Appendix L – Part I. Exhibits of the James Irrigation District Comment Letter on the Draft Mendota Pool Group 20-Year Exchange Program EIS/EIR, Dated January 14, 2019

Appendix L – Exhibit 1 of the James Irrigation District Comment Letter

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SUPERIOR COURT OF CALIFORNIA

COUNTY OF FRESNO

SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY, a California Public Agency; THE NEWHALL LAND AND FARMING COMPANY, a California Limited Partnership,

Petitioners,

v.

WESTLANDS WATER DISTRICT, a California Water District; and DOES 1- 99,

Respondents,

Case No. 626573-0

(1) PETITION FOR WRIT OF MANDATE

(2) COMPLAINT FOR INJUNCTIVE RELIEF

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Baker Farming Company, a General Partnership; Blackburn Farming Company, Inc.; Britz Mendota, T.I.C.; Coelho West, a General Partnership; Conejo Farms, a General Partnership; Fordel, Inc.; Hansen Farms, a General Partnership; Hansen, Hansen and Gardner, a General Partnership; J.C. & S. Land Company, a General Partnership; Meyers Farming I, a Partnership; Terra Linda Farms I, a General Partnership;, collectively known as the Mendota Pool Group; Fresno County; City of Mendota; Farmers Water District; River Ranch LLC; Borel Bank and Trust Co.;

Real Parties in Interest.

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GENERAL ALLEGATIONS

Petitioners San Joaquin River Exchange Contractors Water Authority and The Newhall Land and Farming Company, allege:

1. Petitioner San Joaquin River Exchange Contractors Water Authority (hereinafter referred to as "Exchange Contractors"), is a public agency formed and existing pursuant to Government Code section 6500 et seq., and is comprised of the following member agencies, each of which delivers surface water, develops and utilizes or manages groundwater on behalf of the landowners within these boundaries: Central California Irrigation District (CCID), Firebaugh Canal Water District (FCWD), San Luis Canal Company (SLCC) and Columbia Canal Company (Columbia).

2. Petitioner The Newhall Land and Farming Company (hereinafter referred to as "Newhall") is a limited partnership formed and existing in accordance with California law which owns and farms land within the area Northerly of the Mendota Pool.

3. Respondent, Westlands Water District (hereinafter referred to as "Westlands"), is a California Water District duly organized and existing pursuant to California law, commencing with Water Code section 34000, situated in the Counties of Fresno and Kings, State of California.

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4. As used herein, the "Project" means the undertakings and plan of action described in the plan entitled "EIR - Conveyance of Nonproject Groundwater from the Mendota Pool Area Using the California Aqueduct" as approved by the Board of Directors of Westlands on or about December 14, 1998 and generally described hereafter.

5. Real Parties in Interest Fresno County, the City of Mendota, River Ranch LLC and Borel Bank and Trust Co. own some of the land and/or groundwater wells leased by the Mendota Pool Group. Real Parties in Interest Farmers Water District has an interest in water pumped pursuant to the Project for application within Farmers Water District. Real Parties in Interest, Baker Farming Company, a General Partnership, Blackburn Farming Company, Inc., Britz Mendota, T.I.C., Coelho West, a General Partnership, Conejo Farms, a General Partnership, Fordel, Inc., Hansen Farms, a General Partnership, Hansen, Hansen and Gardner, a General Partnership, J.C. & S. Land Company, a General Partnership, Meyers Farming I, a Partnership, and Terra Linda Farms I, a General Partnership, are a group of entrepreneurs who have formed an unincorporated association referred to herein as the "Mendota Pool Group".

6. Members of the Mendota Pool Group own or lease real property and/or wells located on lands surrounding the Mendota Pool (hereinafter "the Mendota Pool Properties"), a pool formed by a dam built at the confluence of the Delta-Mendota Canal ("DMC"), Fresno Slough and San Joaquin River, which serves as the head works for the delivery of water to the Exchange Contractors by the United States Bureau of Reclamation (hereinafter referred to as the "Bureau") pursuant to the Second Amended Contract for Exchange of Waters, Ilr-1144, February 28, 1967 (hereinafter referred to as the "Exchange Contract"). The Mendota Pool is outside the boundaries of Westlands. Groundwater wells located on these Mendota Pool Properties are the source of the water to be pumped into and flow into the Mendota Pool. Real Parties in Interest will be affected by this litigation because, without the Project, Real Parties in Interest will be required to limit their extraction of groundwater to those quantities of water that are needed to provide for reasonable and beneficial use directly on the Mendota Pool Properties which overlie the groundwater and limit use of groundwater pumped to the total

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quantities of groundwater which are available to all lands overlying the groundwater source on a long term sustained basis. With the exception of Farmers Water District, Real Parties in Interest are not interested in applying groundwater to the overlying land at the Mendota Pool Properties. It is only through this Project that Real Parties in Interest are able to pump poor quality groundwater to blend with the groundwater pumped from the vicinity of the Mendota Pool with better quality Central Valley Project ("CVP") water that is delivered to Mendota Pool for delivery to the Exchange Contractors. The Mendota Pool Group members' blending of poor-quality groundwater pumped from under the Mendota Pool Properties into Mendota Pool and exportation of this groundwater from the area of the Mendota Pool Properties allows them to receive water credits for this better quality water for application to land and crops far removed from the Mendota Pool Properties area. The Project allows the Mendota Pool Group members to receive credits for water not reasonably and beneficially used for irrigation on lands overlying the groundwater, and with the Project, the Real Parties in Interest and Westlands are able to export that groundwater through credits far outside the area from where the groundwater is pumped for use on other lands within Westlands at a substantial profit. The area map showing the Mendota Pool Properties and the area to which the groundwater will be credited is attached hereto as Exhibit "A" and incorporated herein by reference.

7. The identities of the parties named as DOE Respondents are unknown to Petitioners. Petitioners will amend this Petition to set forth the true names and capacities of said DOE Respondents, including any Real Party in Interest DOE Respondents, as soon as the same have been ascertained. Petitioners are informed and believe and thereon allege that each of said DOE Respondents 1 through 49 has jurisdiction by law over one or more aspects of the project and its approval, and that each of said DOE Respondents 50 through 99 owns or controls real property to which entitlements were or will be granted by virtue of the Project complained of herein.

8. Petitioners are informed and believe and thereon allege that at all times herein mentioned each Respondent was the agent of each remaining Respondent and in doing the

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things hereinafter alleged was acting within the course and scope of such agency and with the permission and consent of his/her Co-Respondent.

9. The member agencies of the Exchange Contractors serve irrigation water to in excess of 240,000 acres of land. Prior to the construction of Friant Dam in the 1930s, the Exchange Contractors diverted San Joaquin River water to irrigate their lands. The Bureau's construction of Friant Dam on the San Joaquin River as part of the Central Valley Project made it necessary to provide the Exchange Contractors with a substitute supply of water so that San Joaquin River water could be diverted at Friant to irrigate more than one million acres of land to the north and south of the Dam (via the Friant-Kern and Madera Canals). The Exchange Contractors who had previously diverted waters of the San Joaquin River executed the "Exchange Contract" with the Bureau, in accordance with which they were provided with substitute water from the Sacramento River, pumped in the south Delta by the Bureau and transported by way of the DMC to the Mendota Pool.

10. Since 1951, the Exchange Contractors have received a portion or all of their water from the Sacramento River watershed delivered via the DMC to the Mendota Pool pursuant to the Exchange Contract with the Bureau.

11. This Petition challenges compliance with the California Environmental Quality Act ("CEQA") in regard to the Project, which includes the pumping of groundwater near the Mendota Pool via wells which are privately owned by individual entrepreneurs who seek to mine quantities of groundwater in excess of the amounts of groundwater to which the Mendota Pool Properties overlying the groundwater could be capable of reasonably and beneficially using, and claiming ownership of those waters pumped through credits provided by the Project entitling the Real Parties in Interest and Westlands to obtain additional amounts of water for export to areas distant from the Mendota Pool Properties. The pumping started in approximately 1988, but environmental review under CEQA was not done until now because, first, the conveyance of groundwater pumped into Mendota Pool was viewed as a series of one-year water transfer arrangements exempt from the requirement for environmental

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consideration, and, second, because Westlands took the position that it was compelled to convey the water pursuant to Water Code section 1810 et seq. Westlands and the groundwater pumpers now plan to continue the pumping for at least an additional 20 years. No CEQA exemption applies to the project and Westlands acted as lead agency in the preparation of an Environmental Impact Report (EIR). On December 14, 1998, Westlands certified the Final EIR and approved the project. A notice of determination was filed in Fresno and Madera Counties on or about December 15, 1998.

