration of poor quality shallow groundwater due to upslope drainage. The management includes point source control, installation of tile drainage lines and tile interceptor lines, drainage interceptor wells, and blending of poor quality groundwater. The electrical conductivity in this area is typically not useable for agriculture without blending and the monitoring is typically to control the water levels below the effective root zone to keep the soil and crops healthy. The current monitoring network for land subsidence includes the DMC (western boundary) and the SJRRP subsidence monitoring points (eastern boundary) along with continuous monitoring sites monitored by the USGS. These sites will highlight areas of concern that warrant an in-depth investigation to mitigate inelastic land subsidence. The monitoring network for interconnected surface water will utilize the shallow monitor wells near the San Joaquin River installed as part of the USBR's SJRRP. The quantification of potential gains and losses in the San Joaquin River is challenging since various creeks and sloughs intertwine with the San Joaquin River and provide an unmetered point source introduction of water. In order to avoid complicated and costly monitoring, the SJREC GSP Group has proposed to mitigate the risk of significantly and unreasonably depleting interconnected surface water through well construction procedures.

Each sustainability indicator has a representative site, described in section 3.5.3, with the exception of degraded groundwater quality which is actively managed through water level control as mentioned above.

The SJREC GSP Group collects data and has reported consistent with the standards prescribed in the SGMA. Refer to Appendix O for more details on the BMP for the monitoring network. For more details regarding the how the monitoring network works with the SMC and maps of the representative monitoring sites, refer to Sections 3.3 and 3.4.

3.5.2 Monitoring Protocols for Data Collection and Monitoring

The SJREC updated the DWR BMP for monitoring protocols to describe the consistency of technical standards, data collection methods and other procedures to ensure comparable data and methodologies. When reviewing data the first and foremost step is to ensure that the person reviewing the data has the correct units and is using the correct reference. For more details on the SJREC BMP for monitoring protocols refer to Appendix N of this GSP.

3.5.3 Representative Monitoring

In the 1990's, the SJRECWA developed an AB 3030 Groundwater Management Plan. One aspect of that plan was the development of groundwater monitoring zones. Those monitoring zones have proven effective managing groundwater and have carried over into this GSP. The SJREC have sentinel wells (representative monitoring) established in each monitoring zone for the sustainability indicators for Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, and Water Quality; refer to Section 3.3 for more details and a map of the sites. Each representative site was chosen in cooperation with KDSA. Numerous hydrographs were reviewed for each monitoring zone to determine the representative site. Each monitoring zone has a specific yield for the upper aquifer that was defined in the USGS water supply paper 1469. Each monitoring zone has a specific yield and a water level from a representative site which are used conjunctively to determine the change in groundwater storage. Therefore, groundwater elevations are used as a proxy for determining the SMC for a Reduction in Groundwater Storage.

The SJREC are using the continuous land surface monitoring sites to represent the Land Subsidence network. Additionally, the SJREC will refer to the SJRRP subsidence monitoring network and the subsidence surveys on the DMC to look at subsidence in the region. The subsidence network along the DMC will establish the western boundary conditions while the SJRRP program will establish the eastern boundary conditions. In areas of land subsidence, a detailed review of groundwater levels including drawdown are vitally important to develop a sustainable plan to stop subsidence. Since the SJREC have minimal pumping from the lower aquifer, the land subsidence representative monitoring network will be reviewed to determine 1) the amount of subsidence occurring, 2) where subsidence may be originating and 3) potential impacts to critical infrastructure. Refer to the previous sections for more details and a map of the representative land subsidence monitoring locations.

The SJREC will be reviewing shallow monitor wells near the San Joaquin River to determine impacts to interconnected surface water and groundwater. The representative monitoring network and map are detailed in the previous sections. The primary goal described in the SMC for this sustainability indicator is to use well construction procedures to mitigate the potential for undesirable results.

The representative monitoring for Degraded Groundwater Quality is further described in Section 3.3 and Appendix I. The major groundwater quality concern described in this GSP is the migration of shallow, saline groundwater from upslope lands. This saline water has mostly effected Monitoring Zones F and I; respectively CCID Camp 13 area and FCWD. For more details refer to Section 4.2.4 of this plan. The migration of saline water is a regional problem that can cause site specific concerns. For this reason, a representative site has not been selected and the growers in this area actively manage water levels through the use of tile drainage systems to control the water level to keep the poor quality groundwater from inundating the crop root zone.

3.5.4 Assessment and Improvement of Monitoring Network

The SJREC have actively monitored and managed groundwater for decades. In the 1990's the Exchange Contractors embarked on several groundwater investigations to determine appropriate groundwater management and to maintain a healthy aquifer for the small communities adjacent to the service area. Through these investigations KDSA recommended to fill data gaps and improve the monitoring network in order to better understand the groundwater conditions and groundwater flows in and around the SJREC area.

The existing monitoring network was established to monitor groundwater conditions each year through the annual groundwater reports prepared over the last two decades. The results of the groundwater report are reviewed by KDSA. If a problem starts to present itself through the annual report, the SJREC worked with KDSA to develop a more in-depth and site specific analysis to determine the appropriate course of action to mitigate the concern. One such example of the success of the monitoring network is the Red Top Area Subsidence Mitigation Project. The USBR thought that subsidence may be occurring in the Red Top Area. The SJREC had experience in recognizing and dealing with subsidence and started to do a detailed investigation. The analysis showed that there were wells perforated below the Corcoran Clay that were causing subsidence in the area. The SJREC worked with the local landowners to study the problem and work on a solution to stop subsidence near Sack Dam, the headworks of SLCC. This project is further described in Section 4.1.7.

Active groundwater management for decades has afforded the SJREC GSP Group a robust groundwater monitoring system. The SJREC GSP Group is working with the other GSA's to develop a robust network to monitor and manage interconnected surface water.

Although the SJREC GSP Group is not the cause of inelastic subsidence in the area, a more robust lower aquifer groundwater monitoring network could help the Delta-Mendota Subbasin along with the neighboring subbasins gain a better understanding of the lower aquifer. The main reason for the lack of water level data in the lower aquifer is due to the lack of wells perforated in that zone. Drilling monitor wells in the lower aquifer is an expensive task. Since the SJREC GSP Group has limited groundwater extractions from the lower aquifer, the group has historically chosen to use resources to monitor and manage in other locations. An expanded lower aquifer groundwater monitoring network will not impact the SJREC groundwater management and is therefore not considered a cost effective data gap that should be filled. Rather, the SJREC will continue to work with the neighboring GSA's to enhance a lower aquifer groundwater monitoring network to help solve subsidence originating outside of the SJREC service area.

While the current SJREC groundwater monitoring network has proven effective in managing the local aquifers, the SJREC GSP Group is committed to reviewing the network each year and to make any necessary modifications to maintain sustainability. Furthermore, during the drought of 2013-2016, water levels in parts of the SJREC dropped below trigger levels and management actions were implemented to protect the beneficial users of groundwater in the area.

4.0 PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

4.1 Projects

The SJREC GSA, working conjunctively with the San Joaquin River Exchange Contractors Water Authority, has developed a Water Resource Plan to avoid potential impacts from Critical Years under the Exchange Contract and to meet peak irrigation demand. The SJREC are sustainably managing our aquifers and these projects are not intended to mitigate Undesirable Results in this plan. Rather, these projects will provide better management of our surface water supplies, which have the additional benefit of buttressing our groundwater supply, and helps the neighboring agencies in managing their water portfolio's. Many of these projects are done in collaboration between the SJREC and neighboring agencies to provide regional sustainability. These Projects have either been fully developed or are currently under development.

- 4.1.1 Los Banos Creek Diversion Facility (Complete)
- 4.1.2 Los Banos Creek Recharge and Recovery (Expansion Under Development)
- 4.1.3 Los Banos Creek Storage Project (Under Development)
- 4.1.4 Orestimba Creek Recharge and Recovery (Expansion Under Development)
- 4.1.5 BB Limited Groundwater Recharge and Recovery (Under Development)
- 4.1.6 Farmers Water District Groundwater Recharge and Recovery (Under Development)
- 4.1.7 Summary of Active Water Resource Projects 4.1.1-4.1.5
- 4.1.8 Red Top Area Subsidence Mitigation (Complete on-going)

4.1.1 Los Banos Creek Diversion Facility

The Los Banos Creek Diversion Facility is located southwest of the City of Los Banos where the Los Banos Creek crosses the DMC. The project participants for this facility include the San Luis Water District, Grassland Water District, and the member agencies of the SJRECWA. Construction for this project was completed in 2017. The facility has been tested and is operational. This project required close coordination with both state and federal agencies. CCID worked with the USBR to prepare a joint CEQA/NEPA environmental review resulting in a Mitigated Negative Declaration and Mitigated Finding of No Significant Impact (SCH# 2013021001). The following permits were also required prior to construction: California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit, and United States Army Corp of Engineers Clean Water Act Section 404 Permit. This project was made accessible to the public consistent with CEQA/NEPA requirements.

The Los Banos Creek Diversion Facility is located just upstream of where the DMC siphon crosses the Los Banos Creek. The project consists of a gated check structure spanning Los Banos Creek, a turnout structure on the creek, an outlet structure on the DMC, and a box culvert connecting the turnout and outlet. The operation of this facility will keep the first 50 cfs of flood flows released from the Los Banos Creek Detention Reservoir in the creek to maintain historical recharge and can divert up to 250 cfs of flood releases into the DMC. The source water for this project is from runoff in the Los Banos Creek watershed and will be put to beneficial use during times of reservoir releases. The project is designed to also deliver water from the DMC into the Los Banos Creek. This project will provide additional flood protection to the City of Los Banos, a Disadvantaged Community, and also provide wetland benefits through relieved pressure from flood flows on wetland habitat and an additional useable water supply. The Exchange Contractors average annual yield of the project is 3,500 acre-feet/year. Yield for the project will be split, as necessary, for in-lieu groundwater recharge within the SJREC service area or sent to the Los Banos Creek Recharge and Recovery Project. The total cost of the project was about $3,100,000.

The operation of this project will reduce the net extractions from the local aquifer through in-lieu use of the water and increased recharge, thereby increasing Groundwater Storage and raising Groundwater Levels.

The SJREC GSA is working with neighboring GSA's and Water Districts to implement this project, among others, in a sustainable manner. Successful and sustainable management of groundwater is best achieved through local collaboration with interested parties.

4.1.2 Los Banos Creek Recharge and Recovery

The Los Banos Creek Recharge and Recovery Project is along the Los Banos Creek between Pioneer Road and Sunset Avenue, southwest of the City of Los Banos. The feasibility of this project has been analyzed. The environmental review for this project will begin in 2019. A joint CEQA/NEPA Mitigated Negative Declaration and Mitigated Finding of No Significant Impact is expected on this project. Anticipated permits for this project include: Merced County Well Construction Permit, California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit, and United States Army Corp of Engineers Clean Water Act Section 404 Permit. This project will be made accessible to the public consistent with CEQA/NEPA requirements.

This project will use an existing abandoned gravel pit and an adjacent field as a recharge facility. Flood water and/or surface water from the San Joaquin River Exchange Contractor entities, will be delivered to the site from the CCID Outside Canal and/or down the Los Banos Creek from the Los Banos Creek Diversion Facility. The approximately 60-acre site can recharge upwards of 4,500 acre-feet per year. During a Critical Year, the entities of the San Joaquin River Exchange Contractors can extract up to 7,000 acre-feet of stored groundwater. This facility will be managed to recharge and store more water than will be extracted. The excess recharged water will help offset regional groundwater usage along Los Banos Creek. The operations of this facility will help achieve regional sustainability specifically contributing to raising groundwater levels, increasing groundwater storage and improving groundwater quality.

The SJREC GSA is working with neighboring GSA's and Water Districts to implement this project, among others, in a sustainable manner. Successful and sustainable management of groundwater is best achieved through local collaboration with interested parties.

4.1.3 Los Banos Creek Storage Project

The Los Banos Creek Storage Project makes use of the existing Los Banos Creek Detention Reservoir (LBCDR). The feasibility of this project has been analyzed. A joint CEQA/NEPA Mitigated Negative Declaration and Mitigated Finding of No Significant Impact is expected on this project. Anticipated permits for this project include: State Water Resources Control Board Point of Rediversion and Restorage, California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit, United States Army

Corp of Engineers Clean Water Act Section 404 Permit and access & use of the existing and proposed facilities within the USBR right of way. This project will be made accessible to the public consistent with CEQA/NEPA requirements.

The Los Banos Creek Detention Dam (LBCDD) and LBCDR are Federally owned and State operated facilities that were constructed jointly by the USBR and the California DWR as part of the San Luis Unit of the Central Valley Project (CVP) to provide flood control protection to the San Luis Canal. The LBCDR because of its proximity also provides flood protection to the City of Los Banos. The California Department of Parks and Recreation (DPR) operates the public recreational facilities at LBCDR. The dam and reservoir are located approximately six miles southwest of the City of Los Banos. The dam became operational in 1962 and the reservoir has a maximum storage of 34,500 acre-feet (AF). The LBCDR is currently operated near or below the United States Army Corp of Engineers (USACE) winter period conservation pool of 20,600 AF of storage, even though summer operations allow storage of 34,500 AF as authorized by the USACE guidance manual.

Currently the dam is strictly operated as a flood control facility during the late fall and winter months. A group of local agencies have proposed to operate the LBCDD in the spring to route natural Los Banos Creek flows to riparian lands downstream of the facility making space available for storage and thereby increasing the overall benefit of the Los Banos Creek Diversion Facility (See Section 4.1.1). The Project Participants consist of the San Luis Water District (SLWD), Grassland Water District (GWD), and the member agencies of the San Joaquin River Exchange Contractors Water Authority (SJRECWA or Exchange Contractors) which consists of Central California Irrigation District (CCID), San Luis Canal Company (SLCC), Firebaugh Canal Water District (FCWD) and Columbia Canal Company (CCC). The Project Participants would pump conserved water or groundwater into the available storage space in the spring and early summer and return the water to them in the summer or fall to meet peak irrigation or habitat water demands.

The purpose of the proposed Project is to more effectively manage LBCDR in order to maximize flood control and downstream benefits while maintaining recreational use of the reservoir. Project operations would be seasonal in nature and would still follow the current practice of limiting storage to the winter USACE flood control target at all times. The water pumped into the reservoir for storage by the Project Participants would be either conserved water or groundwater. During the flood control season, and potentially year-round, water in the reservoir would be allowed to accumulate and be released from the reservoir to meet Project Participant riparian demand. Starting in the spring, the project participants would pump their conserved water or groundwater into available LBCDD space for temporary storage and return to one or all participant to meet peak irrigation or wildlife water management demands. Some of the project benefits include: improved water supply management and reliability, development of additional Incremental Level 4 refuge water supply, increased flood control protection to downstream facilities, increased access to the LBCDR recreational facilities during most flood release scenarios, increased recreational opportunities at LBCDR, along LBC and in GWD, environmental enhancements at LBCDR, along LBC and in GWD, and Disadvantaged Community (DAC) water supply and water quality improvements.

The Project includes the installation of a pipeline to deliver water from the existing SLWD Reservoir #8, located on a ridge above LBCDR, into the reservoir. The boat ramp was entirely out of the water in 2015 which reduced access to the lake for recreational fishing during that time. This project proposes an extension to the existing boat ramp to ensure recreational opportunities during times of low reservoir elevation. The current access to the recreational facilities including a boat ramp, picnic area and campgrounds, is currently through a low water crossing in the Los Banos Creek below the dam. During times of releases above 50 cfs, all access to the reservoir is restricted. This project also proposes the installation of box culvert to provide access to the reservoir nearly year-round while also mitigating traffic traveling through the creek itself.

LBCDD would be operated in the October through February time period to release natural Los Banos Creek flow downstream for use by riparian lands consistent with the benefits described above and in Sections 4.1.1 and 4.1.2. The operation would also create space in the LBCDD to be used to temporarily store water. Then starting around March 15th of each year (outside flood control season) the Participants would begin temporarily storing up to 8,000 acre-feet of conserved water or groundwater in available LBCDD space. The stored water would be returned to the participating Districts during peak irrigation or wildlife water management times via the Los Banos Creek and Delta-Mendota Canal. The Dam operations would preserve and enhance but be consistent with the current flood control criteria and operation. The source of the water used to temporarily store in the reservoir is Project Participant water that is already south of the Sacramento-San Joaquin Delta and has no direct impacts to the San Joaquin River and outflow through the Delta. Furthermore, once the water is released from the reservoir it will be directly used for beneficial use for agriculture and wetland habitat. This project does not increase pumping at the Bill Jones Pumping Plant (CVP pumps in the Delta) or impact flows in the San Joaquin River out to the Delta. Rather, this project provides operational flexibility to water supply that has already moved through the Bill Jones Pumping Plant while increasing the overall beneficial use of the water.