12. If the Project is permitted to proceed, groundwater quantities equal to approximately fifteen (15) acre feet per overlying acre of land in the area of the Mendota Pool Properties will be extracted in some years by the Mendota Pool Group Real Parties in Interest. The groundwater is, in most cases, of insufficient quality because of salts to be applied and used for crop production directly on the overlying Mendota Pool Properties. With the exception of Farmers Water District, Real Parties in Interest are not interested in applying water to the Mendota Pool Properties overlying the groundwater. The Mendota Pool Group intends to export the groundwater directly, or through a system of water credits granted by Westlands, for use in Westlands on lands the Real Parties in Interest own or farm, or to sell the groundwater for use by others to whom the water credits would be sold. Under the Project the groundwater will be pumped into the Mendota Pool, where it will mix with better-quality surface water. The water would be temporarily stored in the Mendota Pool and then credited. The pumped groundwater, which is higher in salt content than surface water, will either be conveyed via two laterals and/or the California Aqueduct, ending up delivered to lands within Westlands, or, more likely, the poorer-quality blended water in Mendota Pool will be delivered to the Exchange Contractors under their contract with the Bureau. The Projects' ultimate result is that groundwater pumped from the vicinity of the Mendota Pool is being mined in quantities in excess of the Mendota Pool Properties' rights to beneficial use upon those properties, mixed with water in the Mendota Pool to place some of the salts in other parties' waters, and exported for use on lands which are not hydraulically connected to the groundwater areas from which

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the water is being exported and will not contribute to groundwater recharge of the Mendota Pool Properties or the wells from which the water is being extracted. The Mendota Pool Group is exporting the groundwater and its higher salt content by the Project which allows blending of surface and groundwater. However, not addressed by the EIR is the effect that higher levels of salts in Petitioners' receiving water will have on Petitioners' ability to discharge return flow to the San Joaquin River.

13. Real Parties in Interest, the members of the Mendota Pool Group, in exchange for pumping poor quality groundwater into the Mendota Pool, would receive nearly equivalent amounts of better quality water through Westlands' distribution system and water credits toward future water deliveries from Westlands' distribution system. The Real Parties in Interest may use these "water credits" to obtain future supplies of less saline water for use on their own lands which do not overly the groundwater being pumped by the Project. Water credits from the Project allows the pumped groundwater to be sold to other individuals or entities even where the purchasers use the water on lands which are not hydraulically connected and will not contribute to recharge back to the pool pumpers' wells.

14. The Project has and will continue to alter groundwater flow paths. Groundwater is being redirected by the Project pumping from surrounding areas and entities that otherwise had been, and would continue to be able to utilize this groundwater. The change of flow paths interrupts groundwater recharge to areas within Newhall, Columbia and CCID and results in a cone of depression which extends into western Madera County, an area which already suffers from lowered groundwater levels, increasing the lowering of groundwater levels and depriving the areas of land farmed within Petitioner Exchange Contractors and Newhall's service area and Newhall's ownership of groundwater to which those lands are entitled, and deprives those lands of the quality of groundwater that those lands would otherwise obtain from the underground water, while at the same time making it more costly for Petitioners to pump groundwater for use on their overlying land.

15. In pursuing this action, which involves enforcement of an important public right

affecting the public interest, Petitioners confer a substantial benefit on the citizens of the State of California, and, therefore, will be entitled to an award of reasonable attorneys' fees pursuant to §1021.5 of the Code of Civil Procedure.

FIRST CAUSE OF ACTION

PETITION FOR WRIT OF MANDATE

CALIFORNIA ENVIRONMENTAL QUALITY ACT

16. Petitioners reallege and incorporate by reference as if set forth in full at this place the allegations of paragraphs one through fifteen of the General Allegations of this Petition.

17. This cause of action is brought pursuant to the provisions of the California Environmental Quality Act, Public Resources Code §§ 21000, *et seq.*, ("CEQA"). Public Resources Code Section 21167.4 requires expedited review of this matter.

18. The Project of groundwater pumping blending and credits is a project as defined by Public Resources Code §21065(a). Respondent Westlands is the lead agency responsible under the California Environmental Quality Act (CEQA) for evaluating the environmental impacts of the project and complying with CEQA.

19. Respondent caused a draft environmental impact report (EIR) for the project to be prepared and circulated beginning August 24, 1994. Comments on the draft EIR were submitted through approximately February, 1996. Respondent's final EIR was completed on or about December 2, 1998.

20. By resolution dated December 14, 1998, Respondent certified the adequacy of the EIR under CEQA (Public Resources Code Section 21000-21177), and approved the Project. A notice of determination was filed by Respondent on or about December 15, 1998.

21. Petitioners, other agencies, interested groups and individuals made oral and written comments to the draft EIR and final EIR and raised each of the legal deficiencies

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asserted in this Petition.

22. Petitioners performed all conditions precedent to filing this action by complying with the requirements of Public Resources Code Section 21167.5 in serving notice of intent to commence this action on Respondent and Real Parties in Interest on December 18, 1998. A copy of said notice, together with proof of service by mail, is attached hereto as Exhibit "B" and incorporated herein by reference. The time for filing this petition was tolled by agreement a copy of which is attached as Exhibit C and incorporated herein by reference.

23. Petitioners bring this action pursuant to Public Resources Code §21168.5 and Code of Civil Procedure §1085, which require that an agency's approval of a project be set aside if the agency has prejudicially abused its discretion. Prejudicial abuse of discretion occurs where the agency has failed to proceed in a manner required by law or if its determination or decision is not supported by substantial evidence. Respondent has prejudicially abused its discretion in certifying an EIR which fails to comply with the requirements of CEQA and otherwise failing to comply with CEQA as set forth herein. In the alternative, Petitioners bring this action pursuant to Public Resources Code §21168 and Code of Civil Procedure §1094.5.

24. Respondent's actions certifying the EIR and approving the Project constitute a prejudicial abuse of discretion in that Respondent failed to proceed in the manner required by law and its decision is not supported by substantial evidence as follows:

24.1 The project description in the EIR is incomplete and misleading in that it fails to disclose that the water to be conveyed via the Mendota Pool and California Aqueduct will be pumped groundwater which is mined from the underground aquifers in amounts in excess of the quantities the overlying lands are able to reasonably or beneficially use and exported to far distant lands through a series of credits. The area of the Mendota Pool Properties is notorious for its poor quality groundwater and the name of the Project and Project description is misleading in that it does not make clear that the "non-project groundwater" to be conveyed away from the Mendota Pool must

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first be pumped locally and discharged into the Mendota Pool, where it will commingle with and diminish, through salinization, the quality of water delivered to the Exchange Contractors and Newhall.

24.2 The Project description in the EIR is incomplete and misleading in that it fails to explain that all or some of the groundwater pumped from the groundwater resource will be exported for use on lands which are not hydraulically connected to the groundwater resource or paths being pumped and which exported waters not contribute to recharge back to the wells upon the Mendota Pool Properties in violation of California law, and fails to explain that the Real Parties in Interest, the groundwater pumpers, will be pumping substantially more water than they would be able or entitled to use on their overlying properties, and thus mining the groundwater aquifers in violation of California law.

24.3 The EIR identifies significant adverse impacts that will result, and describes general "monitoring" which will take place without even a plan for corrective action in the event the monitoring reveals adverse impacts. As such, the EIR fails to describe and evaluate all feasible mitigation measures that could eliminate or substantially lessen significant environmental impacts of the project, including (i) impacts from interference with wells in the same general hydrogeologic area, including wells located within Exchange Contractors and Newhall, and wells owned and utilized upon Petitioner Newhall's lands, (ii) land subsidence, (iii) subsidence of public facilities used in maintaining and providing public services to lands and inhabitants in the area of the Mendota Pool and adjacent areas, (iv) acceleration of migration of poor-quality groundwater into the area where the groundwater is mined, (v) degradation of groundwater quality, (vi) lowering the level of groundwater supplies in the aquifers connected to those to be pumped, (vii) use of the pumped groundwater, which is not surplus to the local area, on lands which are not hydraulically connected and will not contribute to recharge back to the Mendota Pool Group's wells, in violation of

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California law, (viii) further degradation of the quality of groundwater serving the inhabitants of the community of the City of Mendota, and (ix) degradation of the quality of groundwater available to wells in the vicinity which are owned by Petitioners or used to supplement surface water supplies made available to Authority members.

24.4 The EIR fails to include a reasonable range of alternatives that could eliminate or substantially lessen significant environmental impacts of the Project proposals, including without limitation (i) the limiting of each groundwater pumper to his or her share of the safe yield of the groundwater in the area of the Mendota Pool Properties as an overlying user, (ii) agricultural land retirement as an alternative to mining 15 acre feet per acre of groundwater for export out of the hydrogeologic area in order to provide water to the land that might alternatively be retired, (iii) a water banking project designed to keep local groundwater in the area near the Mendota Pool as opposed to a pumping and conveyance project without enhancing recharge of the aquifers being exploited, and/or (iv) the incorporation of mitigation measures designed to remedy adverse impacts caused by the project, including the admitted potential for subsidence to lands and public improvements in the vicinity of the pumping, a reduction of salts added to Mendota Pool water by pumped groundwater, which salts will reach the lands served within the Authority service area and Newhall lands and drain into the San Joaquin River.

24.5 The EIR fails to respond adequately to comments to the draft and final EIR, including comments regarding available alternatives not considered in the EIR.

24.6 As a result of comments to the draft EIR, Westlands delayed certifying the final EIR but refused to recirculate the EIR for a second round of review even though the comments to the draft and final EIR presented significant new information from that included in those documents. Even the final EIR was revised before it was certified by Westlands to revise the Project, but Westlands still refused to recirculate the EIR to allow Petitioners and other interested parties an opportunity for additional

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review and comment on the substantially new information that was presented. The refusal of Westlands to recirculate the EIR effectively deprived the public of an opportunity to comment on the changes and the revised Project and constitutes a violation of CEQA. Westlands is required to recirculate an EIR when "significant new information" is added to the document after public review.