4.1.4 Orestimba Creek Recharge and Recovery

The Orestimba Creek Recharge and Recovery Project is located west of the City of Newman on an existing farm field. The project participants for this facility include the Del Puerto Water District and the SJRECWA entities. This project consists of an existing 20-acre recharge facility that was constructed in 2018 and an additional 60-acre facility to be constructed by 2023. The 20-acre project required close coordination with both state and federal agencies. CCID worked with the USBR to prepare a joint CEQA/NEPA environmental review resulting in a Mitigated Negative Declaration and Mitigated Finding of No Significant Impact, and it was made accessible to the public consistent with CEQA/NEPA requirements (SCH# 2017042061). The proposed 60-acre project will require CCID to work with USBR to prepare a joint CEQA/NEPA environmental review likely resulting in a Mitigated Negative Declaration and Mitigated Finding of No Significant Impact. Anticipated permits for the 60-acre site include: Stanislaus County Well Construction Permit, California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit and United States Army Corp of Engineers Clean Water Act Section 404 Permit.

The Orestimba Creek Recharge and Recovery Project is located on existing farm land east of Eastin Road and north of Orestimba Road. Flood flows and surface water from Del Puerto Water District and/or the SJRECWA entities will be delivered to the site through an existing pipeline from the DMC. Another source of water for the recharge facility is excess flood flows from Orestimba Creek to be routed through a proposed pipeline to the project site. Diverting excess flood flows from Orestimba Creek will provide additional flood protection to the Disadvantaged Community of the City of Newman. The total

80-acre facility is expected to recharge up to 15,000 acre-feet in a given year. During a Critical Year, the member agencies of the San Joaquin River Exchange Contractors can extract up to 7,500 acre-feet of stored groundwater. This facility will be managed to recharge and store more water than will be extracted. The excess recharged water will help offset regional groundwater usage along Orestimba Creek. The operations of this facility will help achieve regional sustainability specifically contributing to raising groundwater levels, increasing groundwater storage and improving groundwater quality. The total cost to construct the existing 20-acre site was about $1,200,000. The SJRECWA received $6,400,000 in State grants to cover the total cost of $7,900,000 for the 60-acre expansion to the project.

The SJREC GSA is working with neighboring GSA's and Water Districts to implement this project, among others, in a sustainable manner. Successful and sustainable management of groundwater is best achieved through local collaboration with interested parties.

4.1.5 BB Limited Recharge and Recovery

The BB Limited Recharge and Recovery project is located east of the City of Mendota along the eastside of the Fresno Slough and south of the San Joaquin River. This project is on an existing 13-acre recharge site. The environmental review for this project will begin in 2023. The project is anticipated to be fully functional in 2025. A joint CEQA/NEPA is expected for this project resulting in a Negative Declaration and Finding of No Significant Impact. Fresno County Well Construction Permits are required for this project. This project will be made accessible to the public consistent with CEQA/NEPA requirements.

The BB Limited Recharge and Recovery project is located in an existing 13-acre site north of the existing Meyers Water Bank. Surface water from the SJREC will be delivered to the site. Additionally, excess flood water from the Kings River and/or San Joaquin Rivers will be diverted to the site. The total 13-acre facility is expected to recharge upwards of 1,500 acre-feet in a given year. During a Critical Year, the member agencies of the San Joaquin River Exchange Contractors can extract up to 4,000 acre-feet of stored groundwater. It is anticipated that the Exchange Contractors will recharge over 4,000 acre-feet over three consecutive years and ultimately extract 4,000 acre-feet in a subsequent Critical Year. This facility will be managed to recharge and store more water than will be extracted. The excess recharged water will help offset regional groundwater usage near the Mendota Pool. The operations of this facility will help achieve regional sustainability specifically contributing to raising groundwater levels, increasing groundwater storage and improving groundwater quality. The total cost of the 13-acre facility is approximately $600,000.

The SJREC GSA is working with neighboring GSA's and Water Districts to implement this project, among others, in a sustainable manner. Successful and sustainable management of groundwater is best achieved through local collaboration with interested parties.

4.1.6 Farmers Water District Recharge and Recovery

The Farmers Water District Recharge and Recovery project is located east of the City of Mendota along the eastside of the Fresno Slough and south of the San Joaquin River in the Farmers Water District. The project participants for this facility include the Farmers Water District and the SJRECWA entities. This project consists of a proposed 90-acre recharge facility. The environmental review for this project will begin in 2022. The project is anticipated to be fully functional in 2024. A joint CEQA/NEPA is expected for this project resulting in a Mitigated Negative Declaration and a Mitigated Finding of No Significant Impact. This project will be made accessible to the public consistent with CEQA/NEPA requirements.

Anticipated permits for the 90-acre site include: Fresno County Well Construction Permit, California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit and United States Army Corp of Engineers Clean Water Act Section 404 Permit.

The Farmers Water District Recharge and Recovery project is located on 90 acres of existing farm land north of the existing Meyers Water Bank and southeast of the proposed BB Limited Recharge and Recovery project. Surface water from SJRECWA entities will be delivered to the site. Additionally, excess flood water from the Kings River and/or San Joaquin River will be diverted to the site. The total 90-acre facility is expected to recharge upwards of 6,500 acre-feet in a given year. During a Critical Year, the SJRECWA entities can extract up to 4,000 acre-feet of stored groundwater. This facility will be managed to recharge and store more water than will be extracted. The excess recharged water will help offset regional groundwater usage near the Mendota Pool. The operations of this facility will help achieve regional sustainability specifically contributing to raising groundwater levels, increasing groundwater storage and improving groundwater quality. The total cost of the 90-acre facility is approximately $3,000,000.

The SJREC GSA is working with neighboring GSA's and Water Districts to implement this project, among others, in a sustainable manner. Successful and sustainable management of groundwater is best achieved through local collaboration with interested parties.

4.1.7 Summary of Active Water Resource Projects 1-6

The San Joaquin River Exchange Contractors Active Projects 1-6 will significantly contribute to the sustainability of the Delta-Mendota Subbasin. Not only will the SJREC leave more water in the Recharge and Recovery Projects than is extracted, additional water can be recharged through the project facilities to improve groundwater conditions. The SJREC are anticipating needing dispatchable storage approximately 7% of the time through the Planning and Implementation Horizon. In these years the Exchange Contractors will recover stored groundwater to meet demand in-lieu of pumping natural groundwater. Additionally, the Exchange Contractors will recover 8,000 acre-feet of conserved water stored in the LBCDR for use during Critical Years under the Exchange Contract. This has a direct positive impact on groundwater levels and also has a benefit of 31,000 acre-feet for the regional change in groundwater storage.

4.1.8 Red Top Area Subsidence Mitigation

The Red Top Subsidence Mitigation project is located east of the San Joaquin River in the Red Top Area. The Project Participants for this project include the SJREC and the newly formed Triangle T Water District. This existing project was constructed in 2017 and primarily consists of a pipeline under the San Joaquin River to deliver surface water from the Central California Irrigation District's Poso Canal to the east side of the San Joaquin River. This project required close coordination with both state and federal agencies. CCID worked with the USBR to prepare a joint CEQA/NEPA environmental review resulting in a Mitigated Negative Declaration and Mitigated Finding of No Significant Impact (SCH# 2016021011). The following permits were also required prior to construction: California State Lands Commission Lease, Central Valley Flood Protection Board Permit, California Department of Fish and Wildlife Section 1600 Streambed Alteration Permit, Central Valley Regional Water Quality Control Board Clean Water Act Section 401 Permit, and United States Army Corp of Engineers Clean Water Act Section 404 Permit. This project was made accessible to the public consistent with CEQA/NEPA requirements.

The Red Top Subsidence Mitigation project is in an area significantly impacted by subsidence due to extracting groundwater from the aquifer below the Corcoran Clay. The Triangle T Water District, historically solely relying on groundwater, will purchase and deliver surface water through the pipeline under the San Joaquin River. Water delivered to Triangle T Water District will either be used directly in-lieu of pumping groundwater or delivered to recharge ponds. As a direct result of delivering surface water and developing a shallow groundwater recharge and recovery facility, the area will use the stored shallow groundwater and pump less water from the aquifer below the Corcoran Clay. The subsidence contribution in the Red Top Area from the Triangle T Water District will significantly reduce as a result of great collaboration between the project participants. An expert panel will review the area and determine the sustainable yield from the aquifer below the Corcoran Clay that does not cause significant or unreasonable subsidence. There is also a mandatory step-down reduction each year from 2017-2021 for groundwater extractions from below the Corcoran Clay. The annual allowable extraction from below the Corcoran Clay per acre in the Triangle T Water District is respectively; 0.90, 0.75, 0.65, 0.60 and 0.50. The overall extraction will be limited by the lesser of the mandatory step-down reduction or recommendation from the expert panel. In addition to mitigating subsidence, this project will also contribute to regional sustainability, specifically raising groundwater levels and increasing groundwater storage. The total cost of the existing project was $1,125,000.

In addition, the Triangle T Water District is working on a proposed project to expand the acreage of recharge ponds and drill upper aquifer wells while abandoning lower aquifer wells. Pumps will be installed in the Eastside Bypass to capture flood flows and deliver to the Triangle T Water District for direct use or in-lieu use.

This project, while physically outside of the Delta-Mendota Subbasin, will have direct positive impacts on three Undesirable Results occurring outside the Subbasin. Recharging surface water into the Upper Aquifer will increase water levels and groundwater storage in the Chowchilla Subbasin. The major positive impact from this project will, and already has, reduce extractions from the Lower Aquifer resulting in mitigation of Land Subsidence. In 2015, Sack Dam, the headworks for SLCC, was subsiding at a rate of 0.5 feet/year. The subsidence rate at Sack Dam was reduced to about 0.17 feet/year after the first year of implementation of the existing project.

4.2 Management Actions

The SJREC have management actions that have been in place since the 1990's to successfully manage groundwater in and around its service area.

4.2.1 Annual Groundwater Assessment Report

Each year the SJREC prepare an annual report (Report) of the current and historical conditions of groundwater. This report includes groundwater pumping within each member agency of the SJRECWA. The report includes: pumping volumes, pump tests, water quality, and water levels. The report also summarizes regional groundwater pumping. This report is reviewed by our Hydrogeologist, who prepares a supplemental assessment report (Recommendation). The hydrogeologist makes a recommendation on how each monitoring zone (or sub-area) within the SJREC area should be managed for the current year. The Report and Recommendation are annually reviewed and approved by the individual SJRECWA entity Board of Directors. The primary management tool is to review water levels in impacted areas. Historically, the hydrogeologist has recommended limiting the export of groundwater in those impacted areas if the groundwater elevation is below an established trigger level. This Report and Recommendation have proven essential in sustainably managing the aquifers around the districts.

4.2.2 Private Well Pumping for Credits

The member entities of the SJRECWA, allow landowners to pump private well water into the district facilities for credit. The SJREC entities have implemented a policy to regulate pumping and ensure a healthy aquifer while maintaining good service of surface water. Each year the entities work with a Hydrogeologist to prepare an annual groundwater assessment report. In the 1990's, the entities were divided up into management areas, now termed monitoring zones. Our Hydrogeologist recommended, and the boards adopted, establishing trigger water levels to restrict the mining of groundwater in impacted areas. Groundwater cannot be exported out of an impacted area if the water level is below the trigger level. During the recent drought from 2013-2016, water levels in impacted areas dropped below the trigger. In 2017, the water levels recovered. This management action has proven effective to mitigate Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage.

All water pumped for credit must meet water quality standards. Currently, the maximum allowable Total Dissolved Solids and Boron are 1,500 TDS and 2.0 ppm, respectively. In addition, the blended water quality downstream of the well shall not exceed 700 TDS, 0.5 ppm Boron and no additional detection of Selenium. There is also a maximum allowable total volume that can be pumped for credit. However, the maximum allowable credit is further limited by the amount of groundwater which can be pumped without damaging other landowners or depleting groundwater storage. A groundwater consultant may be required to determine the potential impacts of pumping the well for credit. Pumping for credit must be terminated if the pumping has a detrimental impact on neighboring wells or on the groundwater table.

Since 2000, about 70% of the total pumping was subject to the curtailment of these policies and recommendation, resulting from the Hydrogeologist annual groundwater assessment report. Note that the percentage was up to about 90% during the critical water years 2014 and 2015; years of highest stress for the local aquifers. The annual groundwater assessment report, coupled with the Districts policies, have proven effective in sustainably managing groundwater even through the most recent "historic" drought.

4.2.3 Joint Groundwater Conditions Studies Between CCID and Neighboring Cities

CCID nearly surrounds the following six cities: Newman, Gustine, Los Banos, Dos Palos, Firebaugh and Mendota. Three of these cities are DAC's and the other three are Severely DAC's. Maintaining a healthy aquifer was and is a high priority for the cities and the SJREC GSA. Starting in the early 1990's, CCID approached the neighboring cities to embark on a joint study of the groundwater conditions surrounding the City. The cities of Newman, Gustine, Los Banos, Firebaugh and Mendota rely entirely on groundwater to meet their demand. Note that the City of Dos Palos has poor quality groundwater and has an agreement with CCID to transfer and treat surface water. These studies, updated periodically, formed a great partnership and is the basis for including each City GSA as a partner in the SJREC GSP Group. In addition, these studies form the foundation for development and implementation of sustainability criteria in and around each City. Successful implementation of the SGMA is best achieved locally through long-term partnerships.

4.2.4 Mitigation for Migration of Shallow Saline Groundwater

The SJRECWA, particularly FCWD and a portion of CCID (Camp 13), have been engaged in litigation over the migration of poor quality (high electrical conductivity and high selenium) from upslope drainage areas to the south and west. Resolving this issue is of the utmost concern for FCWD and CCID for healthy soils and groundwater and also successful implementation of the SGMA. While this issue remains unresolved at the moment, FCWD and CCID have developed several management actions to help control the further migration of this poor-quality groundwater.

FCWD and Camp 13 have a perched water table, that if not controlled, would cause the overlying land to be unfarmable. Landowners in CCID and FCWD have installed buried tile lines (subsurface drainage) to control the perched groundwater table in the area and are participating in the San Joaquin River Improvement Project (SJRIP) to manage subsurface drain water produced within the region.

One successful management action for the region has been the implementation of the various components of the Westside Regional Drainage Plan; see Appendix P. Four effective strategies have been implemented to reduce drainage discharge including 1) source control, 2) groundwater management, 3) drainage reuse and 4) treatment and disposal. Source control reduces the volume of water contributing to subsurface drainage by reducing deep percolation of applied water and reducing seepage from canals and ditches. In 2002, through a joint study between the SJRECWA and the USBR, it was determined that the pumping of strategically placed wells could lower the perched water table and reduce discharge of subsurface drainage systems. As a result, 18 wells have been installed and have successfully reduced the discharge from subsurface drainage systems. The operation of these wells have proven a vital tool for the FCWD and CCID to successfully manage groundwater and helps to control the further migration of the plume of poor-quality groundwater.

Drainage reuse is the primary function of the SJRIP. The SJRIP utilizes subsurface drain water as a source of irrigation water for salt tolerant crops. This management practice allows for the agricultural region to maintain the health of the soil with subsurface drainage lines while preventing the discharge of that drainage water to the San Joaquin River.

4.3 Implementation of Projects and Management Actions

The SJRECWA and SJREC GSA have actively managed their water resources through various Projects and Management Actions. The development of the SJREC GSP and implementation of the SGMA will work hand-in-hand with the historic practices of the member agencies of the SJRECWA. The SJREC GSA will continue to review new tools to improve management of both surface water and groundwater. One such new tool is the Soil Agricultural Groundwater Banking Index (SAGBI). Figure 25 shows the SAGBI rating for the SJREC GSP Group area.