24.7 The EIR fails to adequately consider the cumulative impacts of the Project. The EIR improperly minimizes the cumulative impacts of the Project by admitting that, although the Project will contribute to and cause adverse impacts such as land subsidence, it cannot be held fully responsible and should not therefore be required to provide any mitigation of the adverse impacts. CEQA review would serve no useful environmental purpose if every project proponent could simply get in line behind pre-existing activities which harm the environment and claim that because its own Project will merely advance the impending doom it is therefore not responsible for reasonable mitigation. The EIR for the Project fails to examine and determine the point in time, or the magnitude of the impending harm, and clearly forecloses the feasibility of proposed additional activity without mitigation designed to keep detrimental or adverse environmental conditions in at least the same state. The EIR accepts, without any examination of alternatives, that allowing new projects to go forward without responsibility until such time as sufficient harm does occur, and those injured are required to file lawsuits against any and all responsible parties. This would result in a complete frustration of the purposes of CEQA and an inadequate EIR. The EIR in question proposes to monitor conditions, but does not offer any mitigation when the wells of Petitioners or the wells of landowners within Exchange Contractors are rendered useless from well interference or become too highly saline for agricultural use, or land subsidence caused from excessive pumping from a confined area requires abandonment of surface water distribution systems by Exchange Contractors's members in the vicinity of the Mendota Pool. The EIR does not state whether pumping would be

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increased or decreased based upon results of monitoring.

24.8 The stated purpose of the project is to keep all agricultural lands in Westlands in production. Any alternative inconsistent with that purpose is rejected out of hand. CEQA requires consideration of all potentially feasible alternatives even if all Project objectives are not met, including those which may result in the retirement of some agricultural land. The EIR fails to consider whether the importance of continued agricultural production in all of Westlands outweighs the benefits of the alternative: retirement of unsuitable agricultural lands within Westlands for the greater good of the surrounding community and physical environment. Until the EIR weighs and considers such alternatives, it fails as a CEQA document. Additionally, the EIR fails to analyze the impact that well interference to wells within the same hydrogeologic area will have on areas such as CCID, Columbia and Newhall which are dependent on conjunctive use of their surface and groundwater resources.

25. The CEQA Guidelines of the State of California adopted in Section 15093 (b) requires that where the decision of the public agency allows "the occurrence of significant effects which are identified in the final EIR but which are not avoided or substantially lessened, the agency shall state in writing the specific reasons to support its action based on the final EIR and/or other information in the record . The statement of overriding considerations must be supported by substantial evidence in the record." Subsection (c) states: "If an agency makes a statement of overriding considerations, the statement should be included in the record of the project approval and should be mentioned in the notice of determination. This statement does not substitute for, and shall be in addition to, findings required pursuant to Section 15091" which provides "[n]o public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding."

25.1 Westlands identified in the EIR substantial adverse environmental

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impacts from the Project including land subsidence, subsidence of public facilities such as the Mendota Dam, the canals of the members of the Authority, roads and utilities, the increased salinization of groundwater utilized by the residents of the City of Mendota, the increased salinization of groundwater utilized by Petitioner Newhall and other landowners and water purveyors in the area of the Mendota Pool properties, increased salinization of the surface waters delivered to the members of Authority and lowering of groundwater levels resulting from the moving of groundwater by the Mendota Pool Properties through credits. Despite identifying those adverse environmental impacts, Westlands refused to require any deposit of monies or payments by the Mendota Pool Group and Real Parties in Interest to provide funds to mitigate the adverse environmental effects by reconstructing or providing substitute facilities or water supplies for the facilities or water sources so adversely impacted over time by the Project. Westlands instead purports to place the "costs of the Project" in adverse environmental impacts upon persons and landowners other than the Real Parties in Interest.

25.2 The findings of overriding consideration are not supported by substantial evidence nor adopted in accordance with the requirements of CEQA or the CEQA guidelines because (i) an explanation that monitoring will take place does not identify why mitigation measures, including the deposit and administration of funds to pay for mitigation of adverse environmental impacts, is not feasible and available; (ii) an explanation and finding that there is insufficient money or resources available in the Real Parties in Interest Project to fund the adverse environmental impacts mitigation was not made, and even if made would be insufficient evidence to support a finding that the benefits of the Project outweigh the adverse environmental consequences under CEQA Guidelines Section 15903(a). If the Real Parties in Interests Project cannot fund the environmental damage repairs caused by it when they occur, and these damages and reports must be made by others including the Petitioners, the Westlands Respondents

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must explain why the assets of Westlands itself or of the Real Parties in Interest cannot be secured and pledged to pay these damages.

25.3 The findings of overruling consideration adopted by Westlands do not so state, or provide substantial evidence of overriding considerations as required by Section 15093(b) of the CEQA Guidelines because (i) they are not supported by substantial evidence in the record that the additional agricultural lands which can be irrigated in Westlands as a result of the Project cannot afford to pay for the damages caused by the Project, (ii) they are not supported by substantial evidence in the record that mitigation of the adverse impacts has been reasonably accomplished by the reduction in the number of acre feet pumped by the Project to reduce the adverse environmental impacts, (iii) are not supported by substantial evidence in the record that the Mendota Pool Pumpers Group and the Real Parties in Interest should not be required to deposit all monies from the use or sales of the groundwater for the purposes of securing that the adverse environmental impacts which may be mitigated by the construction of new facilities, including new means of delivery of water will be accomplished, (iv) they are not supported by substantial evidence that the irrigation of additional agricultural lands within Westlands Water District is more important environmentally than preserving the irrigation of lands within Authority's member units and Newhall, and preventing the salinization of their ground water resources and increased salinity drainage to the San Joaquin River or preserving the domestic water supply system to the City of Mendota which includes approximately 5,000 inhabitants. The Statement of Overriding Consideration assumes without substantial evidence that it is better to risk significant and irremediable adverse environmental impacts in the areas adjacent to the Mendota Pool and within the Exchange Contractors service area and Newhall's ownership and the areas of western Madera County for a higher good of providing cheap and reliable water for agricultural production within Westlands.

26. Respondent violated its duties to certify an EIR which conforms to the

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requirements of CEQA and the CEQA Guidelines (14 CCR section 15091). Accordingly, certification of the EIR and approval of the Project must be set aside.

27. Petitioners are beneficially interested in the issuance of the Writ because Petitioners have a clear, present, and substantial interest in the protection of the groundwater resources relied upon by the lands within the Exchange Contractors service area and underlying Newhall's lands, prevention of well interference from excessive pumping for export, the movement of saline groundwater into their service areas, and land subsidence which threatens the viability of farm land and water delivery facilities. Petitioners bring this action on behalf of themselves and the landowners within their service areas, who are citizens of the State of California, and on behalf of landowners similarly situated who are interested in having Respondent's public duty to comply with CEQA enforced.

28. At all times herein mentioned, Respondent has had the ability to satisfy its duty to comply with CEQA. Notwithstanding such ability, Respondent continues to fail and refuse to do so. Petitioners have standing to bring this action to enforce Westlands' public duty to comply with CEQA. (Citizens Association for Sensible Development of Bishop Area v. County of Inyo (1985) 172 Cal. Appropriate.3d 151, 158.)

Wherefore, Petitioners pray for judgment as hereinafter set forth.

SECOND CAUSE OF ACTION

INJUNCTIVE RELIEF

29. Petitioners reallege and incorporate by reference as if set forth in full at this place the allegations of paragraphs one through thirteen of the General Allegations and Paragraphs fifteen through twenty-eight of this Petition.

30. The actions of Respondent Westlands and the actions of Real Parties in Interest in pumping wells to procure water to implement and carry forward the Project will result in immediate irreparable harm to Petitioners and the public at large if the Project as approved results in quantities of groundwater pumped from Real Parties in Interest wells in the vicinity

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of the Mendota Pool that substantially exceeds the quantity that could be reasonably and beneficially applied to the overlying land. Such impacts include, but are not limited to the following:

30.1 The groundwater pumped from an area which already experiences lowering of groundwater levels will be exported for use on lands which are not hydraulically connected to the groundwater source being pumped and will not contribute to recharge back to the pool pumpers' wells, located upon the Mendota Pool Groups' in violation of California law;

30.2 The EIR admits that significant adverse impacts will result, and describes general "monitoring" which will take place without any guarantee of or description of implementing any corrective action will be taken in the event the monitoring reveals adverse impacts are occurring. The impacts of the Project will include, based on the amounts of groundwater pumping described in the Project, unreasonable interference with the quantity of and quality of water produced by wells in the same general hydrogeologic area, land subsidence, degradation of groundwater quality, lowering the level of the groundwater supply, use of the pumped groundwater which is not surplus to the local area on lands which are not hydraulically connected and will not contribute to recharge back to the pool pumpers' wells, in violation of California law, further degradation of the quality of groundwater serving the community of the City of Mendota, and degradation of the quality of groundwater available to wells in the vicinity which are owned by Petitioners.

30.3 The EIR fails to analyze the impact that drawdown and interference to wells within the same hydrogeologic area will have on areas such as CCID, Columbia and Newhall which are dependent on conjunctive use of their surface and groundwater resources.

31. The Petitioners are likely to prevail in this matter because of the violations of CEQA by Respondent Westlands and harm is likely to be caused to the environment and to the

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Petitioners interests if the Project is implemented and an injunction against its implementation is not granted, which harm will be in excess of the harm caused to Respondent and the Real parties in Interest if the injunction is granted and maintained until such time as the merits of this Petition and Complaint are adjudged.

32. A preliminary and permanent injunction should issue restraining Respondent and Real Parties in Interest from proceeding with the Project.

Wherefore, Petitioners pray for judgment as hereinafter set forth.

PRAYER

WHEREFORE, Petitioners pray for entry of judgment as follows:

On the first cause of action:

1. For a preliminary injunction restraining Respondent and Real Parties in Interest from taking any action to carry out the Project pending trial.

2. For a peremptory writ of mandate directing:

(a) Respondent to vacate and set aside its certification of the EIR and approval of the Project;

(b) Respondent and Real Parties in Interest to suspend all activity under the certification of the EIR and project approval that could result in any change or alteration in the physical environment, including the pumping of groundwater into the Mendota Pool, until Respondent has taken actions that may be necessary to bring the EIR into compliance with CEQA;

(c) Respondent to prepare, circulate, and consider a new and legally adequate EIR and otherwise to comply with CEQA in any subsequent action taken to approve the project.

On the second cause of action (injunctive relief):

3. The issuance of a preliminary and permanent injunction enjoining:

(a) Implementation of any aspect of the Project;

(b) Pumping of any groundwater from any of the wells identified and

discussed in the EIR dated December 1998, except in amounts which are to be put to reasonable and beneficial use upon the Mendota Pool Group lands overlying the groundwater supply which is the source of the water; and,

(c) Deposit of any groundwater or any water whatsoever in the Mendota Pool where it may commingle with water from the Central Valley Project and reduce the quality of water available to the Exchange Contractors or Newhall.

On both causes of action:

4. For costs of suit;

5. For an award of attorneys' fees pursuant to Code of Civil Procedure Section 1021.5.

6. For such other and further equitable or legal relief that the Court considers just and proper.

Dated: February 11, 1999

Respectfully submitted,

MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP

By _____
MICHAEL V. SEXTON
Attorneys for Petitioner San Joaquin River Exchange Contractors Water Authority

BEST BEST & KRIEGER LLP

By _____
HOWARD B. GOLDS
Attorneys for Petitioner, The Newhall Land and Farming Company

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discussed in the EIR dated December 1998, except in amounts which are to be put to reasonable and beneficial use upon the Mendota Pool Group lands overlying the groundwater supply which is the source of the water; and,

(c) Deposit of any groundwater or any water whatsoever in the Mendota Pool where it may commingle with water from the Central Valley Project and reduce the quality of water available to the Exchange Contractors or Newhall.

On both causes of action:

4. For costs of suit;

5. For an award of attorneys' fees pursuant to Code of Civil Procedure Section 1021.5.

6. For such other and further equitable or legal relief that the Court considers just and proper.

Dated: February 11, 1999

Respectfully submitted,

MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP

By_____
MICHAEL V. SEXTON
Attorneys for Petitioner San Joaquin River Exchange Contractors Water Authority

BEST BEST & KRIEGER LLP

By_____
HOWARD B. GOLDS
Attorneys for Petitioner, The Newhall Land and Farming Company

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VERIFICATION

I, Steve Chedester, declare:

I am the Executive Director of the SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY, Petitioner in the foregoing action, and am authorized to make this Verification on its behalf. I have read the foregoing PETITION FOR WRIT OF MANDATE AND COMPLAINT FOR INJUNCTIVE RELIEF and know its contents, and I am informed and believe that the statements made therein are true.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed this 9th day of FEBRUARY, 1999, at SACRAMENTO California.

Steve Chedester
STEVE CHEDESTER

Exhibit "A" Area map showing Mendota Pool Properties and the area to which the groundwater will be credited

Exhibit "B" Notice of Intent to file CEQA Petition dated December 18, 1998

Exhibit "C" Tolling Agreement

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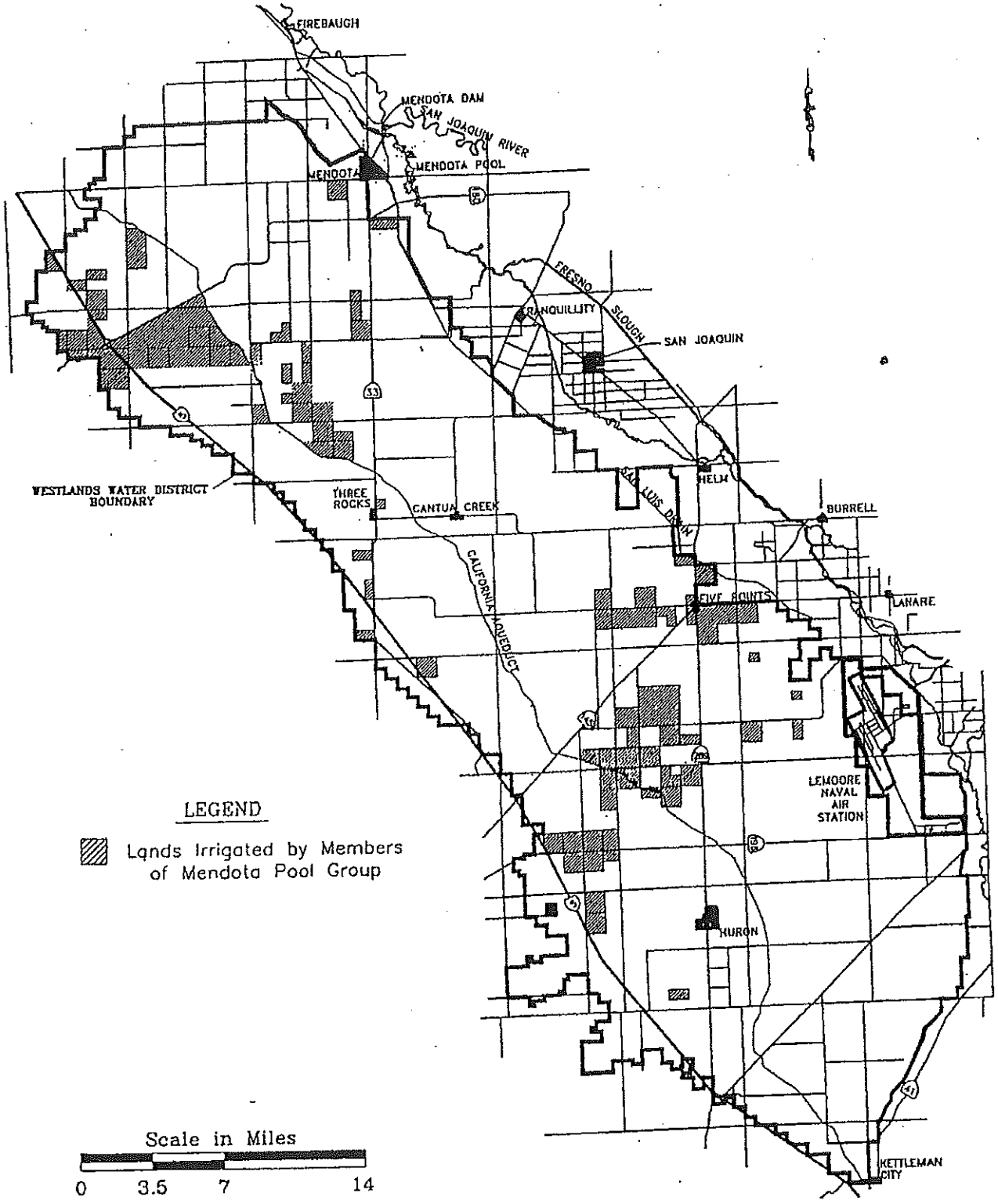
EXHIBIT "A"



Westlands\wwdmend.dwg

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Exhibit 17
Lands Irrigated by Mendota Pool Group in Westlands Water District

EXHIBIT A PG 1 of 1

EXHIBIT "B"

FILE COPY

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PAUL R. MINASIAN, INC.
WILLIAM H. SPRUANCE, INC.
WILLIAM H. BABER III, INC.
JEFFREY A. MEITH
M. ANTHONY SOARES
MICHAEL V. SEXTON
MICHELLE DeCASTRO

PAUL JACKSON MINASIAN, 1933-1981
DAVID H. MINASIAN, RET. 1989

NOTICE OF INTENT TO FILE CEQA PETITION

TO: **WESTLANDS WATER DISTRICT**
Attn: David Orth, General Manager
Post Office Box 6056
Fresno, California 93703-6056

MENDOTA POOL GROUP
c/o David R. Aladjem, Esq.
Downey, Brand, Seymour & Rohwer
555 Capital Mall, 10th Floor
Sacramento, California 95814

NEWHALL LAND & CATTLE COMPANY
c/o Gary Sawyers, Esq.
Law Offices of Gary W. Sawyers
575 East Alluvial Avenue, Ste. 101
Fresno, California 93720

PLEASE TAKE NOTICE, under Public Resources Code Section 21167.5, that petitioners, San Joaquin River Exchange Contractors Water Authority and its member agencies, intend to file a petition under the provisions of the California Environmental Quality Act against respondent, Westlands Water District, challenging its Environmental Impact Report dated December 1998 and its December 14, 1998 approval of the Project described as the "Conveyance of Nonproject Groundwater from the Mendota Pool Area Using the California Aqueduct".