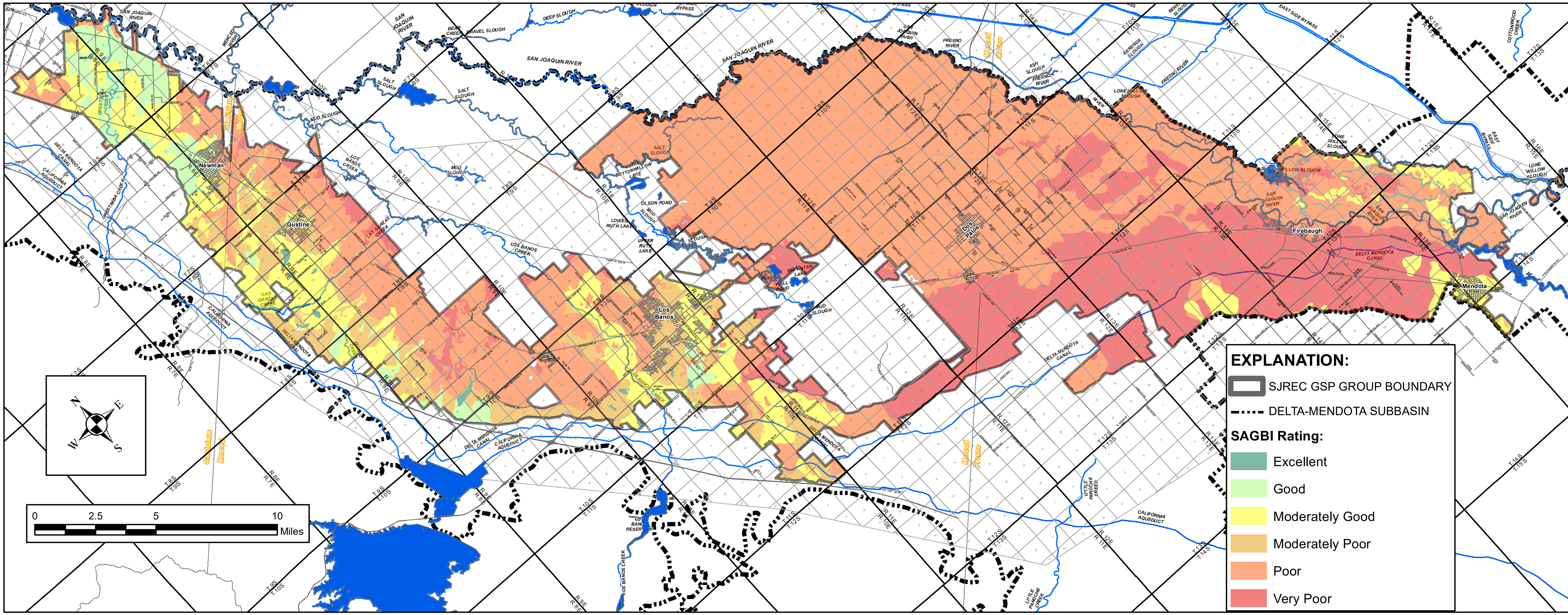

FIGURE 25 - SAGBI MAP

5.0 PLAN IMPLEMENTATION

5.1 Estimate of GSP Implementation Costs

Development for the SJREC GSP is anticipated to cost $700,000 which will be shared between the following GSA's: San Joaquin River Exchange Contractors, City of Newman, City of Gustine, City of Los Banos, City of Dos Palos, City of Firebaugh, City of Mendota, Turner Island Water District – 2, County of Madera – 3, Merced County – Delta Mendota (portion), Fresno County – Management Area B (portion), further described in numerous MOU's with the Exchange Contractors. The annual GSP cost is projected to be $50,000. During each of the five-year plan updates the projected cost is $200,000. The Exchange Contractors GSP Group has received $335,000 in funds from the Sustainable Groundwater Planning Grant Program. The Exchange Contractors have historically been actively managing groundwater and do not anticipate a significant increase in cost to monitor and report groundwater conditions. The SJREC also received Category 1 funding from the SGWP Grant to offset costs for SDAC's.

5.2 Schedule of Implementation

The SJRECWA, and subsequent SJREC GSA, has been sustainably managing groundwater for decades. The SJREC GSA is a net importer to groundwater. Many of the Projects and Management Actions described in Section 4.0 have already been implemented. Furthermore, the Projects and Management Actions that have yet to be implemented will only enhance the sustainability of the local aquifers and help neighboring GSA's and GSP Groups achieve and maintain sustainability.

5.3 Annual Reporting

Consistent with Water Code Section 10728, On the April 1 following the adoption of a GSP and annually thereafter, a GSA shall submit a report to the DWR containing the following information about the basin managed in the GSP:

a) Groundwater elevation data.
b) Annual aggregated data identifying groundwater extraction for the preceding water year.
c) Surface water supply used for or available for use for groundwater recharge or in-lieu use.
d) Total water use.
e) Change in groundwater storage.

5.4 Periodic Evaluations

The SJREC GSA will periodically evaluate its GSP, assess changing conditions in the basin that may warrant modification of the plan or management objectives, and may adjust components in the plan. An evaluation of the plan shall focus on determining whether the actions under the plan are meeting the plan's management objectives and whether those objectives are meeting the sustainability goal in the basin. Oftentimes, an iterative process proves most effective in managing complex plans. The SJREC GSA intends to continually update and progress groundwater management in and around its service area.

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7.0 CITY OF NEWMAN GSA AREA

7.1 Background for City of Newman

The City of Newman is an expanding urban area that relies entirely on groundwater. Mutual concerns of the quantity and quality of groundwater in terms of future growth, initiated conversations between CCID and the City to investigate the long-term reliability of the surrounding aquifer. In the early 1990's, CCID and the City jointly participated in a study of the groundwater conditions in and around the City, (KDSA 1992; Newman). Subsequent groundwater studies for the City of Newman have been completed in cooperation with CCID.

Over the years, CCID has invested in helping cities monitor, understand and manage the aquifers for the communities near the district. The relationship has resulted in a common understanding of the aquifer and a partnership which is the foundation of the SJREC GSA and the City of Newman GSA cooperating to develop this part of the GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Newman, a DAC, and worked with City leaders and technical staff to understand potential opportunities and constraints of SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Newman welcomed the SJREC's assistance in developing the required elements in a GSP. It was mutually agreed that the SJREC work with the City to develop the requirements in the GSP and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater for the region.

The SJREC are committed to assist this DAC to maintain sustainability through the planning and implementation horizon. The City of Newman GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix Q for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

7.2 Water Budgets for the City of Newman

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Newman GSA.

7.2.1 Historic Water Budget for the City of Newman

The City of Newman solely relies on groundwater to provide its residents drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. Groundwater pumping during this timeframe ranged from 2,100 to 2,700 AF/year with an average pumping of 2,500 AF/year. The City sends effluent to its Waste Water Treatment Facility (WWTF). They have about 160 acres of holding ponds at the WWTF. Once treated in the holding ponds, water is used to irrigate 300-400 acres of pasture, alfalfa, oats and corn. The amount of effluent used for irrigation ranged from 800 to 1,600 AF/year with an average of 1,100 AF/year. There is approximately 250 AF/year evaporation from the effluent ponds. The irrigation efficiency of the effluent water used to irrigate crops is assumed to be 70% which equates to a net crop evapotranspiration of about 550 AF/year, for a total consumptive use of about 800 AF/year.

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 1,400 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 1,000 AF/year.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 1,800 AF/year. The City of Newman GSA covers roughly 1,250 acres. The approximate sustainable yield for the City of Newman GSA is 0.40 acre-feet/acre or about 500 acre-feet/year.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2003	2,100	800	1,300	1,600
2004	2,400	800	1,600	1,800
2005	2,500	800	1,700	1,900
2006	2,700	1,100	1,600	2,000
2007	2,700	1,400	1,300	2,000
2008	2,700	1,400	1,300	1,900
2009	2,500	1,100	1,400	1,800
2010	2,300	800	1,500	1,700
2011	2,200	900	1,300	1,700
2012	2,600	1,600	1,000	1,900

Table 41 - City of Newman Historic Water Budget Data

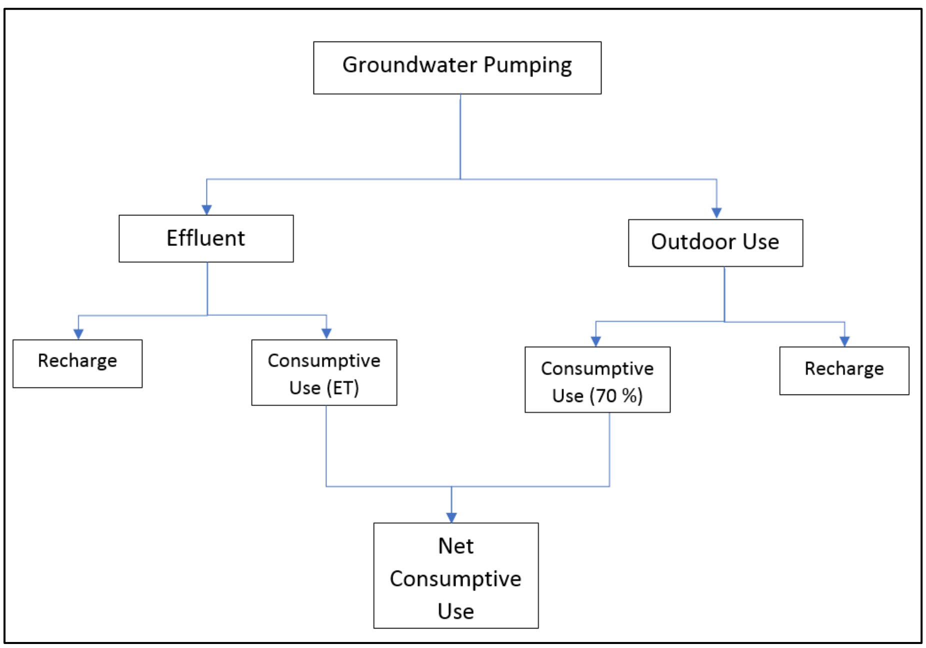

Figure 26 - City Water Use Diagram

7.2.2 Current Water Budget for the City of Newman

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2013	2,500	1,700	800	1,800

Table 42 - City of Newman Current Water Budget Data

7.2.3 Projected Water Budget for the City of Newman

The City of Newman General Plan projects 2% annual growth, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 7.2.1 were used to determine consumptive use of groundwater. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 1,500 AF/year to a total of 3,200 AF by 2070. Section 7.3 will discuss SMC in order for the City of Newman to be sustainable. Section 7.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED PUMPAGE (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2014	2,300	1,500	800	1,700
2015	1,900	1,300	600	1,400
2016	2,000	1,000	1,000	1,500
2017	2,000	1,100	900	1,500
2018	2,300	1,100	1,200	1,700
2019	2,300	1,100	1,200	1,700
2020	2,400	1,100	1,300	1,800
2021	2,400	1,200	1,200	1,700
2022	2,500	1,200	1,300	1,800
2023	2,500	1,200	1,300	1,800
2024	2,600	1,200	1,400	1,800
2025	2,600	1,300	1,300	1,800
2026	2,700	1,300	1,400	1,800
2027	2,700	1,300	1,400	1,800
2028	2,800	1,300	1,500	1,900
2029	2,900	1,400	1,500	1,900
2030	2,900	1,400	1,500	1,900
2031	3,000	1,400	1,600	2,000
2032	3,000	1,500	1,500	1,900
2033	3,100	1,500	1,600	2,000
2034	3,200	1,500	1,700	2,100
2035	3,200	1,500	1,700	2,100
2036	3,300	1,600	1,700	2,100
2037	3,400	1,600	1,800	2,100
2038	3,400	1,600	1,800	2,100
2039	3,500	1,700	1,800	2,100
2040	3,600	1,700	1,900	2,200
2041	3,600	1,700	1,900	2,200
2042	3,700	1,800	1,900	2,200
2043	3,800	1,800	2,000	2,300
2044	3,800	1,800	2,000	2,300
2045	3,900	1,900	2,000	2,300
2046	4,000	1,900	2,100	2,300
2047	4,100	2,000	2,100	2,300
2048	4,200	2,000	2,200	2,400
2049	4,200	2,000	2,200	2,400
2050	4,300	2,100	2,200	2,400
2051	4,400	2,100	2,300	2,500
2052	4,500	2,200	2,300	2,500
2053	4,600	2,200	2,400	2,500
2054	4,700	2,200	2,500	2,600
2055	4,800	2,300	2,500	2,600
2056	4,900	2,300	2,600	2,700
2057	5,000	2,400	2,600	2,700
2058	5,100	2,400	2,700	2,800
2059	5,200	2,500	2,700	2,800
2060	5,300	2,500	2,800	2,800
2061	5,400	2,600	2,800	2,800
2062	5,500	2,600	2,900	2,900
2063	5,600	2,700	2,900	2,900
2064	5,700	2,700	3,000	3,000
2065	5,800	2,800	3,000	3,000
2066	6,000	2,800	3,200	3,100
2067	6,100	2,900	3,200	3,100
2068	6,200	3,000	3,200	3,100
2069	6,300	3,000	3,300	3,200
2070	6,400	3,100	3,300	3,200

Table 43 – City of Newman Projected Water Budget Data

7.3 Sustainable Management Criteria for the City of Newman

The City of Newman has historically relied completely on groundwater extraction to meet water demand. Groundwater overdraft around the City has primarily been offset by recharge from the SJREC service area. As mentioned previously, the SJREC are invested in helping the City to monitor, understand and manage groundwater. The SJREC GSP Group, collectively, is currently sustainable. In order for the group to maintain sustainability, the SJREC will work with the City of Newman on Projects and Management actions to offset groundwater extractions above the sustainable yield of the City.

The historical consumptive use for the City of Newman was about 1,800 AF/year which equates to an average use of about 1.5 AF/acre. The sustainable yield for the city is about 500 AF/year, which leaves a 1,300 AF/year consumptive use deficit that needs to be met through projects and management actions. While the City of Newman lies in the SJREC Monitoring Zone A, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability.

7.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the City are positively impacted through recharge from the SJREC. Water levels in the SJREC Monitoring Zone A will be used to sustainably manage groundwater levels around the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

7.3.2 Reduction in Groundwater Storage

Groundwater storage under the City of Newman is positively impacted through recharge from the SJREC. Managing groundwater storage for the City will be accomplished through updated water budgets for the City. The SJREC are contributing recharge to maintain adequate groundwater storage to offset storage reductions caused by the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

7.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

7.3.4 Degraded Water Quality

The main concern for the City is the contamination resulting from naturally occurring constituents including nitrate, arsenic, hexavalent chromium, selenium, total dissolved solids, sulfate, chloride, and boron. These constituents are important in terms of developing public supply wells to meet Title 22 Standards. As part of the process to install new wells, the City does vertical trends in groundwater quality and completes the well opposite of the zones with quality concerns. One potential solution for water quality concerns and also to meet overdraft is for the City to receive a surface water transfer from the SJREC.

7.3.5 Land Subsidence

The City has two wells that solely tap strata in the lower aquifer and two composite wells that tap both the upper and lower aquifers. Wells pumping from a confined aquifer have the potential to cause inelastic land subsidence. To date, the land subsidence in and around the City has been minimal and is indicative that the City wells have not caused any significant land subsidence. The SJREC and the City will work together to ensure that significant and unreasonable land subsidence does not occur due to City pumping. Any future increase in pumping from below the Corcoran clay will be analyzed to determine the potential to cause land subsidence and appropriate mitigation measures will be implemented. One such mitigation measure could include a reduced pumping from the lower aquifer with the increase in demand offset by restricted watering and/or transfer of surface water to the City.

7.3.6 Depletions of Interconnected Surface Water

The presence of an undesirable result for depletions of interconnected surface water is not likely to occur in the City of Newman and therefore no SMC have been established for this sustainability indicator.

7.4 Projects and Management Actions for the City of Newman

The City is actively pursuing water conservation. In order to maintain sustainability for each GSA in the SJREC GSP group, the City is committed to offsetting an increase in demand based on projected population growth, by developing certain projects. Each project will be analyzed jointly with the City and the SJREC to maximize the regional benefits. The City will develop projects to offset overdraft including; 1) storm water capture, 2) demand reduction through reduced watering, 3) surface water transfer, 4) purchasing groundwater credits, 5) participation in recharge projects 6) reclaimed water for outdoor watering and 7) the city will continue to investigate other types of projects.

The groundwater quality, under natural conditions, under the City has some constituents of concern discussed in Appendix Q. The City currently pumps certain wells as needed to meet Title 22 water quality standards for the consumer. If the groundwater quality were to naturally degrade and/or the Title 22 standards for drinking water were to be updated with lower MCL's, the City may run the risk of exceeding allowable limits. In addition to the potential water quality concerns, with the SGMA, the City currently has a deficit water balance. To counteract both of these concerns, the City has started preliminary discussions with the SJREC on two possible projects mentioned above. One project to offset water quality concerns is to transfer surface water from the SJREC to the City in exchange for the City pumping groundwater into the CCID Main Canal.

Another project has been discussed to address both overdraft and water quality concerns for the City. The SJREC would make surface water available for transfer to the City, thereby reducing the City's need to pump groundwater while providing cleaner drinking water for the DAC's residents. The City of Dos Palos has been receiving surface water from CCID for decades due to groundwater quality concerns. The SJREC would anticipate mimicking that proven model to provide a sustainable water supply for the residents of Newman.

The SJREC will continue to work with the City to not only meet the requirements of the SGMA but more importantly, to maximize the benefits of local water resources and providing safe and clean drinking water for this disadvantaged community.

7.5 Plan Implementation for the City of Newman

The cost to develop and implement the GSP specific to the City of Newman has been cost shared at 50% between the SJREC GSA and the City of Newman GSA. Additionally, the SJREC GSA has participated in the Sustainable Groundwater Planning Grant Program (SGWP) on behalf of the SJREC GSP Group and will offset up to 50% of the plan development costs for the City of Newman GSA. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. One groundwater management success story in the Newman area was the implementation of a representative well with a trigger level to limit groundwater transfers from the area. As a result of the annual groundwater investigations prepared by the SJREC, the problem presented itself along with a solution to mitigate the concern; resulting in the aquifer fully recovering after water levels dropped below established triggers and no long-term lowering of the aquifer was experienced. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

8.0 CITY OF GUSTINE GSA AREA

8.1 Background for City of Gustine

The City of Gustine is an expanding urban area that relies entirely on groundwater. Mutual concerns of the quantity and quality of groundwater in terms of future growth, initiated conversations between CCID and the City to investigate the long-term reliability of the surrounding aquifer. In the early 1990's, CCID and the City jointly participated in a study of the groundwater conditions in and around the City, (KDSA 1992; Gustine). Subsequent groundwater studies for the City of Gustine have been completed in cooperation with CCID.