Dated: December 18, 1998

MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP

By Michelle DeCastro
Michael V. Sexton
Michelle DeCastro
Attorneys for Petitioner, San Joaquin River Exchange Contractors Water Authority

EXHIBIT B, Pg. 1 of 2

DECLARATION OF SERVICE (CCP §§ 1013(a), 2015.5)

I, **SANDRA LEE**, declare:

I am employed by the law firm of MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP My business address is 1681 Bird Street, Post Office Box 1679, Oroville, California 95965-1679. I am over the age of eighteen (18) years and not a party to this action.

On December 18, 1998, I served the document set forth below in the manner indicated:

( ) **Service By Mail (Deposit)**: By enclosing a copy in an envelope addressed as shown below and depositing the sealed envelope with the United States Postal Service with the postage fully prepaid.

(X) **Service By Mail (Collection)**: By enclosing a copy in an envelope addressed as shown below and placing the envelope for collection and mailing on December 18, 1998 at Oroville, California, following our ordinary business practices. I am readily familiar with this firm's practice for collecting and processing correspondence for mailing. It is deposited in the ordinary course of business with the United States Postal Service in a sealed envelope with postage fully prepaid.

Document(s) Served: **NOTICE OF INTENT TO FILE CEQA PETITION**

Person(s) Served:

Westlands Water District
Attn: David Orth, General Manager
Post Office Box 6056
Fresno, California 93703-6056

Mendota Pool Group
c/o David R. Aladjem, Esq.
Downey, Brand, Seymour & Rohwer
555 Capital Mall, 10th Floor
Sacramento, California 95814

Newhall Land & Cattle Company
c/o Gary Sawyers, Esq.
Law Offices of Gary W. Sawyers
575 East Alluvial Avenue, Ste. 101
Fresno, California 93720

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on December 18, 1998 at Oroville, California

EXHIBIT B, Pg 2 of 2

Sandra Lee
SANDRA LEE

EXHIBIT "C"

Tolling Agreement

This Tolling Agreement is entered into and effective this 7th day of Jan., 1999, by and among the Mendota Pool Group, an unincorporated association composed of the entities listed on Exhibit A, (the "Group"); the San Joaquin River Exchange Contractors Water Authority (the "Authority"); Newhall Land and Farming Company, a California limited partnership ("Newhall"); and Westlands Water District (the "District").

Recitals

1. By letter dated December 10, 1998, the Authority informed the District that the Authority would commence litigation against the District if the District certified the Final Environmental Impact Report for the Conveyance of Nonproject Groundwater from the Mendota Pool Area Using the California Aqueduct (State Clearinghouse No. 94082069) (the "Final EIR") as complying with the provisions of the California Environmental Quality Act ("CEQA") and approved an agreement between the District and the Group based on the Final EIR (the "Project"). Newhall expressed similar concerns;

2. On December 14, 1998, the District certified the Final EIR and approved the Project;

3. The Authority, Newhall, the District, and the Group wish to meet to discuss whether it is possible to avoid litigation arising out of the District's certification of the Final EIR and approval of the Project;

4. The short statute of limitations for challenges under CEQA may limit the ability of the parties to conduct such meetings and discussions; and

5. The District and the Group are willing to toll the statute of limitations for challenges by the Authority and Newhall under CEQA for 30 days and to toll the statute of limitations for nuisance and related conduct for a period equal to the length of this agreement in order to facilitate such meetings and discussions.

Agreement

The parties agree as follows:

1. *Tolling of Limitations Period*. The limitations period established under CEQA for the commencement of any action against the District arising out of its certification of the Final EIR or approval of the Project and any limitations period applicable to claims against the District and the Group founded on nuisance and related claims shall be tolled for a period of 30 days. The parties agree that, as a result of this Agreement, the limitations period for challenges based on CEQA to the certification of the Final EIR and/or the approval of the Project shall expire on February 15, 1999, and that claims based on nuisance and related conduct may be brought within the limitations period applicable to such claims plus the period of this agreement.

2. *Non-Assertion of Statute of Limitations*. The District and the Group agree not to assert as an issue, claim or defense to a legal action filed by the Authority and Newhall under CEQA challenging the District's certification of the Final EIR or approval of the Project, or against the District or the Group founded on nuisance and related claims, that such legal action is time-barred due to the Authority or Newhall's failure to file the legal action within the applicable limitations period for such challenges, provided that legal action under CEQA is filed on or before February 15, 1999, and any action based on nuisance and related conduct is brought within the limitations period applicable to such claims plus the period of this agreement. If the Authority or Newhall fails to file a legal action under CEQA challenging the District's certification of the Final EIR or approval of the Project on or before February 15, 1999, then the Authority and Newhall will be deemed to have waived any and all rights under CEQA to challenge the certification of the Final EIR and the approval of the Project (including any action by the District or the Group to implement those decisions) and any such challenge shall be deemed to be time-barred.

3. *Bar to Inconsistent Claims*. Any party may use this Agreement in a court of law as an absolute bar to the assertion of any position contrary to the terms of this Agreement.

4. *No Effect as to Non-Parties*. Nothing in this Agreement shall be deemed to limit, abrogate, or waive any right of the District or the Group to raise any claim or defense against any individual, agency, or entity other than the Authority.

5. *Reservation of Rights*. Except as specifically set forth herein, each of the parties to this Agreement expressly retains and reserves all legal rights and remedies and nothing in this Agreement shall be construed to prejudice such rights or remedies.

6. *No Admission Intended.* Nothing in this Agreement shall be construed as an admission by any Party.

7. *No Third-Party Beneficiaries.* This Agreement is made solely for the benefit of the parties and no other person or entity shall have or acquire any right by virtue of this Agreement.

8. *General Provisions*

   a. *Authority.* Each signatory to this Agreement represents that s/he is authorized to execute this Agreement on behalf of one of the parties to this Agreement. Each party represents that it has legal authority to enter into this Agreement and to perform all obligations under this Agreement.

   b. *Amendment.* This Agreement may be amended or modified only by a written instrument executed by each of the parties to this Agreement.

   c. *Construction and Interpretation.* This Agreement has been arrived at through negotiation and each party has had a full and fair opportunity to revise the terms of this Agreement. As a result, the normal rule of construction that any ambiguities are to be resolved against the drafting party shall not apply in the construction or interpretation of this Agreement.

   d. *Entire Agreement.* This Agreement constitutes the entire agreement of the parties with respect to the subject matter of this Agreement and supersedes any prior oral or written agreement, understanding, or representation relating to the subject matter of this Agreement.

   e. *Necessary Actions.* Each party agrees to execute and deliver additional documents and instruments and to take any additional actions as may be reasonably required to carry out the purposes of this Agreement.

f. *Counterparts*. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original.

Dated: January ___, 1999 SAN JOAQUIN RIVER EXCHANGE CONTRACTORS AUTHORITY

By: _____

Name: _____

Title: _____

Dated: January ___, 1999 WESTLANDS WATER DISTRICT

By: _____

Name: _____

Title: _____

Dated: January ___, 1999 MENDOTA POOL GROUP

By: _____

Name: _____

Title: _____

Dated: January ___, 1999 THE NEWHALL LAND AND FARMING COMPANY

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP,
Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION,
Managing General Partner

By: _____
John R. Frye, Vice President of Agriculture

EXHIBIT C Pg. 4 of 6

f. *Counterparts.* This Agreement may be executed in one or more counterparts, each of which shall be deemed an original.

Dated: January 7, 1999 SAN JOAQUIN RIVER EXCHANGE CONTRACTORS AUTHORITY

By: _____

Name: STEVE CHEDESTER

Title: EXECUTIVE DIRECTOR

Dated: January 7, 1999 WESTLANDS WATER DISTRICT

By: _____

Name: David Orth

Title: General Manager

Dated: January 7, 1999 MENDOTA POOL GROUP

By: _____

Name: JOHN C. BRYNER

Title: AGENT

Dated: January ___, 1999 THE NEWHALL LAND AND FARMING COMPANY

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP,
Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION,
Managing General Partner

By: _____
John R. Frye, Vice President of Agriculture

Mendota Pool Group

Baker Farming Company, a General Partnership
Blackburn Farming Company, Inc.
Britz Mendota, T.I.C.
Coelho West, a General Partnership
Conejo Farms, a General Partnership
Fordel, Inc.
Hansen Farms, a General Partnership
Hansen, Hansen and Gardner, a General Partnership
J.C. & S. Land Company, a General Partnership
Meyers Farming I, a Partnership
Terra Linda Farms I, a General Partnership

Exhibit A

EXHIBIT C, Pg. 6 of 6

Appendix L – Exhibit 2 of the James Irrigation District Comment Letter

PAUL R. MINASIAN, ESQ. SBN 040972
MICHAEL V. SEXTON, ESQ. SBN 119354
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1681 Bird Street
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Facsimile: (530) 533-0197

Attorneys for: San Joaquin River Exchange Contractors Water Authority

FILED
MAR 02 1999
FRESNO COUNTY SUPERIOR COURT
By M.S., DEPUTY

MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP
ATTORNEYS AT LAW
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SUPERIOR COURT OF CALIFORNIA

COUNTY OF FRESNO

SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY, a California Public Agency,

Plaintiff

v.

Baker Farming Company, a General Partnership; Blackburn Farming Company, Inc.; Britz Mendota, T.I.C.; Coelho West, a General Partnership; Conejo Farms, a General Partnership; Fordel, Inc.; Hansen Farms, a General Partnership; Hansen, Hansen and Gardner, a General Partnership; J.C. & S. Land Company, a General Partnership; Meyers Farming I, a Partnership; Terra Linda Farms I, a General Partnership; Mendota Pool Group, an unincorporated association, River Ranch LLC And DOES 1 through 500, Inclusive

Defendants

SUMMONS ISSUED

627638-0

COMPLAINT FOR NUISANCE, DECLARATORY AND INJUNCTIVE RELIEF

General Allegations

Plaintiff, San Joaquin River Exchange Contractors Water Authority, alleges:

1. Plaintiff, San Joaquin River Exchange Contractors Water Authority (hereinafter referred to as "Exchange Contractors"), is a public agency formed and existing pursuant to Government Code section 6500 et seq., and is comprised of the following member agencies: Central California Irrigation District (CCID), Firebaugh

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Canal Water District (FCWD), San Luis Canal Company (SLCC) and Columbia Canal Company (Columbia).

2. The Exchange Contractors exercise the powers of an irrigation district and have standing to bring this action pursuant to Water Code Section 22654 which provides: "A district may commence, maintain, intervene in, compromise, and assume the costs of any action or proceeding involving or affecting the ownership of use of waters or water rights within the district used or useful for any purpose of the district or of benefit to any land."

3. Defendants, Baker Farming Company, a General Partnership; Blackburn Farming Company, Inc.; Britz Mendota, T.I.C.; Coelho West, a General Partnership; Conejo Farms, a General Partnership; Fordel, Inc.; Hansen Farms, a General Partnership; Hansen, Hansen and Gardner, a General Partnership; J.C. & S. Land Company, a General Partnership; Meyers Farming I, a Partnership; Terra Linda Farms I, a General Partnership;, are a group of entrepreneurs who have formed an unincorporated association referred to as the Mendota Pool Group. Members of the Mendota Pool Group and Defendant River Ranch LLC, which we are informed and believe recently acquired its property from the Bureau of Reclamation, (hereinafter referred to as the "Bureau") own or lease real property and/or wells located on lands surrounding the Mendota Pool (hereinafter "the Mendota Pool Properties"), a pool formed by a dam built at the confluence of the Delta-Mendota Canal ("DMC"), Fresno Slough and San Joaquin River, which serves as the head works for the delivery of water to the Exchange Contractors by the Bureau pursuant to the Second Amended Contract for Exchange of Waters, Ilr-1144, February 14, 1968 (hereinafter referred to as the "Exchange Contract"). Groundwater wells located on these Mendota Pool Properties are the source of the water to be pumped into and flow into the Mendota Pool. Through a Project which was approved by Westlands Water District (Westlands) on December 14, 1998, and which is the subject of a pending Petition for

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Writ of Mandate (CEQA), San Joaquin River Exchange Contractors Water Authority v. Westlands Water District, Fresno Superior Court, Case No. 626573-0, Defendants are able to pump poor quality groundwater to blend with the groundwater pumped from the vicinity of the Mendota Pool with better quality Central Valley Project ("CVP") water which is delivered to Mendota Pool for delivery to the Exchange Contractors. The blending of poor-quality groundwater pumped from under the Mendota Pool Properties into Mendota Pool and exportation of this groundwater from the area of the Mendota Pool Properties allows Defendants to receive water credits for this better quality water for application to land and crops far removed from the Mendota Pool Properties area. The Project allows Defendants to receive credits for water not reasonably and beneficially used for irrigation on lands overlying the groundwater, and with the Project, the Defendants are able through water credits issued by the Bureau and Westlands to export that groundwater far outside the area from where the groundwater is pumped for use on other lands within Westlands, and even to sell the water credits thus obtained at a substantial profit. The area map showing the Mendota Pool Properties and the area to which the groundwater will be credited is attached hereto as Exhibit "A" and incorporated herein by reference.

4. The identities of the parties named as DOE defendants are unknown to Plaintiff. Plaintiff will amend this Complaint to set forth the true names and capacities of said DOE defendants as soon as the same have been ascertained. Plaintiff is informed and believes and thereon alleges that each of said DOE defendants 1 through 49 has jurisdiction by law, over one or more aspects of the Project that was approved by Westlands and that each of said DOE defendants 50 through 99 owns or controls real property to which entitlements were or will be granted by virtue of the Project complained of herein. Plaintiff is informed and believes and thereon alleges that each of said DOE defendants numbered 100 through 500 own real property within the geographic area depicted in Exhibit A and claim

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some right to pump groundwater from the area.

5. Plaintiff is informed and believes and thereon alleges that at all times herein mentioned each Defendant was the agent of each remaining defendant and in doing the things hereinafter alleged was acting within the course and scope of such agency and with the permission and consent of his/her Co-Defendant.

6. The member agencies of the Exchange Contractors serve irrigation water to in excess of 240,000 acres of land. Prior to the construction of Friant Dam in the 1930s, the Exchange Contractors diverted San Joaquin River water to irrigate their lands. The Bureau's construction of Friant Dam on the San Joaquin River as part of the CVP made it necessary to provide the Exchange Contractors with a substitute supply of water so that San Joaquin River water could be diverted at Friant to irrigate more than one million acres of land to the north and south of the Dam (via the Friant-Kern and Madera Canals). The Exchange Contractors who had previously diverted waters of the San Joaquin River executed the "Exchange Contract" with the Bureau, in accordance with which they are provided with substitute water from the Sacramento River, pumped in the south Delta by the Bureau and transported by way of the DMC to the Mendota Pool.

7. Since 1951, the Exchange Contractors have received a portion or all of their water from the Sacramento River watershed delivered via the DMC to the Mendota Pool pursuant to the Exchange Contract with the Bureau.

8. This Complaint challenges the excessive pumping of groundwater from the Mendota Pool Properties from wells which are privately owned by individual entrepreneurs who seek to mine quantities of groundwater in excess of the amounts of groundwater to which the Mendota Pool Properties overlying the groundwater could be capable of reasonably and beneficially using, and claiming ownership of those waters pumped through water credits provided by the Bureau and Westlands to the Defendants which entitles Defendants to export water to areas far distant from the

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Mendota Pool Properties. The pumping started in approximately 1988. At first, the conveyance of groundwater pumped into Mendota Pool was viewed as a drought relief measure and year to year water transfer arrangement. Then the drought ended but the groundwater pumping was then viewed as a way to supplement reduced water supplies to Westlands when Congress enacted P.L. 102-575 Title XXXIV, Central Valley Project Improvement Act which amended the purposes for use of CVP water to include substantial environmental water obligations. Defendants now plan to continue the pumping for at least an additional 20 years. All efforts by Plaintiff to obtain voluntary reduction in groundwater pumping to that quantity which will not cause well interference and lowered water levels, interfere with groundwater recharge or cause added land subsidence have been rebuffed by Defendants.

9. If the Project is permitted to proceed, groundwater quantities equal to approximately fifteen (15) acre feet per overlying acre of land in the area of the Mendota Pool Properties will be extracted in some years by the Defendants. The groundwater is, in most cases, of insufficient quality because of its salt content to be applied and used for crop irrigation directly on the overlying Mendota Pool Properties, and, in any event, Defendants are not interested in applying water to the Mendota Pool Properties overlying the groundwater. The Defendants intend to export the groundwater directly, or through a system of water credits granted by the Bureau and Westlands, for use in Westlands on lands the Defendants own or farm, or to sell the water credits thus granted for use by others. Under the Project, the groundwater will be pumped into the Mendota Pool where it will mix with better-quality surface water. The water pumped into Mendota Pool would then be credited by the Bureau to Westlands' CVP accounts. The pumped groundwater, which is higher in salt content than surface water, will in some cases be conveyed via two laterals to Westlands. More likely, the quantity of water pumped will be credited by the Bureau to Westlands' CVP contract entitlement and delivered directly to Westlands from the

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California Aqueduct. The poorer-quality blended water in Mendota Pool will be delivered to the Exchange Contractors under their Exchange Contract with the Bureau. The Projects' ultimate result is that groundwater pumped from the vicinity of the Mendota Pool is being mined in quantities in excess of the Mendota Pool Properties' rights to beneficial use upon those properties, mixed with water in the Mendota Pool to place some of the salts in other parties' waters, and exported for use on lands which are not hydraulically connected to the groundwater areas from which the water is being exported and which will not contribute to groundwater recharge of the Mendota Pool Properties or the wells from which the water is being extracted. The Mendota Pool Group is exporting the groundwater and its higher salt content by the Project which allows blending of surface water and groundwater. The Project will cause higher levels of salts in Plaintiff's receiving water which will adversely effect Plaintiff's ability to discharge agricultural return flow to the San Joaquin River.