Over the years, CCID has invested in helping cities monitor, understand and manage the aquifers for the communities near the district. The relationship has resulted in a common understanding of the aquifer and a partnership which is the foundation of the SJREC GSA and the City of Gustine GSA cooperating to develop this part of the GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Gustine, a DAC, and worked with City leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Gustine welcomed the SJREC's assistance in developing the required elements in a GSP. It was mutually agreed that the SJREC will work with the City to develop the requirements in the GSP and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater for the region.

The SJREC are committed to assist this DAC to maintain sustainability through the planning and implementation horizon. The City of Gustine GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix R for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

8.2 Water Budgets for the City of Gustine

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Gustine GSA.

8.2.1 Historic Water Budget for the City of Gustine

The City of Gustine solely relies on groundwater to provide its residents drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. Groundwater pumping during this timeframe ranged from 1,000 to 1,500 AF/year with an average pumping of 1,300 AF/year. The City sends effluent to its Waste Water Treatment Facility (WWTF). The City was unable to provide historic records of effluent discharged over the historic period and the records from 2015 was used as a surrogate. The City is working with staff to maintain better records for subsequent groundwater reports. A total of about 625 acre-feet of City effluent was discharged in 2015. Once treated in the holding ponds, about 100-200 acre-feet of effluent water is used to irrigate hay and pasture. The remaining water is either evaporated or percolated. Due to the fine grained soils in the area, KDSA estimated the consumptive use of the City effluent to be about 80% or about 500 AF/year. In 2015, groundwater pumping was 20% lower than the historic average. The assumed consumptive use in the WWTF for the City during the historic water budget may be 20% higher than what was observed in 2015 or about 625 AF/year

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 525 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 365 AF/year.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 1,000 AF/year. The City of Gustine GSA covers roughly 900 acres. The approximate sustainable yield for the City of Gustine GSA is 0.40 acre-feet/acre or about 400 acre-feet/year.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2003	1,400	800	600	1,000
2004	1,400	800	600	1,000
2005	1,300	800	500	1,000
2006	1,300	800	500	1,000
2007	1,500	800	700	1,100
2008	1,300	800	500	1,000
2009	1,000	800	200	800
2010	1,200	800	400	900
2011	1,200	800	400	900
2012	1,300	800	500	1,000

Table 44 - City of Gustine Historic Water Budget Data

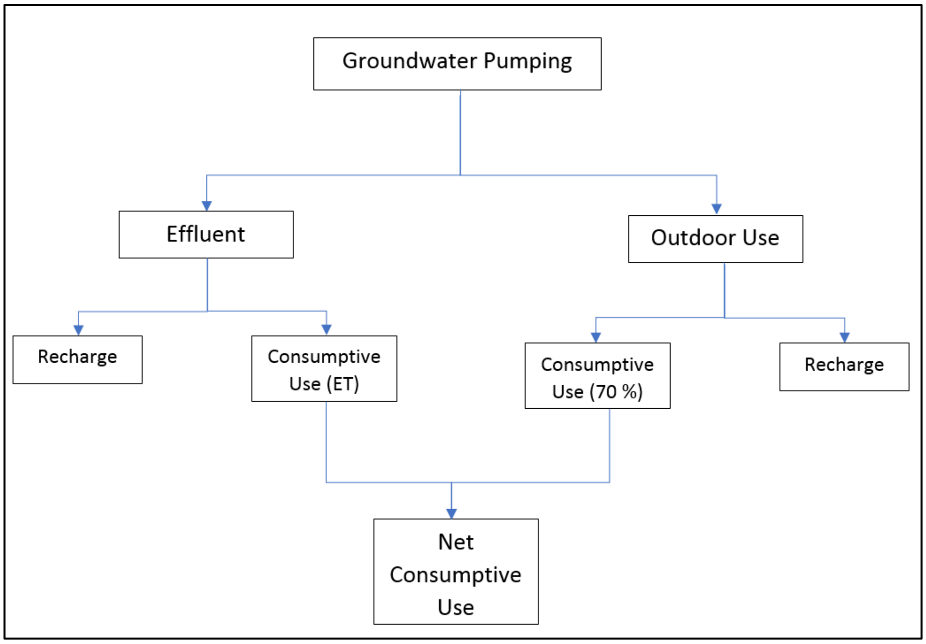

Figure 27 - City Water Use Diagram

8.2.2 Current Water Budget for the City of Gustine

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2013	1,300	800	500	1,000

Table 45 - City of Gustine Current Water Budget Data

8.2.3 Projected Water Budget for the City of Gustine

The City of Gustine General Plan projects 2.5% annual growth, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 8.2.1 were used to determine consumptive use of groundwater. Based on the Historic Water Budget, the effluent discharge is assumed at 60% of total groundwater pumping. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 2,600 AF/year to a total of 3,600 AF by 2070. Section 8.3 will discuss SMC in order for the City of Gustine to be sustainable. Section 8.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED PUMPAGE (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2014	1,100	700	400	800
2015	1,100	700	400	800
2016	1,200	700	500	900
2017	1,300	800	500	1,000
2018	1,300	800	500	1,000
2019	1,300	800	500	1,000
2020	1,400	800	600	1,100
2021	1,400	800	600	1,100
2022	1,400	800	600	1,100
2023	1,500	900	600	1,100
2024	1,500	900	600	1,100
2025	1,500	900	600	1,100
2026	1,600	1,000	600	1,200
2027	1,600	1,000	600	1,200
2028	1,700	1,000	700	1,300
2029	1,700	1,000	700	1,300
2030	1,700	1,000	700	1,300
2031	1,800	1,100	700	1,400
2032	1,800	1,100	700	1,400
2033	1,900	1,100	800	1,400
2034	1,900	1,100	800	1,400
2035	2,000	1,200	800	1,500
2036	2,000	1,200	800	1,500
2037	2,100	1,300	800	1,600
2038	2,100	1,300	800	1,600
2039	2,200	1,300	900	1,700
2040	2,200	1,300	900	1,700
2041	2,300	1,400	900	1,800
2042	2,400	1,400	1,000	1,800
2043	2,400	1,400	1,000	1,800
2044	2,500	1,500	1,000	1,900
2045	2,500	1,500	1,000	1,900
2046	2,600	1,600	1,000	2,000
2047	2,700	1,600	1,100	2,100
2048	2,700	1,600	1,100	2,100
2049	2,800	1,700	1,100	2,100
2050	2,900	1,700	1,200	2,200
2051	2,900	1,700	1,200	2,200
2052	3,000	1,800	1,200	2,300
2053	3,100	1,900	1,200	2,400
2054	3,200	1,900	1,300	2,400
2055	3,200	1,900	1,300	2,400
2056	3,300	2,000	1,300	2,500
2057	3,400	2,000	1,400	2,600
2058	3,500	2,100	1,400	2,700
2059	3,600	2,200	1,400	2,700
2060	3,700	2,200	1,500	2,800
2061	3,800	2,300	1,500	2,900
2062	3,900	2,300	1,600	3,000
2063	3,900	2,300	1,600	3,000
2064	4,000	2,400	1,600	3,000
2065	4,100	2,500	1,600	3,100
2066	4,300	2,600	1,700	3,300
2067	4,400	2,600	1,800	3,300
2068	4,500	2,700	1,800	3,400
2069	4,600	2,800	1,800	3,500
2070	4,700	2,800	1,900	3,600

Table 46 - City of Gustine Projected Water Budget Data

8.3 Sustainable Management Criteria for the City of Gustine

The City of Gustine has historically relied completely on groundwater extraction to meet water demand. Groundwater overdraft around the City has primarily been offset by recharge from the SJREC service area. As mentioned previously, the SJREC are invested in helping the City to monitor, understand and manage groundwater. The SJREC GSP Group, collectively, is currently sustainable. In order for the group to maintain sustainability, the SJREC will work with the City of Gustine on Projects and Management actions to offset groundwater extractions by the City that is above their sustainable yield.

The historical consumptive use for the City of Gustine was about 1,000 AF/year which equates to an average use of about 1.1 AF/acre. The sustainable yield for the city is about 400 AF/year, which leaves a 600 AF/year consumptive use deficit that needs to be met through projects and management actions. While the City of Gustine lies in the SJREC Monitoring Zone B, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability. Additionally, the Gustine Drainage District was formed to lower the high-water table in the area to maintain productive soils.

8.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the City are positively impacted through recharge from the SJREC. Water levels in the SJREC Monitoring Zone B will be used to sustainably manage groundwater levels around the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

8.3.2 Reduction in Groundwater Storage

Groundwater storage under the City of Gustine is positively impacted through recharge from the SJREC. Managing groundwater storage for the City will be accomplished through updated water budgets for the City. The SJREC are contributing recharge to maintain adequate groundwater storage to offset storage reductions caused by the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

8.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

8.3.4 Degraded Water Quality

The main concern for the City is the contamination resulting from naturally occurring constituents including nitrate, arsenic, hexavalent chromium, selenium, total dissolved solids, sulfate, chloride, and boron. These constituents are important in terms of developing public supply wells to meet Title 22 Standards. As part of the process of installing new wells, the City does vertical trends in groundwater quality and completes the well opposite of the zones with quality concerns. One potential solution for water quality concerns and also to meet overdraft is for the City to receive a surface water transfer from the SJREC.

8.3.5 Land Subsidence

The City has one well that solely taps strata in the lower aquifer and four wells that solely tap strata in the upper aquifer. Wells pumping from a confined aquifer have the potential to cause inelastic land subsidence. To date, the land subsidence in and around the City has been minimal and is indicative that the City wells have not caused any significant land subsidence. The SJREC and the City will work together to ensure that significant and unreasonable land subsidence does not occur due to City pumping. Any future increase in pumping from below the Corcoran clay will be analyzed to determine the potential to cause land subsidence and appropriate mitigation measures will be implemented. One such mitigation measure could include a reduced pumping from the lower aquifer with the increase in demand offset by restricted watering and/or transfer of surface water to the City.

8.3.6 Depletions of Interconnected Surface Water

The presence of an undesirable result for depletions of interconnected surface water is not likely to occur in the City of Gustine and therefore no SMC have been established for this sustainability indicator.

8.4 Projects and Management Actions for the City of Gustine

The City is actively pursuing water conservation. In order to maintain sustainability for each GSA in the SJREC GSP group, the City is committed to offsetting an increase in demand based on projected population growth, by developing certain projects. Each project will be analyzed jointly with the City and the SJREC to maximize the regional benefits. The City will develop projects to offset overdraft including; 1) storm water capture, 2) demand reduction through reduced watering, 3) surface water transfer, 4) purchasing groundwater credits, 5) participation in recharge projects, 6) reclaimed water for outdoor watering and 7) the city will continue to investigate other types of projects.

The groundwater quality, under natural conditions, under the City has some constituents of concern discussed in Appendix R. The City currently pumps certain wells as needed to meet Title 22 water quality standards for the consumer. If the groundwater quality were to naturally degrade and/or the Title 22 standards for drinking water were to be updated with lower MCL's, the City may run the risk of exceeding allowable limits. In addition to the potential water quality concerns, with the SGMA, the City currently has a deficit water balance. To counteract both of these concerns, the City has started preliminary discussions with the SJREC on two possible projects mentioned above. One project to offset water quality concerns is to transfer surface water from the SJREC to the City in exchange for the City pumping groundwater into the CCID Main Canal.

Another project has been discussed to address both overdraft and water quality concerns for the City. The SJREC would make surface water available for transfer to the City, thereby reducing the City's need to pump groundwater while providing cleaner drinking water for the DAC's residents. The City of Dos Palos has been receiving surface water from CCID for decades due to groundwater quality concerns. The SJREC would anticipate mimicking that proven model to provide a sustainable water supply for the residents of Gustine.

The SJREC will continue to work with the City to not only meet the requirements of the SGMA but more importantly, to maximize the benefits of local water resources and providing safe and clean drinking water for this disadvantaged community.

8.5 Plan Implementation for the City of Gustine

The cost to develop and implement the GSP specific to the City of Gustine has been cost shared at 50% between the SJREC GSA and the City of Gustine GSA. Additionally, the SJREC GSA has participated in the Sustainable Groundwater Planning Grant Program (SGWP) on behalf of the SJREC GSP Group and will offset up to 50% of the plan development costs for the City of Gustine GSA. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. One groundwater management success story was the development of the Gustine Drainage District. The Gustine Drainage District was formed to provide drainage of good water quality to the area around Gustine to maintain healthy soils. This area receives significant recharge from CCID, the ephemeral streams and the GWD and the GDD has actively managed groundwater levels to maintain healthy soils. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

9.0 CITY OF LOS BANOS GSA AREA

9.1 Background for City of Los Banos

The City of Los Banos is an expanding urban area that relies entirely on groundwater. Mutual concerns of the quantity and quality of groundwater in terms of future growth, initiated conversations between CCID and the City to investigate the long-term reliability of the surrounding aquifer. In the early 1990's, CCID and the City jointly participated in a study of the groundwater conditions in and around the City, (KDSA 1991; Los Banos). Subsequent groundwater studies for the City of Los Banos have been completed in cooperation with CCID and the USBR.

Over the years, CCID has invested in helping cities monitor, understand and manage the aquifers for the communities near the district. The relationship has resulted in a common understanding of the aquifer and a partnership which is the foundation of the SJREC GSA and the City of Los Banos GSA cooperating to develop this GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Los Banos, a DAC, and worked with City leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Los Banos welcomed the SJREC's assistance in developing the required elements in a GSP. It was mutually agreed that the SJREC will work with the City to develop the requirements in the GSP City and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater for the region.

The City of Los Banos, the largest City in the Delta-Mendota Subbasin, was originally a partner with the SJRECWA, GWD and SLWD on the Los Banos Creek Diversion Facility described in Section 4.1.1 of this GSP. The Los Banos Creek Recharge and Recovery Project developed jointly with the SJRECWA, GWD and SLWD, directly benefits the water quality for the City supply wells. The Hexavalent Chromium concentration dropped below the standard in one City well near the Los Banos Creek during the extended recharge in 2017. The City recognizes the value working with the local districts to jointly manage local water resources. In continuation of a great working relationship, the City has partnered with the SJREC GSA, GWD and SLWD to develop a sustainable plan for an area that extends beyond the City urban growth boundary and includes upgradient lands.

The SJREC are committed to assist this DAC to maintain sustainability through the planning and implementation horizon. The City of Los Banos GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix S for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

9.2 Water Budgets for the City of Los Banos

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Los Banos GSA.

9.2.1 Historic Water Budget for the City of Los Banos

The City of Los Banos solely relies on groundwater to provide its residents drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. Groundwater pumping during this timeframe ranged from 6,400 to 9,100 AF/year with an average pumping of 7,900 AF/year. The City sends effluent to its Waste Water Treatment Facility (WWTF). They have about 200 acres of holding ponds at the WWTF. Once treated in the holding ponds, water is used to irrigate 350 acres of pasture. There is approximately 600 AF/year evaporation from the effluent ponds. The amount of effluent used for irrigation ranged from 2,600 to 4,000 AF/year with an average of 3,400 AF/year. The consumptive use of the pasture averaged about 3.3 AF/acre for an average consumptive use of about 1,100 AF/year.