10. Some of Defendants' groundwater wells were installed and are operated so as to constitute a continuing nuisance and, plaintiff is informed and believes, in flagrant violation of the requirements of law as follows: failure to obtain necessary well permits from the County of Fresno Department of Environmental Health; failure to file driller's logs for the wells constructed; installation of wells too close to a landfill site; use of landfill material without the owner's knowledge or authorization which was then used to fill in waterways including portions of Fresno Slough in order to construct a well site and construct a well; spilling of diesel fuel at the well sites next to Mendota Pool which constitutes a continuing threat to water quality of the Pool's surface water as well as to groundwater in the vicinity of the Mendota Pool.

11. The Project has and will continue to alter groundwater flow paths. Groundwater is being redirected by the Project's pumping away from surrounding areas, water agencies and individuals that otherwise have been and would continue to be able to utilize this groundwater. The change of flow paths interrupts groundwater

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recharge to areas within the service areas of members of the Exchange Contractors. Groundwater pumping of this magnitude also results in a cone of depression which extends into western Madera County, an area which already suffers from lowering groundwater levels. Pumping this quantity of groundwater from a confined area further lowers groundwater levels which deprives land farmed within the Exchange Contractors service area of groundwater to which those lands are entitled. The pumping Project will deprive lands within Plaintiff members' service area of the quality of groundwater that those lands would otherwise obtain and make it more costly for Plaintiff's members to pump groundwater for use on their overlying land.

12. The Project will introduce additional salts into water supplies delivered to Plaintiff which is problematic enough from an irrigation perspective; however, the additional salts are doubly burdensome to Plaintiff's member FCWD which consists of approximately 22,000 acres, and to 6000 acres of Plaintiff's member CCID (generally referred to as the Camp 13 area) both of which are participants in the Grassland Bypass Project (GBP). The GBP service area totals approximately 100,000 acres.

12.1 In May of 1996, the Central Valley Regional Water Quality Control Board (RWQCB) adopted a control plan for agricultural drainage which emanated from the west side of the San Joaquin Valley area served by the Grassland Area Farmers, the group which has been involved in the GBP. In response to that control plan, the Grassland Area Farmers formed a regional drainage entity under the umbrella of the San Luis and Delta-Mendota Water Authority, a California joint exercise of powers agency, which was formed, in large part, to provide for the operation and maintenance on behalf of its member water agencies of the federal Delta Mendota Canal (DMC). Participants in this regional drainage entity include Broadview Water District, Charleston Drainage District, Firebaugh Canal Water District, Pacheco Water District, Panoche Drainage District, Widren Water District and the Camp 13

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Drainers, an association of landowners located in part of Central California Irrigation District.

12.2 The Grassland Bypass Project is an innovative program which was designed by the Grassland Area Farmers to improve water quality in wetland areas by removing agricultural drainage from the channels used to deliver water to the Grasslands and wetland areas that are located in proximity to their service area. The project, which was done in coordination with the U.S. Bureau of Reclamation (USBR), U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), various environmental groups and other interested water contractors, commenced in 1996.

12.3 Through their involvement in the GBP, FCWD and the Camp 13 area of CCID have aggressively pursued drainage reduction and water conservation practices, many of which were included in the San Joaquin Valley Drainage Report. Many of these practices are new and innovative to this area. On July 24, 1998 the RWQCB issued waste discharge requirements for the Grassland Bypass Project that implemented the basin plan objectives for the Project.

12.4 Historically, the Grassland Bypass Project service area has produced drainage from agricultural activities which has been a combination of subsurface tile water as well as surface tail water. FCWD, Camp 13 and the other Grassland Area Farmers aggressively manage discharges of salts and other constituents from their service area. They routinely recycle portions of their salty drain water and intentionally put high salinity water back onto their fields in order to sustain irrigated agriculture and to maintain a drainage outlet while meeting water quality objectives. This balancing act must be done so as not to damage the crops.

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12.5 The Defendants' Project will introduce more salts into the receiving waters of FCWD and the Camp 13 area of CCID thereby reducing the ability of these Grassland Area Farmers to meet mandated water quality standards established by the RWQCB's waste discharge requirements.

13. In pursuing this action, which involves enforcement of an important public right affecting the public interest, Plaintiff confers a substantial benefit on the citizens of the State of California, and, therefore, will be entitled to an award of reasonable attorneys' fees pursuant to §1021.5 of the Code of Civil Procedure.

First Cause of Action

Nuisance

14. Plaintiff realleges and incorporates by reference as if set forth in full at this place the allegations of paragraphs 1 through 13 of this Complaint.

15. Plaintiff, Exchange Contractors' members CCID and Columbia, are, and at all times herein mentioned were, the owners and in possession and control of certain real property consisting of land and improvements along with deep water wells used to supply groundwater for irrigation of lands within the service area of said Plaintiff, located in Fresno and Madera Counties, California.

16. Plaintiff, Exchange Contractors and its member agencies, also bring this action on behalf of the landowners within their service areas for whom Plaintiff receives, holds and distributes irrigation water.

17. Defendants are, and at all times herein mentioned were, the owners and/or in possession and control of certain real property consisting of land and improvements including deep water wells, located in Fresno County, California.

18. Plaintiff's property and the properties of Defendants, and each of them, overlie the hydrogeologic area in question located in Fresno, and Madera Counties.

19. The law of California groundwater right and use only permits the

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appropriation of groundwater that is surplus to the reasonable needs of overlying owners. The owners of groundwater wells which overlie the hydrogeologic area from which the Defendants pump groundwater are already putting the full safe yield to reasonable and beneficial use; consequently, no surplus exists and no water is available for Defendants to appropriate for export from the hydrogeologic region. The Project also violates the law in that it allows "water credits" to be sold to the highest bidder and water exported outside the hydrogeologic region for use on non-overlying lands without regard for the safe yield of the supply from which the groundwater is extracted or whether Defendants' extraction of groundwater for export is of water that is surplus to the reasonable and beneficial demands of overlying landowners.

20. The law of California groundwater right and use permits the Defendants to pump as much of the groundwater as they are able to put to reasonable and beneficial use upon lands overlying the basin. Under the current project, they propose to pump quantities of groundwater far in excess of any reasonable quantity; the wells pump an outrageous amount of water: in excess of 15 acre feet of groundwater per acre of land which is far in excess of the quantity of water that they would be able or entitled to use upon their own lands.

21. In overdraft conditions, the law of California groundwater right and use allocates the shortage among all overlying users: each overlying owner is entitled only to the quantity of groundwater reasonably necessary and available. The hydrogeologic area in question cannot sustain the level of groundwater pumping that this project proposes. The quantity of groundwater proposed for pumping and export grossly exceeds the amount each overlying owner could reasonably put to beneficial use on land overlying the hydrogeologic area.

22. At all times herein mentioned and in selected years since approximately 1988, Defendants have occupied, used and maintained their properties in the vicinity

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of the Mendota Pool in such a manner as to pump more groundwater than they are able to put to reasonable and beneficial use upon their lands overlying the hydrogeologic area. Defendants have contributed to a state of lowered groundwater levels in the hydrogeologic region which underlies their properties and the properties of Plaintiff, and caused interference and degraded groundwater quality in wells of Plaintiff and others; and Defendants have caused or substantially exacerbated land subsidence in the area of Plaintiff's water distribution systems which are located in the vicinity of Defendants' wells.

23. The aforementioned occupancy, use and maintenance of the properties of Defendants constitutes a nuisance within the meaning of Section 3479 of the Civil Code, in that it is injurious to public health and interferes with the comfortable enjoyment of plaintiff's properties.

24. Continually since 1991, Plaintiff has advised the Mendota Pool Group defendants' agent, John Bryner, of the damage caused and likely to be exacerbated by the nuisance, and requested its abatement. Defendants, through their agent John Bryner, have some years limited their pumping due to concerns raised by plaintiff; however with the approval of the Project by Westlands, Defendants have now refused, and continue to refuse, to abate the nuisance.

25. The nuisance affects, at the same time, a considerable number of persons in that it deprives other landowners overlying the hydrogeologic area of the right to put groundwater to reasonable and beneficial use upon their overlying lands, degrades the quality of groundwater available to other overlying landowners, and increases the cost of water service to landowners within the service areas of the Plaintiff inasmuch as Plaintiff will be required to acquire substitute water supplies to replace degraded groundwater supplies, assuming such supplies are available. In the event that the nuisance continues unabated, land subsidence in the vicinity of the Mendota Dam could have catastrophic consequences on the ability of the Exchange

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Contractors to divert water to irrigate over 240,000 acres in their service area.

26. Defendants, and each of them, have threatened to and will, unless restrained by this court, continue to maintain the nuisance and continue the acts complained of, and each and every act has been, and will be, without the consent, against the will, and in violation of the rights of Plaintiff.