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 4,000 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 2,800 AF/year.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 4,500 AF/year. The City of Los Banos GSA covers roughly 5,800 acres. The approximate sustainable yield for the City of Los Banos GSA is 0.40 acre-feet/acre or about 2,300 acre-feet/year.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2003	6,400	3,200	3,200	4,000
2004	6,900	3,500	3,500	4,200
2005	7,200	3,600	3,600	4,200
2006	7,500	3,800	3,800	4,400
2007	9,100	4,600	4,600	4,900
2008	8,900	4,500	4,500	4,900
2009	8,300	4,200	4,200	4,700
2010	7,700	3,900	3,900	4,500
2011	7,800	3,900	3,900	4,500
2012	8,900	4,500	4,500	4,900

Table 47 - City of Los Banos Historic Water Budget Data

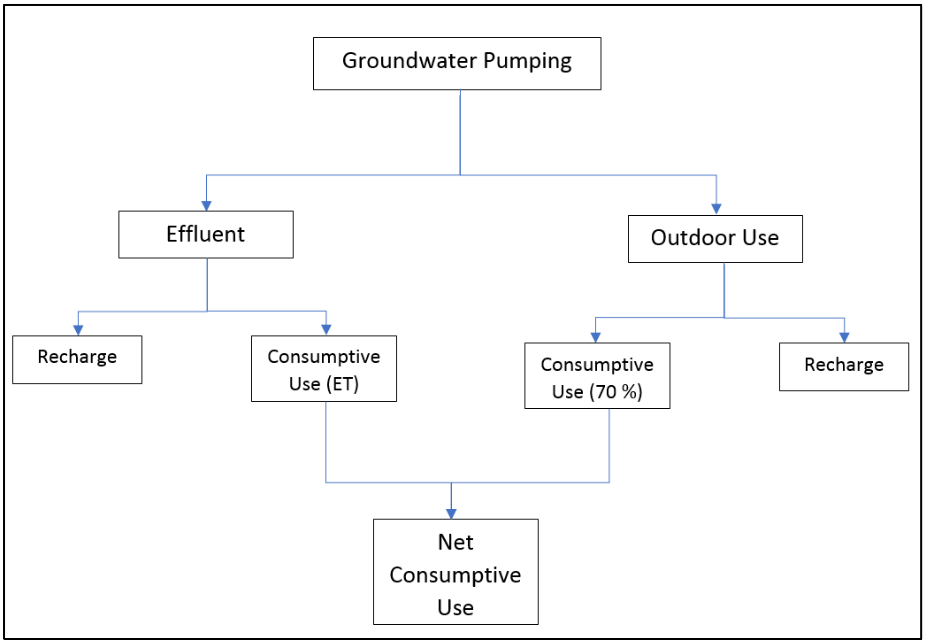

Figure 28 - City Water Use Diagram

9.2.2 Current Water Budget for the City of Los Banos

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2013	8,500	4,300	4,300	4,700

Table 48 - City of Los Banos Current Water Budget Data

9.2.3 Projected Water Budget for the City of Los Banos

The City of Los Banos General Plan projects 2% annual growth, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 9.2.1 were used to determine consumptive use of groundwater. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 7,600 AF/year to a total of 12,100 AF by 2070. Section 9.3 will discuss SMC in order for the City of Los Banos to be sustainable. Section 9.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED PUMPAGE (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2014	7,900	4,000	3,900	4,500
2015	6,700	3,400	3,300	3,900
2016	6,100	3,100	3,000	3,600
2017	7,800	3,900	3,900	4,500
2018	8,000	4,000	4,000	4,600
2019	8,100	4,100	4,000	4,600
2020	8,300	4,100	4,200	4,800
2021	8,400	4,200	4,200	4,800
2022	8,600	4,300	4,300	4,900
2023	8,800	4,400	4,400	5,000
2024	9,000	4,500	4,500	5,100
2025	9,100	4,600	4,500	5,100
2026	9,300	4,700	4,600	5,200
2027	9,500	4,800	4,700	5,300
2028	9,700	4,800	4,900	5,500
2029	9,900	4,900	5,000	5,600
2030	10,100	5,000	5,100	5,700
2031	10,300	5,100	5,200	5,800
2032	10,500	5,200	5,300	5,900
2033	10,700	5,400	5,300	6,000
2034	10,900	5,500	5,400	6,100
2035	11,100	5,600	5,500	6,200
2036	11,400	5,700	5,700	6,400
2037	11,600	5,800	5,800	6,500
2038	11,800	5,900	5,900	6,600
2039	12,100	6,000	6,100	6,700
2040	12,300	6,100	6,200	6,900
2041	12,500	6,300	6,200	6,900
2042	12,800	6,400	6,400	7,100
2043	13,100	6,500	6,600	7,300
2044	13,300	6,700	6,600	7,300
2045	13,600	6,800	6,800	7,500
2046	13,900	6,900	7,000	7,700
2047	14,100	7,100	7,000	7,800
2048	14,400	7,200	7,200	7,900
2049	14,700	7,300	7,400	8,100
2050	15,000	7,500	7,500	8,300
2051	15,300	7,600	7,700	8,400
2052	15,600	7,800	7,800	8,600
2053	15,900	8,000	7,900	8,700
2054	16,200	8,100	8,100	8,900
2055	16,600	8,300	8,300	9,100
2056	16,900	8,400	8,500	9,300
2057	17,200	8,600	8,600	9,400
2058	17,600	8,800	8,800	9,600
2059	17,900	9,000	8,900	9,800
2060	18,300	9,100	9,200	10,000
2061	18,600	9,300	9,300	10,100
2062	19,000	9,500	9,500	10,400
2063	19,400	9,700	9,700	10,600
2064	19,800	9,900	9,900	10,800
2065	20,200	10,100	10,100	11,000
2066	20,600	10,300	10,300	11,200
2067	21,000	10,500	10,500	11,400
2068	21,400	10,700	10,700	11,600
2069	21,800	10,900	10,900	11,800
2070	22,300	11,100	11,200	12,100

Table 49 – City of Los Banos Projected Water Budget Data

9.3 Sustainable Management Criteria for the City of Los Banos

The City of Los Banos has historically relied completely on groundwater extraction to meet water demand. Groundwater overdraft around the City has primarily been offset by recharge from the SJREC service area. As mentioned previously, the SJREC are invested in helping the City to monitor, understand and manage groundwater. The SJREC GSP Group, collectively, is currently sustainable. In order for the group to maintain sustainability, the SJREC will work with the City of Los Banos on Projects and Management actions to offset groundwater extractions by the City that is above their sustainable yield.

The historical consumptive use for the City of Los Banos was about 4,500 AF/year which equates to an average use of about 0.8 AF/acre. The sustainable yield for the city is about 2,300 AF/year, which leaves a 2,200 AF/year consumptive use deficit that needs to be met through projects and management actions. While the City of Los Banos lies in the SJREC Monitoring Zone C, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability.

9.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the City are positively impacted through recharge from the SJREC, SLWD and seepage in the Los Banos Creek. Water levels in the SJREC Monitoring Zone C will be used to sustainably manage groundwater levels around the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

9.3.2 Reduction in Groundwater Storage

Groundwater storage under the City of Los Banos is positively impacted through recharge from the SJREC, SLWD and seepage in the Los Banos Creek. Managing groundwater storage for the City will be accomplished through updated water budgets for the City. The SJREC are contributing recharge to maintain adequate groundwater storage to offset storage reductions caused by the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

9.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

9.3.4 Degraded Water Quality

The main concern for the City is the contamination resulting from naturally occurring constituents including nitrate, arsenic, hexavalent chromium, selenium, total dissolved solids, sulfate, chloride, and boron. These constituents are important in terms of developing public supply wells to meet Title 22 Standards. As part of the process of installing new wells, the City does vertical trends in groundwater quality and completes the well opposite of the zones with quality concerns. One potential solution for water quality concerns and also to meet overdraft is for the City to receive a surface water transfer from the SJREC.

9.3.5 Land Subsidence

The City has one active composite well that taps both the upper and lower aquifers. Wells pumping from a confined aquifer have the potential to cause inelastic land subsidence. To date, the land subsidence in and around the City has been minimal and is indicative that the City wells have not caused any significant land subsidence. The SJREC and the City will work together to ensure that significant and unreasonable land subsidence does not occur due to City pumping. Any future increase in pumping from below the Corcoran clay will be analyzed to determine the potential to cause land subsidence and appropriate mitigation measures will be implemented. One such mitigation measure could include a reduced pumping from the lower aquifer with the increase in demand offset by restricted watering and/or transfer of surface water to the City.

9.3.6 Depletions of Interconnected Surface Water

The presence of an undesirable result for depletions of interconnected surface water is not likely to occur in the City of Los Banos and therefore no SMC have been established for this sustainability indicator.

9.4 Projects and Management Actions for the City of Los Banos

The City is actively pursuing water conservation. In order to maintain sustainability for each GSA in the SJREC GSP group, the City is committed to offsetting an increase in demand based on projected population growth, by developing certain projects. Each project will be analyzed jointly with the City and the SJREC to maximize the regional benefits. The City will develop projects to offset overdraft including; 1) storm water capture, 2) demand reduction through reduced watering, 3) surface water transfer, 4) purchasing groundwater credits, 5) participation in recharge projects and 6) the city will continue to investigate other types of projects.

The groundwater quality, under natural conditions, under the City has some constituents of concern discussed in Appendix S. The City currently pumps certain wells as needed to meet Title 22 water quality standards for the consumer. If the groundwater quality were to naturally degrade and/or the Title 22 standards for drinking water were to be updated with lower MCL's, the City may run the risk of exceeding allowable limits, particularly for the hexavalent chromium standard. In addition to the potential water quality concerns, with the SGMA, the City currently has a deficit water balance. To counteract both of these concerns, the City has started preliminary discussions with the SJREC on two possible projects mentioned above. One project to offset water quality concerns is to transfer surface water from the SJREC to the City in exchange for the City pumping groundwater into the CCID Main Canal.

Another project has been discussed to address both overdraft and water quality concerns for the City. The SJREC would make surface water available for transfer to the City, thereby reducing the City's need to pump groundwater while providing cleaner drinking water for the DAC's residents. The City of Dos Palos has been receiving surface water from CCID for decades due to groundwater quality concerns. The SJREC would anticipate mimicking that proven model to provide a sustainable water supply for the residents of Los Banos.

The SJREC will continue to work with the City to not only meet the requirements of the SGMA but more importantly, to maximize the benefits of local water resources and providing safe and clean drinking water for this disadvantaged community.

9.5 Plan Implementation for the City of Los Banos

The cost to develop and implement the GSP specific to the City of Los Banos has been cost shared at 25% between the SJREC GSA, SLWD, GWD and the City of Los Banos GSA. Additionally, the SJREC GSA has participated in the Sustainable Groundwater Planning Grant Program (SGWP) on behalf of the SJREC GSP Group and will offset up to 50% of the plan development costs for the City of Los Banos GSA. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. One groundwater management success story in the Los Banos Creek area was the implementation of a representative well with a trigger level to limit groundwater transfers from the area. As a result of the annual groundwater investigations prepared by the SJREC, the problem presented itself along with a solution to mitigate the concern; resulting in the aquifer fully recovering after water levels dropped below established triggers and no long-term lowering of the aquifer was experienced. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

10.0 CITY OF Dos Palos GSA AREA

10.1 Background for City of Dos Palos

The City of Dos Palos is a Severely Disadvantaged Community that has completely relied on treated surface water. The quality of the groundwater around the City of Dos Palos was not suitable for residential use. Through an agreement dated May 8, 1936 the San Joaquin & Kings River Canal & Irrigation Company, the predecessor to CCID, agreed to provide surface water to the City of Dos Palos through the Canal Company's Colony Main Canal. Water deliveries from what is now the CCID Colony Main Canal continued until 1989 when the City of Dos Palos, through the Dos Palos Area JPA, worked with CCID and the USBR to change their point of diversion to the San Luis Canal (California Aqueduct). A pipeline was constructed to wheel water transferred from CCID from the San Luis Canal to the City's water treatment facility. CCID and the SJREC have a long history working with the local communities to solve regional water problems.

Over the years, CCID has invested in helping cities monitor, understand and manage water resources for the communities near the district. The relationship has resulted in a common understanding of the groundwater conditions and a partnership which is the foundation of the SJREC GSA and the City of Dos Palos GSA cooperating to develop this part of the GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Dos Palos, a SDAC, and worked with City leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Dos Palos welcomed the SJREC's assistance in developing the required elements in a GSP. The City requested the SJREC to develop the requirements in the GSP on behalf of the City and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater and surface water resources with the City and CCID.

The SJREC are committed to assist this SDAC to maintain sustainability through the planning and implementation horizon. The City of Dos Palos GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix T for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

10.2 Water Budgets for the City of Dos Palos

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Dos Palos GSA.

10.2.1 Historic Water Budget for the City of Dos Palos

The City of Dos Palos solely relies on treated surface water to provide its residents drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. The surface water delivery to the City ranged from 1,200 to 1,700 AF/year with an average delivery of 1,400 AF/year. The City sends effluent to its Waste Water Treatment Facility (WWTF). They have about 54 acres of ponds at the WWTF. The total City effluent is about 700 AF/year. The evaporation from the ponds is approximately 300 AF/year. The remaining treated effluent, about 400 AF/year, is used to irrigate crops near the WWTF. The irrigation efficiency of the effluent water used to irrigate crops is assumed to be 70% which equates to a net crop evapotranspiration of about 300 AF/year, for a total consumptive use of City effluent of 600 AF/year.

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 700 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 500 AF/year.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 1,100 AF/year. The City of Dos Palos GSA covers roughly 750 acres. Although the City of Dos Palos does not pump groundwater, the approximate sustainable yield for the City of Dos Palos GSA is 0.40 acre-feet/acre or about 300 acre-feet/year.

WATER YEAR	SURFACE WATER DELIVERY (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2003	1,400	700	700	1,100
2004	1,500	700	800	1,200
2005	1,400	700	700	1,100
2006	1,500	700	800	1,200
2007	1,600	700	900	1,200
2008	1,700	700	1,000	1,300
2009	1,300	700	600	1,000
2010	1,300	700	600	1,000
2011	1,200	700	500	1,000
2012	1,300	700	600	1,000

Table 50 – City of Dos Palos Historic Water Budget

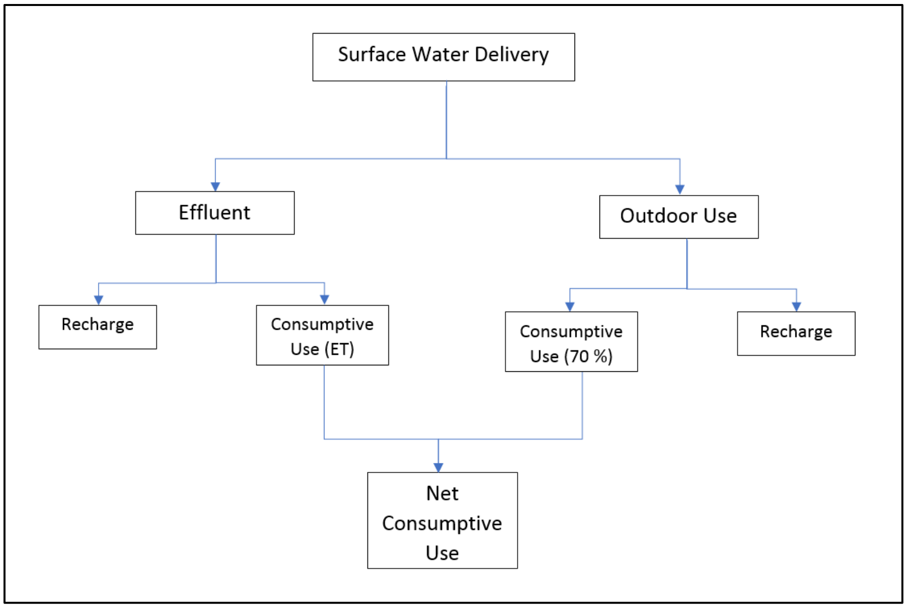

Figure 29 - City Water Use Diagram

10.2.2 Current Water Budget for the City of Dos Palos

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	SURFACE WATER DELIVERY (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2013	1,800	700	1,100	1,400

Table 51 - City of Dos Palos Current Water Budget Data

10.2.3 Projected Water Budget for the City of Dos Palos

The City of Dos Palos General Plan projects a 1% annual growth from 2025-2070, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 10.2.1 were used to determine the consumptive use. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 500 AF/year to a total of 1,600 AF by 2070. Section 10.3 will discuss SMC in order for the City of Dos Palos to be sustainable. The current contract between CCID and the City of Dos Palos allows for the transfer of up to 2,500 AF/year of surface water which is below the total projected water delivery in 2070. The City of Dos Palos does not pump any groundwater and is sustainable. Section 10.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED SURFACE WATER DELIVERY (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2014	1,400	500	900	1,100
2015	1,000	500	500	800
2016	1,200	500	700	900
2017	1,400	700	700	1,100
2018	1,400	700	700	1,100
2019	1,400	700	700	1,100
2020	1,400	700	700	1,100
2021	1,400	700	700	1,100
2022	1,400	700	700	1,100
2023	1,400	700	700	1,100
2024	1,400	700	700	1,100
2025	1,400	700	700	1,100
2026	1,400	700	700	1,100
2027	1,400	700	700	1,100
2028	1,500	700	800	1,100
2029	1,500	700	800	1,100
2030	1,500	700	800	1,100
2031	1,500	800	700	1,100
2032	1,500	800	700	1,100
2033	1,500	800	700	1,100
2034	1,500	800	700	1,100
2035	1,600	800	800	1,200
2036	1,600	800	800	1,200
2037	1,600	800	800	1,200
2038	1,600	800	800	1,200
2039	1,600	800	800	1,200
2040	1,600	800	800	1,200
2041	1,700	800	900	1,300
2042	1,700	800	900	1,300
2043	1,700	800	900	1,300
2044	1,700	900	800	1,300
2045	1,700	900	800	1,300
2046	1,700	900	800	1,300
2047	1,800	900	900	1,400
2048	1,800	900	900	1,400
2049	1,800	900	900	1,400
2050	1,800	900	900	1,400
2051	1,800	900	900	1,400
2052	1,800	900	900	1,400
2053	1,900	900	1,000	1,400
2054	1,900	900	1,000	1,400
2055	1,900	1,000	900	1,400
2056	1,900	1,000	900	1,400
2057	1,900	1,000	900	1,400
2058	2,000	1,000	1,000	1,500
2059	2,000	1,000	1,000	1,500
2060	2,000	1,000	1,000	1,500
2061	2,000	1,000	1,000	1,500
2062	2,000	1,000	1,000	1,500
2063	2,100	1,000	1,100	1,600
2064	2,100	1,000	1,100	1,600
2065	2,100	1,100	1,000	1,600
2066	2,100	1,100	1,000	1,600
2067	2,100	1,100	1,000	1,600
2068	2,200	1,100	1,100	1,600
2069	2,200	1,100	1,100	1,600
2070	2,200	1,100	1,100	1,600

Table 52 – City of Dos Palos Projected Water Budget Data

10.3 Sustainable Management Criteria for the City of Dos Palos

The City of Dos Palos has historically relied completely on treated surface water to meet demand. As mentioned previously, the SJREC are invested in helping each of the communities in our area to achieve sustainability. The SJREC GSP Group is currently sustainable; collectively.

The historical consumptive use for the City of Dos Palos was about 1,800 AF/year which equates to an average use of about 2.3 AF/acre which is met by the importation of surface water. While the City of Dos Palos lies in the SJREC Monitoring Zone D, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability.

10.3.1 Chronic Lowering of Groundwater Levels

The City does not own or operate production wells. Chronic lowering of groundwater levels for the City of Dos Palos GSA will not occur since the City doesn't pump groundwater and therefore no SMC have been established for this sustainability indicator.

10.3.2 Reduction in Groundwater Storage

The City does not own or operate production wells. Reduction in Groundwater Storage for the City of Dos Palos GSA will not occur since the City doesn't pump groundwater and therefore no SMC have been established for this sustainability indicator.

10.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

10.3.4 Degraded Water Quality

The City does not own or operate production wells. Degraded water Quality for the City of Dos Palos GSA will not occur since the City doesn't pump groundwater and therefore no SMC have been established for this sustainability indicator. Additionally, due to the poor quality of groundwater the City of Dos Palos has relied on treated surface water from the Colony Main Canal dating back to at least 1936, and more recently received water directly from the San Luis Canal.

10.3.5 Land Subsidence

The City does not own or operate production wells. Land subsidence for the City of Dos Palos GSA will not occur since the City doesn't pump groundwater and therefore no SMC have been established for this sustainability indicator.

10.3.6 Depletions of Interconnected Surface Water

The presence of an undesirable result for depletions of interconnected surface water is not likely to occur in the City of Dos Palos and therefore no SMC have been established for this sustainability indicator.

10.4 Projects and Management Actions for the City of Dos Palos

The City of Dos Palos took a proactive roll reaching out to CCID and its predecessor to provide drinking water to the severely disadvantaged community residents through developing a surface water treatment facility and associated appurtenances. The City will continue to work with the SJREC to ensure regional sustainability.

10.5 Plan Implementation for the City of Dos Palos

The cost to develop and implement the GSP specific to the City of Dos Palos has been cost shared at 50% between the SJREC GSA and the City of Dos Palos GSA. Additionally, the SJREC GSA has pursued additional grant funding to fully offset GSP development costs for SDAC's. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

11.0 CITY OF FIREBAUGH GSA AREA

11.1 Background for City of Firebaugh

The City of Firebaugh is a Severely Disadvantaged Community relies entirely on groundwater. In 2008 KDSA analyzed groundwater conditions in the vicinity of Firebaugh in support of the Draft EIR for the City's General Plan. The quality of the groundwater around the City of Firebaugh on the west side of the San Joaquin River was not suitable for residential use. In the early 2000's, the City of Firebaugh worked with Columbia Canal Company and the landowners on the east side of the river to drill domestic supply wells on the east side of the river where the water quality was significantly better. A pipeline was constructed to deliver water from lands in and adjacent to CCC (east side of the river) to the City (west side of the river). CCC and the SJREC have a long history working with the local communities to solve regional water problems. In this case, the district worked with the local landowners to provide sites for the City to construct wells to provide the residents with water.

Over the years, the CCC has invested in helping cities monitor, understand and manage the aquifers for the communities near the district. The relationship has resulted in a common understanding of the aquifer and a partnership which is the foundation of the SJREC GSA and the City of Firebaugh GSA cooperating to develop this part of the GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Firebaugh, a SDAC, and worked with City leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Firebaugh welcomed the SJREC's assistance developing the required elements in a GSP. It was mutually agreed that the SJREC will work with the City to develop the requirements in the GSP and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater for the region.

The SJREC are committed to assist this SDAC to maintain sustainability through the planning and implementation horizon. The City of Firebaugh GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix U for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

11.2 Water Budgets for the City of Firebaugh

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Firebaugh GSA.

11.2.1 Historic Water Budget for the City of Firebaugh

The City of Firebaugh solely relies on groundwater to provide its residents drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. Groundwater pumping during this timeframe ranged from 2,400 to 2,600 AF/year with an average pumping of 2,500 AF/year. The City sends effluent to its Waste Water Treatment Facility (WWTF). They have about 30 acres of holding ponds at the WWTF. The effluent ranges from 600 to 800 AF/year with an average effluent of 700 AF/year. Each year about 100 AF evaporates while the remaining 600 AF percolates in the ponded area. Additionally, the Tomatek processing plant provides about 500 AF/year of effluent which irrigates about 160 acres of sudan and cotton. The effluent water from Tomatek equates to a consumptive use of about 400 AF/year due to evapotranspiration. The total effluent consumptive use for the City of Firebaugh and Tomatek averages about 500 AF/year.

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 1,300 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 900 AF/year.

The City is adjacent to the San Joaquin River for about 4.5 river miles. The San Joaquin River is assumed to have about 4 cfs losses through this stretch, of which about 2 cfs is recharging the aquifer in the vicinity of the City. This stretch of river is typically wet year round which results in about 1,400 AF/year of recharge towards the City.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 1,400 AF/year. The City of Firebaugh GSA covers roughly 1,850 acres. The approximate sustainable yield for the City of Firebaugh GSA is 0.40 acre-feet/acre or about 700 acre-feet/year in addition to recharge from the river of about 1,400 AF/year for a total of about 2,100 AF/year.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	TOMATEK EFFLUENT (AF)	OUTDOOR USE (AF)	SEEPAGE FROM THE SJR (AF)	CONSUMPTIVE USE (AF)
2003	2,400	800	500	1,100	1,400	1,300
2004	2,500	800	500	1,200	1,400	1,300
2005	2,400	800	500	1,100	1,400	1,300
2006	2,400	700	500	1,200	1,400	1,300
2007	2,600	800	500	1,300	1,400	1,400
2008	2,500	700	500	1,300	1,400	1,400
2009	2,500	600	500	1,400	1,400	1,500
2010	2,500	600	500	1,400	1,400	1,500
2011	2,500	600	500	1,400	1,400	1,500
2012	2,400	600	500	1,300	1,400	1,400

Table 53 - City of Firebaugh Historic Water Budget Data

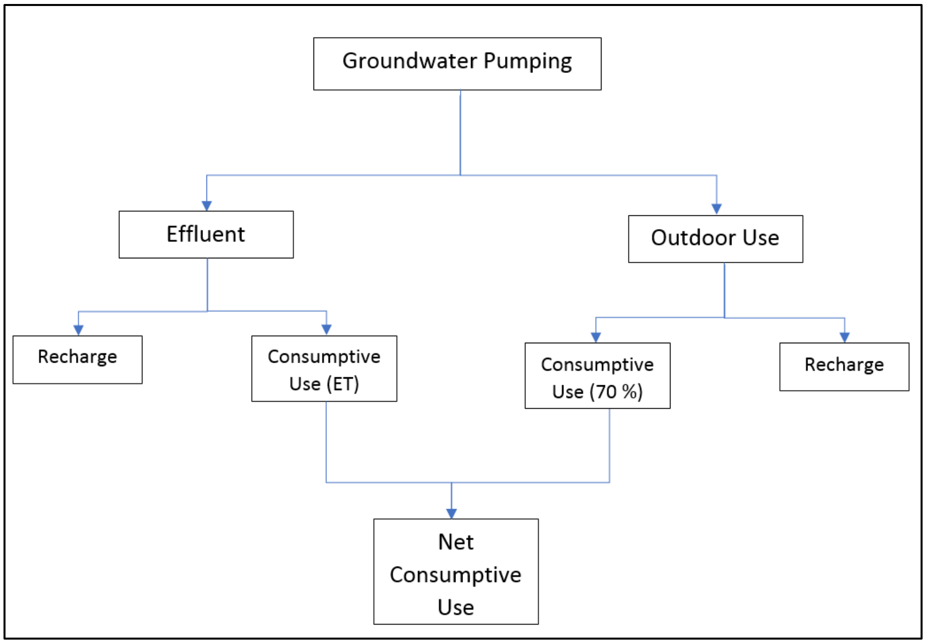

Figure 30 - City Water Use Diagram

11.2.2 Current Water Budget for the City of Firebaugh

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	TOMATEK EFFLUENT (AF)	OUTDOOR USE (AF)	SEEPAGE FROM THE SJR (AF)	CONSUMPTIVE USE (AF)
2013	2,400	700	500	1,200	1,400	1,300

Table 54 - City of Firebaugh Current Water Budget Data

11.2.3 Projected Water Budget for the City of Firebaugh

The City of Firebaugh General Plan projects 1.8% annual growth, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 11.2.1 were used to determine consumptive use of groundwater. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 2,000 AF/year to a total of 3,500 AF by 2070. Section 11.3 will discuss SMC in order for the City of Firebaugh to be sustainable. Section 11.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED PUMPAGE (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED TOMATEK EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	SEEPAGE FROM THE SJR (AF)	CONSUMPTIVE USE (AF)
2014	2,600	700	500	1,400	1,400	1,500
2015	2,300	700	500	1,100	1,400	1,300
2016	2,200	700	500	1,000	1,400	1,200
2017	2,300	700	500	1,100	1,400	1,300
2018	2,500	700	500	1,300	1,400	1,400
2019	2,500	700	500	1,300	1,400	1,400
2020	2,600	700	500	1,400	1,400	1,500
2021	2,600	700	500	1,400	1,400	1,500
2022	2,700	800	500	1,400	1,400	1,500
2023	2,700	800	500	1,400	1,400	1,500
2024	2,800	800	500	1,500	1,400	1,600
2025	2,800	800	500	1,500	1,400	1,600
2026	2,900	800	500	1,600	1,400	1,600
2027	2,900	800	500	1,600	1,400	1,600
2028	3,000	800	500	1,700	1,400	1,700
2029	3,000	900	500	1,600	1,400	1,600
2030	3,100	900	500	1,700	1,400	1,700
2031	3,200	900	500	1,800	1,400	1,800
2032	3,200	900	500	1,800	1,400	1,800
2033	3,300	900	500	1,900	1,400	1,900
2034	3,300	900	500	1,900	1,400	1,900
2035	3,400	900	500	2,000	1,400	1,900
2036	3,400	1,000	500	1,900	1,400	1,900
2037	3,500	1,000	500	2,000	1,400	1,900
2038	3,600	1,000	500	2,100	1,400	2,000
2039	3,600	1,000	500	2,100	1,400	2,000
2040	3,700	1,000	500	2,200	1,400	2,100
2041	3,800	1,100	500	2,200	1,400	2,100
2042	3,800	1,100	500	2,200	1,400	2,100
2043	3,900	1,100	500	2,300	1,400	2,200
2044	4,000	1,100	500	2,400	1,400	2,200
2045	4,000	1,100	500	2,400	1,400	2,200
2046	4,100	1,200	500	2,400	1,400	2,200
2047	4,200	1,200	500	2,500	1,400	2,300
2048	4,300	1,200	500	2,600	1,400	2,400
2049	4,300	1,200	500	2,600	1,400	2,400
2050	4,400	1,200	500	2,700	1,400	2,500
2051	4,500	1,300	500	2,700	1,400	2,500
2052	4,600	1,300	500	2,800	1,400	2,500
2053	4,700	1,300	500	2,900	1,400	2,600
2054	4,800	1,300	500	3,000	1,400	2,700
2055	4,800	1,400	500	2,900	1,400	2,600
2056	4,900	1,400	500	3,000	1,400	2,700
2057	5,000	1,400	500	3,100	1,400	2,800
2058	5,100	1,400	500	3,200	1,400	2,800
2059	5,200	1,500	500	3,200	1,400	2,900
2060	5,300	1,500	500	3,300	1,400	2,900
2061	5,400	1,500	500	3,400	1,400	3,000
2062	5,500	1,500	500	3,500	1,400	3,100
2063	5,600	1,600	500	3,500	1,400	3,100
2064	5,700	1,600	500	3,600	1,400	3,100
2065	5,800	1,600	500	3,700	1,400	3,200
2066	5,900	1,600	500	3,800	1,400	3,300
2067	6,000	1,700	500	3,800	1,400	3,300
2068	6,100	1,700	500	3,900	1,400	3,400
2069	6,200	1,700	500	4,000	1,400	3,400
2070	6,300	1,800	500	4,000	1,400	3,500

Table 55 – City of Firebaugh Projected Water Budget Data

11.3 Sustainable Management Criteria for the City of Firebaugh

The City of Firebaugh has historically relied completely on groundwater extraction to meet water demand. Groundwater overdraft around the City has primarily been offset by recharge from the SJREC service area and seepage from the San Joaquin River. As mentioned previously, the SJREC are invested in helping the City to monitor, understand and manage groundwater. The SJREC GSP Group, collectively, is currently sustainable. In order for the group to maintain sustainability, the SJREC will work with the City of Firebaugh on Projects and Management actions to offset groundwater extractions by the City that is above their sustainable yield.

The historical consumptive use for the City of Firebaugh was about 1,400 AF/year which equates to an average use of about 0.7 AF/acre. The sustainable yield for the City is 700 AF/year plus the river recharged approximated at 1,400 AF/year for a total of 2,100 AF/year. Through the planning an implementation horizon the city may have a consumptive use deficit that will need to be met through projects and management actions. While the City of Firebaugh lies near SJREC Monitoring Zones F, G and J, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability.

11.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the City are positively impacted through recharge from the SJREC and seepage from the San Joaquin River and have remained fairly stable. Water levels in the SJREC Monitoring Zone J will be used to sustainably manage groundwater levels for the City since the City's wells are located within that area. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

11.3.2 Reduction in Groundwater Storage

Groundwater storage under the City of Firebaugh is positively impacted through recharge from the SJREC and seepage from the San Joaquin River. Managing groundwater storage for the City will be accomplished through updated water budgets for the City. The SJREC are contributing recharge to maintain adequate groundwater storage to offset storage reduction caused by the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

11.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

11.3.4 Degraded Water Quality

The main concern for the City is the contamination resulting from naturally occurring constituents including nitrate, arsenic, hexavalent chromium, selenium, total dissolved solids, sulfate, chloride, and boron. These constituents are important in terms of developing public supply wells to meet Title 22 Standards. As part of the process of installing new wells, the City does vertical trends in groundwater quality and completes the well opposite of the zones with quality concerns. One potential solution for water quality concerns and also to meet overdraft is for the City to receive a surface water transfer from the SJREC.

11.3.5 Land Subsidence

The City does not operate any wells perforated below the Corcoran Clay. As a result, inelastic land subsidence is unlikely to occur as a result of pumping from the City of Firebaugh wells. Therefore, no SMC have been established for this sustainability indicator. The SJREC and the City will work together to ensure that significant and unreasonable land subsidence does not occur due to City pumping.

11.3.6 Depletions of Interconnected Surface Water

The City of Firebaugh plans to work with the SJREC to sustainably manage interconnected surface water and groundwater. For more details refer to the following sections in this GSP: 3.2.6, 3.3.6, and 3.4.6.

11.4 Projects and Management Actions for the City of Firebaugh

The City is actively pursuing water conservation. In order to maintain sustainability for each GSA in the SJREC GSP group, the City is committed to offsetting an increase in demand based on projected population growth, by developing certain projects. Each project will be analyzed jointly with the City and the SJREC to maximize the regional benefits. The City will develop projects to offset overdraft including; 1) storm water capture, 2) demand reduction through reduced watering, 3) surface water transfer, 4) purchasing groundwater credits, 5) participation in recharge projects, 6) reclaimed water for outdoor watering and 7) the city will continue to investigate other types of projects.

The groundwater quality, under natural conditions, under the City has some constituents of concern discussed in Appendix U. The City currently pumps certain wells as needed to meet Title 22 water quality standards for the consumer. If the groundwater quality were to naturally degrade and/or the Title 22 standards for drinking water were to be updated with lower MCL's, the City may run the risk of exceeding allowable limits. In addition to the potential water quality concerns, with the SGMA, the City currently has a deficit water balance. To counteract both of these concerns, the City has started preliminary discussions with the SJREC on two possible projects mentioned above. One project to offset a water budget deficit would be for the City to work with the SJREC for groundwater recharge credits.

Another project has been discussed to address both overdraft and water quality concerns for the City. The SJREC would make surface water available for transfer to the City, thereby reducing the City's need to pump groundwater while providing cleaner drinking water for the DAC's residents. The City of Firebaugh has moved its well field to the other side of the river due to groundwater quality concerns.

The SJREC will continue to work with the City to not only meet the requirements of the SGMA but more importantly, to maximize the benefits of local water resources and providing safe and clean drinking water for this disadvantaged community.

11.5 Plan Implementation for the City of Firebaugh

The cost to develop and implement the GSP specific to the City of Firebaugh has been cost shared at 50% between the SJREC GSA and the City of Firebaugh GSA. Additionally, the SJREC GSA has pursued additional grant funding to fully offset GSP development costs for SDAC's. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. One groundwater management success story in the Mendota area was the implementation of monitoring and management program for well water transfers near the Mendota Pool. The SJREC worked with the regional water leaders to develop and implement a plan that would maximize water resources without sacrificing the needs of the local communities. As a result, water levels have remained fairly stable and none of the wells pumping as part of the program are contributing to land subsidence. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

12.0 CITY OF MENDOTA GSA AREA

12.1 Background for City of Mendota

The City of Mendota is a Severely Disadvantaged Community relies entirely on groundwater. In 1999, KDSA analyzed groundwater conditions in the vicinity of the City of Mendota. The quality of the groundwater around the City of Mendota was not suitable for public supply. In the early 2000's, the City of Mendota worked with Columbia Canal Company and the landowners on the east side of the river to drill domestic supply wells on the east side of the river where the water quality was significantly better. A pipeline was constructed to deliver water from lands in and adjacent to CCC (east side of the river) to the City (west side of the river). Additionally, the landowners provided the City access to use the Mowry bridge to access the City wells across the San Joaquin River. CCC and the SJREC have a long history working with the local communities to solve regional water problems. In this case, the district worked with the local landowners to provide sites for the City to construct wells to provide the residents drinking water.

Over the years, the CCC has invested in helping cities monitor, understand and manage the aquifers for the communities near the district. The relationship has resulted in a common understanding of the aquifer and a partnership which is the foundation of the SJREC GSA and the City of Mendota GSA cooperating to develop this part of the GSP. Some potential impacts to the City include increased costs for the SWRCB to develop and implement a sustainable plan for the City and a standalone plan that isn't synchronous with the lands surrounding the City. CCID recognized the potential impacts to the City of Mendota, a SDAC, and worked with City leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the City. Ultimately, the City decided to form its' own GSA with the help from the SJREC to appropriately file. The City of Mendota welcomed the SJREC's assistance in developing the required elements in a GSP. It was mutually agreed that the SJREC will work with the City to develop the requirements in the GSP and to include this in a discrete Section in the SJREC GSP. This was a seamless process due to the decades of cooperation of managing groundwater for the region.

The SJREC are committed to assist this SDAC to maintain sustainability through the planning and implementation horizon. The City of Mendota GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix V for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the City. Some further details are provided below.

12.2 Water Budgets for the City of Mendota

Presented herein is the compilation of the historic, current and projected water budgets specific to the City of Mendota GSA.

12.2.1 Historic Water Budget for the City of Mendota

The City of Mendota solely relies on groundwater to provide its residents clean drinking water. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-

Mendota Subbasin. Groundwater pumping during this timeframe ranged from 1,600 to 1,800 AF/year with an average pumping of 1,700 AF/year. The City sends effluent its Waste Water Treatment Facility (WWTF). They have about 76 acres of percolation ponds at the WWTF. The effluent flow from the City averages 1,200 AF/year. Each year about 300 AF evaporates while the remaining 900 AF percolates in the ponded area. The total effluent consumptive use for the City of Mendota averages about 300 AF/year.

The City water use that does not result in the production of effluent was used to water lawns, parks, etc. The outdoor water use is the difference of pumpage and effluent and averaged about 500 AF/year. Typically, a 70% irrigation efficiency is applied to urban landscape watering which results in an average annual consumptive use of about 400 AF/year.

The total average annual consumptive use from outdoor water use and crop demand at the WWTF is 700 AF/year. The City of Mendota GSA covers roughly 2,100 acres. The approximate sustainable yield for the City of Mendota GSA is 0.40 acre-feet/acre or about 800 acre-feet/year.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2003	1,600	1,200	400	600
2004	1,700	1,200	500	700
2005	1,600	1,200	400	600
2006	1,600	1,200	400	600
2007	1,700	1,200	500	700
2008	1,800	1,200	600	700
2009	1,700	1,200	500	700
2010	1,800	1,200	600	700
2011	1,700	1,200	500	700
2012	1,800	1,200	600	700

Table 56 - City of Mendota Historic Water Budget Data

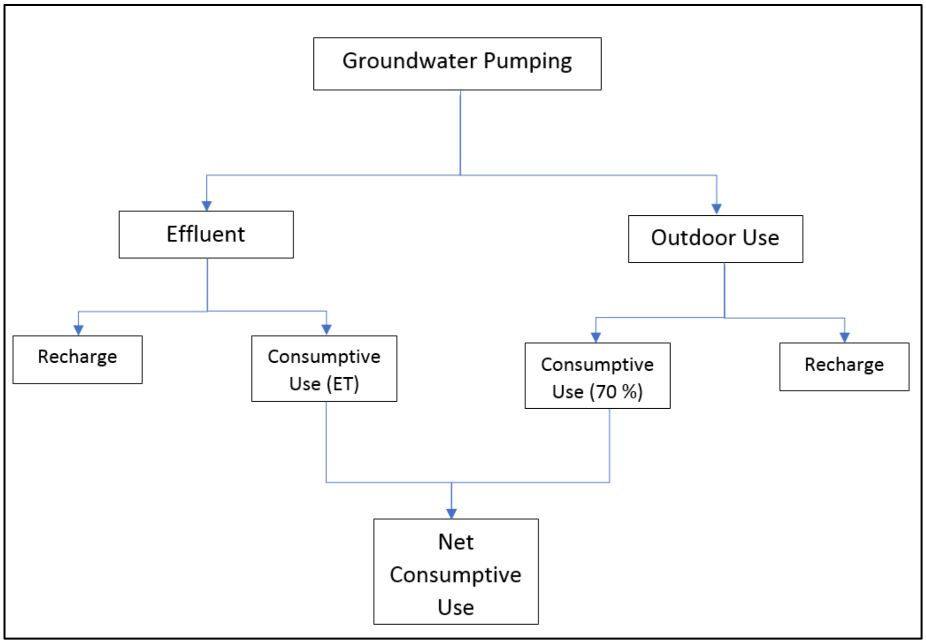

Figure 31 - City Water Use Diagram

12.2.2 Current Water Budget for the City of Mendota

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	PUMPAGE (AF)	CITY EFFLUENT (AF)	OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2013	1,500	1,200	300	500

Table 57 - City of Mendota Current Water Budget Data

12.2.3 Projected Water Budget for the City of Mendota

The City of Mendota General Plan projects the City to have a pumping demand of 10,600 AF by 2070 which equates to a 3.6% annual growth, which was used in this plan to determine the projected baseline demand on water. The average annual pumping from the historic water budget was used as a baseline to project the demand on water through the planning and implementation horizon. The same data and methodologies described in Section 12.2.1 were used to determine consumptive use of groundwater. Below is a table of the projected water budget. The projected consumptive use is anticipated to increase by 3,300 AF/year to a total of 4,000 AF by 2070. Section 12.3 will discuss SMC in order for the City of Mendota to be sustainable. Section 12.4 will discuss projects and management actions to offset the increased demand.

WATER YEAR	PROJECTED PUMPAGE (AF)	PROJECTED CITY EFFLUENT (AF)	PROJECTED OUTDOOR USE (AF)	CONSUMPTIVE USE (AF)
2014	1,400	1,200	200	400
2015	1,400	1,200	200	400
2016	1,700	1,200	500	700
2017	1,800	1,200	600	700
2018	1,700	1,200	500	700
2019	1,800	1,200	600	700
2020	1,800	1,300	500	700
2021	1,900	1,300	600	700
2022	2,000	1,400	600	800
2023	2,000	1,400	600	800
2024	2,100	1,500	600	800
2025	2,200	1,500	700	900
2026	2,300	1,600	700	900
2027	2,300	1,600	700	900
2028	2,400	1,700	700	900
2029	2,500	1,800	700	900
2030	2,600	1,800	800	1,000
2031	2,700	1,900	800	1,000
2032	2,800	2,000	800	1,100
2033	2,900	2,000	900	1,100
2034	3,000	2,100	900	1,200
2035	3,100	2,200	900	1,200
2036	3,200	2,300	900	1,200
2037	3,300	2,300	1,000	1,300
2038	3,400	2,400	1,000	1,300
2039	3,600	2,500	1,100	1,400
2040	3,700	2,600	1,100	1,400
2041	3,800	2,700	1,100	1,400
2042	4,000	2,800	1,200	1,500
2043	4,100	2,900	1,200	1,600
2044	4,200	3,000	1,200	1,600
2045	4,400	3,100	1,300	1,700
2046	4,500	3,200	1,300	1,700
2047	4,700	3,300	1,400	1,800
2048	4,900	3,400	1,500	1,900
2049	5,100	3,600	1,500	2,000
2050	5,200	3,700	1,500	2,000
2051	5,400	3,800	1,600	2,100
2052	5,600	4,000	1,600	2,100
2053	5,800	4,100	1,700	2,200
2054	6,000	4,300	1,700	2,300
2055	6,200	4,400	1,800	2,400
2056	6,500	4,600	1,900	2,500
2057	6,700	4,700	2,000	2,600
2058	6,900	4,900	2,000	2,600
2059	7,200	5,100	2,100	2,700
2060	7,400	5,300	2,100	2,800
2061	7,700	5,400	2,300	3,000
2062	8,000	5,600	2,400	3,100
2063	8,300	5,800	2,500	3,200
2064	8,600	6,000	2,600	3,300
2065	8,900	6,300	2,600	3,400
2066	9,200	6,500	2,700	3,500
2067	9,500	6,700	2,800	3,600
2068	9,900	7,000	2,900	3,800
2069	10,200	7,200	3,000	3,900
2070	10,600	7,500	3,100	4,000

Table 58 – City of Mendota Projected Water Budget Data

12.3 Sustainable Management Criteria for the City of Mendota

The City of Mendota has historically relied completely on groundwater extraction to meet water demand. Groundwater overdraft around the City has primarily been offset by recharge from the SJREC service area and seepage from the San Joaquin River. As mentioned previously, the SJREC are invested in helping the City to monitor, understand and manage groundwater. The SJREC GSP Group, collectively, is currently sustainable. In order for the group to maintain sustainability, the SJREC will work with the City of Mendota on Projects and Management actions to offset groundwater extractions by the City that is above their sustainable yield.

The historical consumptive use for the City of Mendota was about 700 AF/year which equates to an average use of about 0.3 AF/acre. The sustainable yield for the city is about 800 AF/year. Currently, the City of Mendota GSA is sustainable but will likely have a consumptive use deficit through the planning and implementation horizon that will need to be offset through projects and management actions. While the City of Mendota lies near SJREC Monitoring Zones G and J, different SMC is developed in order for the City to achieve collective and independent groundwater sustainability.

12.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the City are positively impacted through recharge from the SJREC and seepage from the San Joaquin River and have remained fairly stable. Water levels in the SJREC Monitoring Zone J will be used to sustainably manage groundwater levels for the City since the City's wells are located within that area. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

12.3.2 Reduction in Groundwater Storage

Groundwater storage under the City of Mendota is positively impacted through recharge from the SJREC and seepage from the San Joaquin River. Managing groundwater storage for the City will be accomplished through updated water budgets for the City. The SJREC will contribute to recharge to maintain adequate groundwater storage to offset reductions caused by the City. Sustainable groundwater management for the City is best achieved by offsetting overdraft through the implementation of projects and management actions.

12.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

12.3.4 Degraded Water Quality

The main concern for the City is the contamination resulting from naturally occurring constituents including nitrate, arsenic, hexavalent chromium, selenium, total dissolved solids, sulfate, chloride, and boron. These constituents are important in terms of developing public supply wells to meet Title 22 Standards. As part of the process of installing new wells, the City does vertical trends in groundwater quality and completes the well opposite of the zones with quality concerns. One potential solution for water quality concerns and also to meet overdraft is for the City to receive a surface water transfer from the SJREC.

12.3.5 Land Subsidence

The City does not operate any wells perforated below the Corcoran Clay. As a result, inelastic land subsidence is unlikely to occur as a result of pumping from the City of Mendota wells. Therefore, no SMC have been established for this sustainability indicator. The SJREC will continue to work with the City to monitor subsidence and work with regional partners on solutions if subsidence is observed and may cause damage to critical infrastructure.

12.3.6 Depletions of Interconnected Surface Water

The City of Mendota plans to work with the SJREC to sustainably manage interconnected surface water and groundwater. For more details refer to the following Sections in this GSP: 3.2.6, 3.3.6, and 3.4.6.

12.4 Projects and Management Actions for the City of Mendota

The City is actively pursuing water conservation. In order to maintain sustainability for each GSA in the SJREC GSP group, the City is committed to offsetting an increase in demand based on projected population growth, by developing certain projects. Each project will be analyzed jointly with the City and the SJREC to maximize the regional benefits. The City will develop projects including; 1) storm water capture, 2) demand reduction through reduced watering, 3) surface water transfer, 4) purchasing groundwater credits, 5) participation in recharge projects, 6) reclaimed water for outdoor watering and 7) the city will continue to investigate other types of projects.

The groundwater quality, under natural conditions, under the City has some constituents of concern discussed in Appendix V. The City currently pumps certain wells as needed to meet Title 22 water quality standards for the consumer. If the groundwater quality were to naturally degrade and/or the Title 22 standards for drinking water were to be updated with lower MCL's, the City may run the risk of exceeding allowable limits. In addition to the potential water quality concerns, with the SGMA, the City poses the risk of having a deficit water balance in the future. To counteract both of these concerns, the City has started preliminary discussions with the SJREC on two possible projects mentioned above. One project to offset a water budget deficit would be for the City to work with the SJREC for groundwater recharge credits.

Another project has been discussed to address both overdraft and water quality concerns for the City. The SJREC would make surface water available for transfer to the City, thereby reducing the City's need to pump groundwater while providing cleaner drinking water for the DAC's residents. The City of Firebaugh has moved its well field to the other side of the river due to groundwater quality concerns.

The SJREC will continue to work with the City to not only meet the requirements of the SGMA but more importantly, to maximize the benefits of local water resources and providing safe and clean drinking water for this disadvantaged community.

12.5 Plan Implementation for the City of Mendota

The cost to develop and implement the GSP specific to the City of Firebaugh has been cost shared at 50% between the SJREC GSA and the City of Firebaugh GSA. Additionally, the SJREC GSA has pursued additional grant funding to fully offset GSP development costs for SDAC's. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. One groundwater management success story in the Mendota area was the implementation of monitoring and management program for well water transfers near the Mendota Pool. The SJREC worked with the regional water leaders to develop and implement a plan that would maximize water resources without sacrificing the needs of the local communities. As a result, water levels have remained fairly stable and none of the wells pumping as part of the program are contributing to land subsidence. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort with the City, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

13.0 TURNER ISLAND WATER DISTRICT – 2 GSA AREA

13.1 Background for Turner Island Water District

The Turner Island Water District (TIWD) is in an area bound by the San Joaquin River to the north (boundary of the Delta-Mendota Subbasin) and the SJREC GSA to the east, west and south. Every acre of the area has historically been farmed. This area receives drain water (surface water spills) from the SLCC to meet the crop consumptive use.

Over the years, the SJREC have invested in working with other local agencies to monitor, understand and manage the aquifers around the Exchange Contractors service area. The SLCC has a long-standing relationship with TIWD to jointly manage water in the area including surface water, groundwater and drain water. This relationship has resulted in a common understanding of the local water resources and a partnership which is the foundation of the SJREC GSA and the Turner Island Water District - 2 GSA cooperating to develop this part of the GSP.

The SJREC and TIWD are committed to maintain sustainability through the planning and implementation horizon. The TIWD-2 GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix W for a discussion on the basin setting, sustainable management criteria and projects & management actions specific to the TIWD. Some further details are provided below.

13.2 Water Budgets for the Turner Island Water District

Presented herein is the compilation of the historic, current and projected water budgets specific to the Turner Island Water District - 2 GSA.

13.2.1 Historic Water Budget for the Turner Island Water District

TIWD relies on surface water from SLCC during non-critical years under the Exchange Contract. During Shasta Critical years, the TIWD supplements crop demand by pumping groundwater. Additionally, the TIWD pumps groundwater from their lands in the TIWD-2 GSA (Delta-Mendota Subbasin) and provides that water through an existing pipeline under the San Joaquin River to their lands on the other side of the river (Merced Subbasin). The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. Groundwater pumping during this timeframe ranged from 700 to 1,100 AF/year with an average pumping of 800 AF/year. Surface Water deliveries during this timeframe ranged from 4,300 to 6,500 AF/year with an average delivery of 5,600 AF/year. The total crop demand of irrigation water (ET_{iw}) ranged from 2,600 to 3,700 AF/year with an average ET_{iw} of 3,200 AF/year. All of the crop ET was met with surface water. The change in groundwater storage during this timeframe averaged about +2,000 AF/year. The TIWD-2 GSA covers roughly 1,850 acres. The approximate sustainable yield for the Turner Island Water District – 2 GSA is 0.40 acre-feet/acre or about 700 acre-feet/year.

WATER YEAR	SHASTA WATER YEAR DESIGNATION	SURFACE WATER APPLIED	GROUNDWATER PUMPING	TOTAL CROP ET_c	TOTAL CROP ET_{iw}	DEEP PERCOLATION OF IRRIGATION	CHANNEL RECHARGE	CHANGE IN GROUNDWATER STORAGE
2003	Non-Critical	6,300	700	4,500	3,600	2,700	700	2,700
2004	Non-Critical	5,700	900	4,200	3,200	2,500	700	2,300
2005	Non-Critical	6,000	800	3,700	2,700	3,300	700	3,200
2006	Non-Critical	6,500	800	4,700	3,600	2,900	700	2,800
2007	Non-Critical	6,300	900	4,400	3,700	2,600	700	2,400
2008	Non-Critical	5,800	900	3,800	3,200	2,600	700	2,400
2009	Non-Critical	4,900	700	3,700	2,900	2,000	700	2,000
2010	Non-Critical	4,700	700	3,500	2,600	2,100	700	2,100
2011	Non-Critical	5,200	800	4,400	3,500	1,700	700	1,600
2012	Non-Critical	4,300	1,100	4,200	3,400	900	700	500

Table 59 - TIWD Historic Water Budget Data

13.2.2 Current Water Budget for the Turner Island Water District

The same data and methodologies from the Historic Water Budget was used to develop the Current Water Budget.

WATER YEAR	SHASTA WATER YEAR DESIGNATION	SURFACE WATER APPLIED	GROUNDWATER PUMPING	TOTAL CROP ET_c	TOTAL CROP ET_{iw}	DEEP PERCOLATION OF IRRIGATION	CHANNEL RECHARGE	CHANGE IN GROUNDWATER STORAGE
2013	Non-Critical	5,000	900	4,300	3,400	1,600	700	1,400

Table 60 - TIWD Current Water Budget Data

13.2.3 Projected Water Budget for the Turner Island Water District

The TIWD is currently fully planted. Any increase in demand is directly tied to Climate Change. The same process outlined in Section 2.2.3.3 was used to determine climate change factors. Below is a table of the projected water budget. The projected consumptive use of applied water is anticipated to increase from 3,200 AF/year to a maximum of 4,000 AF by 2070. Since the TIWD receives drain water in excess of 4,000 on an average annual basis, it is reasonable to assume that the TIWD water budget is sustainable. Section 13.3 will discuss SMC in order for TIWD to maintain sustainability. Section 13.4 will discuss projects and management actions.

WATER YEAR	HISTORICAL REFERENCE USED FOR HYDROLOGY	HISTORICAL REFERENCE FOR WATER DELIVERY/DEMAND	SHASTA WATER YEAR DESIGNATION	WATER YEAR TYPE (SJ VALLEY)
2014	-	2014	Critical	Critically Dry
2015	-	2015	Critical	Critically Dry
2016	-	2016	Non-Critical	Dry
2017	-	2011	Non-Critical	Wet
2018	1979	2010	Non-Critical	Above Normal
2019	1980	2011	Non-Critical	Wet
2020	1981	2012	Non-Critical	Dry
2021	1982	2011	Non-Critical	Wet
2022	1983	2011	Non-Critical	Wet
2023	1984	2010	Non-Critical	Above Normal
2024	1985	2012	Non-Critical	Dry
2025	1986	2011	Non-Critical	Wet
2026	1987	2013	Non-Critical	Critically Dry
2027	1988	2013	Non-Critical	Critically Dry
2028	1989	2013	Non-Critical	Critically Dry
2029	1990	2013	Non-Critical	Critically Dry
2030	1991	2014	Critical	Critically Dry
2031	1992	2015	Critical	Critically Dry
2032	1993	2011	Non-Critical	Wet
2033	1994	2013	Non-Critical	Critically Dry
2034	1995	2011	Non-Critical	Wet
2035	1996	2011	Non-Critical	Wet
2036	1997	2011	Non-Critical	Wet
2037	1998	2011	Non-Critical	Wet
2038	1999	2010	Non-Critical	Above Normal
2039	2000	2010	Non-Critical	Above Normal
2040	2001	2012	Non-Critical	Dry
2041	2002	2012	Non-Critical	Dry
2042	2003	2003	Non-Critical	Below Normal
2043	2004	2004	Non-Critical	Dry
2044	2005	2005	Non-Critical	Wet
2045	2006	2006	Non-Critical	Wet
2046	2007	2007	Non-Critical	Critically Dry
2047	2008	2008	Non-Critical	Critically Dry
2048	2009	2009	Non-Critical	Below Normal
2049	2010	2010	Non-Critical	Above Normal
2050	2011	2011	Non-Critical	Wet
2051	2001	2012	Non-Critical	Dry
2052	1992	2013	Non-Critical	Critically Dry
2053	1976	2014	Critical	Critically Dry
2054	1977	2015	Critical	Critically Dry
2055	2002	2016	Non-Critical	Dry
2056	2011	2011	Non-Critical	Wet
2057	1965	2011	Non-Critical	Wet
2058	1966	2009	Non-Critical	Below Normal
2059	1967	2011	Non-Critical	Wet
2060	1968	2012	Non-Critical	Dry
2061	1969	2011	Non-Critical	Wet
2062	1970	2010	Non-Critical	Above Normal
2063	1971	2009	Non-Critical	Below Normal
2064	1972	2012	Non-Critical	Dry
2065	1973	2010	Non-Critical	Above Normal
2066	1974	2011	Non-Critical	Wet
2067	1975	2011	Non-Critical	Wet
2068	1976	2014	Critical	Critically Dry
2069	1977	2015	Critical	Critically Dry
2070	1978	2011	Non-Critical	Wet

Table 61 – TIWD Projected Water Budget Water Year Data

WATER YEAR	SURFACE WATER APPLIED	GROUNDWATER PUMPING	CLIMATE CHANGE FACTOR	TOTAL ET_C WITH CLIMATE CHANGE	TOTAL ET_{IW} WITH CLIMATE CHANGE	DEEP PERCOLATION OF IRRIGATION WATER	CHANNEL SEEPAGE (RECHARGE)	CHANGE IN GROUNDWATER STORAGE
2014	4,600	3,300	1.000	4,000	3,200	1,400	700	-1,200
2015	4,000	2,500	1.000	2,600	1,900	2,100	700	300
2016	4,400	1,400	1.000	3,900	3,000	1,400	700	700
2017	5,200	800	1.000	4,400	3,500	1,700	700	1,600
2018	4,700	700	1.034	3,600	2,700	2,000	700	2,000
2019	5,200	800	1.035	4,600	3,600	1,600	700	1,500
2020	4,300	1,100	1.037	4,400	3,500	800	700	400
2021	5,200	800	1.034	4,500	3,600	1,600	700	1,500
2022	5,200	800	1.037	4,600	3,600	1,600	700	1,500
2023	4,700	700	1.030	3,600	2,700	2,000	700	2,000
2024	4,300	1,100	1.038	4,400	3,500	800	700	400
2025	5,200	800	1.039	4,600	3,600	1,600	700	1,500
2026	5,000	900	1.033	4,400	3,500	1,500	700	1,300
2027	5,000	900	1.035	4,500	3,500	1,500	700	1,300
2028	5,000	900	1.033	4,400	3,500	1,500	700	1,300
2029	5,000	900	1.028	4,400	3,500	1,500	700	1,300
2030	4,600	3,300	1.029	4,100	3,300	1,300	700	-1,300
2031	4,000	2,500	1.032	2,700	2,000	2,000	700	200
2032	5,200	800	1.034	4,500	3,600	1,600	700	1,500
2033	5,000	900	1.035	4,500	3,500	1,500	700	1,300
2034	5,200	800	1.043	4,600	3,700	1,500	700	1,400
2035	5,200	800	1.028	4,500	3,600	1,600	700	1,500
2036	5,200	800	1.029	4,500	3,600	1,600	700	1,500
2037	5,200	800	1.035	4,600	3,600	1,600	700	1,500
2038	4,700	700	1.037	3,600	2,700	2,000	700	2,000
2039	4,700	700	1.034	3,600	2,700	2,000	700	2,000
2040	4,300	1,100	1.028	4,300	3,500	800	700	400
2041	4,300	1,100	1.029	4,300	3,500	800	700	400
2042	6,300	700	1.033	4,600	3,700	2,600	700	2,600
2043	5,700	900	1.028	4,300	3,300	2,400	700	2,200
2044	6,000	800	1.038	3,800	2,800	3,200	700	3,100
2045	6,500	800	1.038	4,900	3,700	2,800	700	2,700
2046	6,300	900	1.082	4,800	4,000	2,300	700	2,100
2047	5,800	900	1.079	4,100	3,500	2,300	700	2,100
2048	4,900	700	1.082	4,000	3,100	1,800	700	1,800
2049	4,700	700	1.086	3,800	2,800	1,900	700	1,900
2050	5,200	800	1.088	4,800	3,800	1,400	700	1,300
2051	4,300	1,100	1.074	4,500	3,700	600	700	200
2052	5,000	900	1.089	4,700	3,700	1,300	700	1,100
2053	4,600	3,300	1.087	4,300	3,500	1,100	700	-1,500
2054	4,000	2,500	1.082	2,800	2,100	1,900	700	100
2055	4,400	1,400	1.082	4,200	3,200	1,200	700	500
2056	5,200	800	1.088	4,800	3,800	1,400	700	1,300
2057	5,200	800	1.083	4,800	3,800	1,400	700	1,300
2058	4,900	700	1.086	4,000	3,100	1,800	700	1,800
2059	5,200	800	1.090	4,800	3,800	1,400	700	1,300
2060	4,300	1,100	1.086	4,600	3,700	600	700	200
2061	5,200	800	1.086	4,800	3,800	1,400	700	1,300
2062	4,700	700	1.080	3,800	2,800	1,900	700	1,900
2063	4,900	700	1.090	4,000	3,200	1,700	700	1,700
2064	4,300	1,100	1.078	4,500	3,700	600	700	200
2065	4,700	700	1.083	3,800	2,800	1,900	700	1,900
2066	5,200	800	1.086	4,800	3,800	1,400	700	1,300
2067	5,200	800	1.086	4,800	3,800	1,400	700	1,300
2068	4,600	3,300	1.087	4,300	3,500	1,100	700	-1,500
2069	4,000	2,500	1.082	2,800	2,100	1,900	700	100
2070	5,200	800	1.075	4,700	3,800	1,400	700	1,300

Table 62 - TIWD Projected Water Budget

13.3 Sustainable Management Criteria for the Turner Island Water District

The TIWD is a conjunctive use area that relies primarily on surface water. Water levels around TIWD have been fairly stable due to surface water deliveries and seepage from the San Joaquin River. The SJREC GSP Group, collectively, is currently sustainable. The TIWD is currently sustainable and the SJREC will continue to monitor and manage jointly with TIWD to ensure that we maintain sustainability through annual review of groundwater conditions.

The historical consumptive use for the TIWD was about 3,200 AF/year which equates to an average use of about 1.7 AF/acre, with an average pumping of about 800 AF/year. While the TIWD lies near SJREC Monitoring Zone H, different SMC is developed to specifically meet the needs of the district and to achieve collective and independent sustainability.

13.3.1 Chronic Lowering of Groundwater Levels

Water levels in the vicinity of the TIWD are positively impacted through recharge from the SJREC/TIWD and seepage from the San Joaquin River, and have remained fairly stable. Water levels in the SJREC Monitoring Zone H will be used to analyze potential chronic lowering of groundwater levels. The total groundwater extractions for the TIWD are less than the deep percolation of applied surface water. This indicates that extractions from this area will not have a negative impact on groundwater levels. Even so, the TIWD will manage this potential undesirable result consistent with the groundwater management established for the SJREC Monitoring Zone H; see Section 3.

13.3.2 Reduction in Groundwater Storage

Groundwater storage under the TIWD is positively impacted through recharge from the SJREC/TIWD and seepage from the San Joaquin River. Managing groundwater storage for the TIWD will be accomplished through updated water budgets for the district and offsetting storage reductions caused by TIWD.

13.3.3 Seawater Intrusion

The Delta-Mendota Subbasin does not currently experience seawater intrusion and does not anticipate this occurring. The presence of an undesirable result for seawater intrusion is not likely to occur and therefore no SMC have been established for this sustainability indicator.

13.3.4 Degraded Water Quality

TIWD is managing groundwater quality similar to the SJREC GSA. TIWD will monitor electrical conductivity and impose management actions as necessary. Currently no management actions are recommended to supplement the SJREC GSA management efforts. For more details refer to the following Sections in this GSP: 3.2.4, 3.3.4, and 3.4.4.

13.3.5 Land Subsidence

The TIWD does not operate any wells perforated below the Corcoran Clay. As a result, inelastic land subsidence is unlikely to occur as a result of pumping from the TIWD wells. Therefore, no SMC have been established for this sustainability indicator. The SJREC and the district will work together to ensure that significant and unreasonable land subsidence does not occur due to district pumping.

13.3.6 Depletions of Interconnected Surface Water

The TIWD plans to work with the SJREC to sustainably manage interconnected surface water and groundwater. For more details refer to the following Sections in this GSP: 3.2.6, 3.3.6, and 3.4.6.

13.4 Projects and Management Actions for the Turner Island Water District

The TIWD is in an area with shallow groundwater. One current management action that TIWD proposes is to continue to pump groundwater to lower the water table below the crop root zone in order to maintain healthy soils. This management is consistent with the Measurable Objectives defined in Section 3.2. The TIWD will continue to work with SLCC to maintain regional sustainability. The projected water budget for TIWD with climate change indicates that the district will contribute to a positive change in groundwater storage through the planning and implementation horizon.

13.5 Plan Implementation for the Turner Island Water District

The cost to develop and implement the GSP specific to the TIWD-2 GSA has been solely funded by the TIWD-2 GSA. Additionally, the SJREC GSA has participated in the Sustainable Groundwater Planning Grant Program (SGWP) on behalf of the SJREC GSP Group and will offset up to 50% of the plan development costs for the TIWD-2 GSA. The SJREC GSP Group has been, and will continue to sustainably manage groundwater through the planning and implementation horizon. The SJREC have annually evaluated groundwater conditions in this area for decades and have a proven track record of successfully implementing criteria to offset groundwater problems. The SJREC GSP group will continue to sharpen our pencils to provide safe and reliable water. Although we are sustainable, if any issues are identified in our annual evaluations, we will work with our regional partners to promptly address the concerns. Consistent with our decades long relationship of leading the groundwater management effort in this area, the SJREC will take the lead preparing annual reports consistent with SGMA regulations.

14.0 MADERA COUNTY-3 GSA AREA

14.1 Background for County of Madera

There is about 3,100 acres of lands not in a public water district, white area, in the Madera County portion of the Delta-Mendota Subbasin. All of the lands with groundwater wells lie between the CCID and CCC. The historic groundwater management from the SJREC have directly and positively impacted the County islands within the SJREC service area. The SJREC worked with County leaders and technical staff to understand the potential opportunities and constraints of the SGMA to the County White Areas. It was mutually agreed that the SJREC will work with the County to develop the requirements in the GSP and to include this in a discrete section of this plan.

The SJREC are committed to assist the County to maintain sustainability through the planning and implementation horizon. The County of Madera-3 GSA is a party to the Delta-Mendota Subbasin Coordination Agreement and Cost Sharing Agreement (Appendices B & C; respectively).

Section 1 of this GSP discusses the purpose of this plan, sustainability goal, agency information and the organization of this plan for all GSA's in the SJREC GSP. Section 2.1 of this GSP describes the plan area for all of the GSA's in the SJREC GSP. Refer to Appendix I for a discussion on the basin setting for the SJREC GSA and surrounding areas including the County of Madera-3 GSA area. The Water Budget, Sustainable Management Criteria and Projects & Management Actions are included below.

14.2 Water Budgets for the County of Madera

Presented herein is the compilation of the historic, current and projected water budgets specific to the County of Madera - 3 GSA.

14.2.1 Historic Water Budget for the County of Madera

The County of Madera - 3 GSA encompasses about 3,100 acres of land. Of that, about 2,000 acres are actively farmed, 700 acres covers the Chowchilla Bypass channel and the remaining acres are small slivers of land that are not actively farmed and do not pump groundwater. The historic water budget from 2003-2012 is consistent with the historic range selected by the entire Delta-Mendota Subbasin. It is assumed that all of the ET_{iw} needed to grow the crops in the area was met by pumping groundwater. Groundwater pumping during this timeframe ranged from 4,000 to 5,000 AF/year with an average pumping of 4,400 AF/year. The approximate sustainable yield for the County of Madera - 3 GSA is 0.40 acre-feet/acre or about 1,200 acre-feet/year.