27. As a proximate result of the nuisance created by the Defendants, and each of them, Plaintiff has been, and will be, damaged in an amount within the jurisdiction of this Court which is necessary to replace degraded groundwater supplies with substitute surface water supplies and to mitigate impacts to water distribution facilities caused by well interference and land subsidence.

28. As a further proximate result of the nuisance, the value of Plaintiff's properties and the properties of all landowners within the boundaries of Plaintiff's service areas have been diminished in an amount within the jurisdiction of this Court. Unless the nuisance is abated, Plaintiff's properties and the properties of all landowners within the boundaries of Plaintiff's service areas, will be progressively further diminished in value.

29. Unless Defendants, and each of them, are restrained by order of this court, it will be necessary for Plaintiff to commence many successive actions against Defendants, and each of them, to secure compensation for damages sustained, thus requiring a multiplicity of suits.

30. Unless Defendants, and each of them, are enjoined from continuing their course of conduct, Plaintiff will suffer irreparable injury in that the usefulness and economic value of Plaintiff's properties will be substantially diminished and Plaintiff will be deprived of the comfortable enjoyment of its properties, including the right to put groundwater underlying its properties to reasonable and beneficial use.

31. Plaintiff has no plain, speedy, or adequate remedy at law, and injunctive relief is expressly authorized by Sections 526 and 731 of the Code of Civil

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Procedure.

Wherefore, Plaintiff prays for judgment as hereinafter set forth.

Second Cause of Action
Injunctive Relief

32. Plaintiff realleges and incorporates by reference as if set forth in full at this place the allegations of paragraphs 1 through 31of this Complaint.

33. The actions of Defendants may result in immediate irreparable harm to Plaintiff and the public at large if the Project as approved results in large quantities of groundwater pumping from Defendants' wells in the vicinity of the Mendota Pool. Such impacts include, but are not limited to the following:

33.1. The groundwater pumped from an area which is already suffering lowered groundwater levels will be exported for use on lands which are not hydraulically connected to the groundwater source being pumped and will not contribute to recharge back to the pool pumpers' wells, in violation of California law;

33.2. The impacts of the Project will include, based on the amounts of groundwater pumping described in the Project, unreasonable interference with the quantity of water produced by wells in the same general hydrogeologic area, land subsidence, degradation of groundwater quality, lowering the level of the groundwater supply, use of the pumped groundwater which is not surplus to the local area on lands which are not hydraulically connected and which will not contribute to recharge back to the pool pumpers' wells in violation of California law, further degradation of the quality of groundwater serving the community of the City of Mendota, and degradation of the quality of groundwater available to wells in the vicinity which are owned by Plaintiff.

34. A preliminary and permanent injunction should issue restraining

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Defendants from proceeding with the Project or, in the alternative, providing for the mitigation of land subsidence, lowered groundwater levels, well interference, and water quality impacts until trial.

Wherefore, Plaintiff prays for judgment as hereinafter set forth.

PRAYER

WHEREFORE, Plaintiff prays for entry of judgment as follows:

1. For a preliminary and permanent injunction enjoining the Defendants, and each of them, and their agents, servants, and employees, and all persons acting under, in concert with, or for them from pumping more groundwater than they can put to reasonable and beneficial use on their overlying lands, and restraining and enjoining the exportation of such groundwater directly or indirectly;

2. For general damages in an amount within the jurisdiction of this Court.

3. For costs of suit;

4. For an award of attorneys' fees pursuant to Code of Civil Procedure Section 1021.5.

5. For such other and further equitable or legal relief that the Court considers just and proper.

Respectfully submitted,

Dated: February 26, 1999

MINASIAN, SPRUANCE, BABER, MEITH, SOARES & SEXTON, LLP

By _____
MICHAEL V. SEXTON
Attorneys for San Joaquin River Exchange Contractors Water Authority

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VERIFICATION

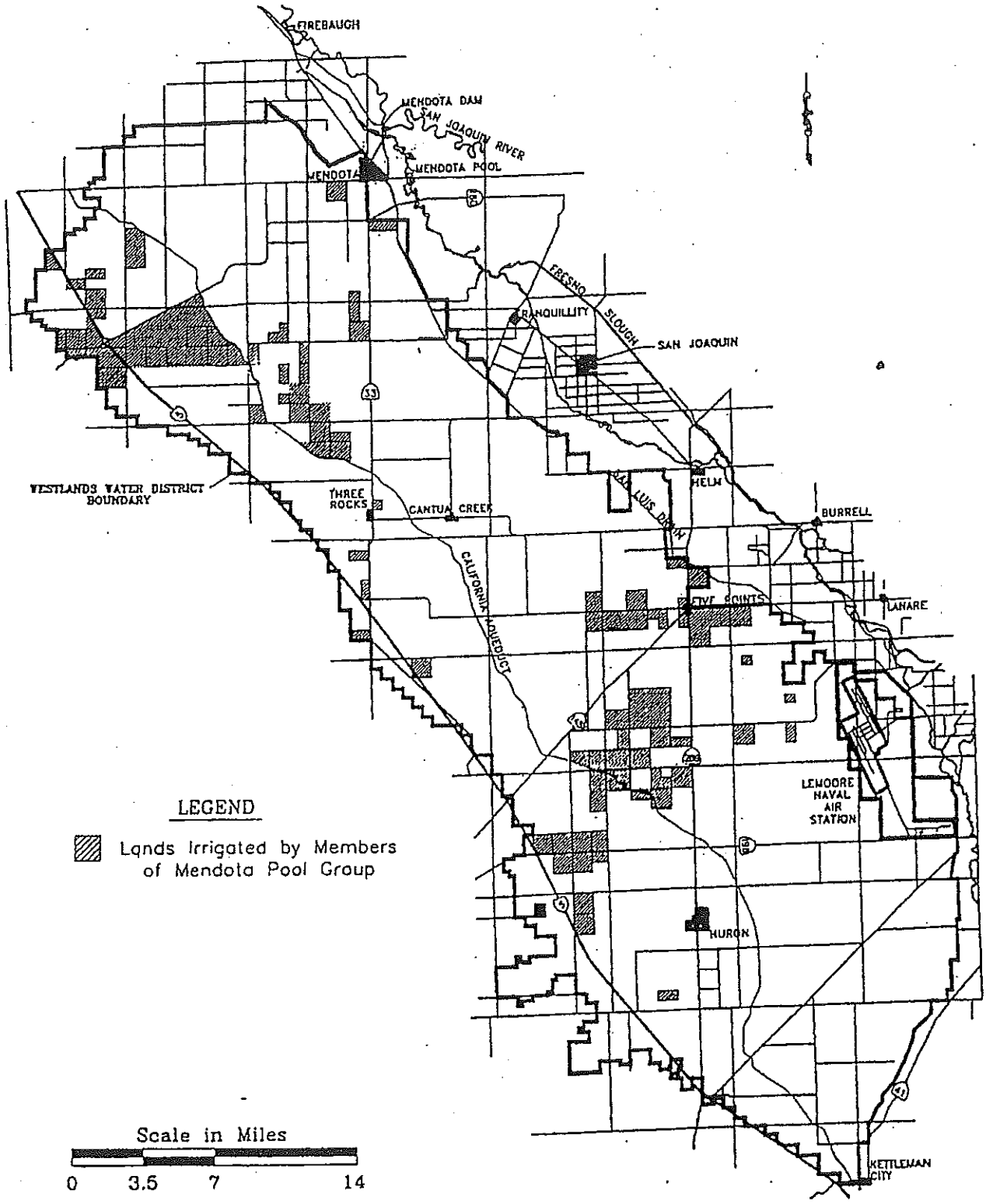
I, Steve Chedester, declare:

I am the Executive Director of the SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY, Plaintiff in the foregoing action and am authorized to make this Verification on its behalf. I have read the foregoing COMPLAINT FOR NUISANCE, DECLARATORY AND INJUNCTIVE RELIEF and know its contents and I am informed and believe that the statements made therein are true.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed this 23RD day of February , 1999, at SACRAMENTO, California.

Steve Chedester



Westlands\wxdmend.dwg

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Exhibit 17
Lands Irrigated by Mendota Pool Group in Westlands Water District

EXHIBIT A-Portal

Appendix L – Exhibit 3 of the James Irrigation District Comment Letter

AGREEMENT
FOR MENDOTA POOL
TRANSFER PUMPING PROJECT

THIS AGREEMENT (the or this "Agreement") is executed in triplicate as of the Effective Date by and among the SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY (the "Exchange Contractors"), THE NEWHALL LAND AND FARMING COMPANY ("Newhall"), and the following named parties jointly and severally, BAKER FARMING CO. ("Baker"), BLACKBURN FARMING CO., INC. ("Blackburn"), BRITZ MENDOTA, T.I.C. ("Britz"), COELHO WEST ("Coelho"), CONEJO FARMS ("Conejo"), FORDEL, INC. ("Fordel"), HANSEN FARMS ("Hansen"), H. G. H.("H.G.H."), J.C. & S. LAND CO. ("J.C. & S."), MEYERS FARMING I ("Meyers"), TERRA LINDA FARMS I ("Terra Linda"), collectively referred to as the MENDOTA POOL GROUP ("MPG"), and individually referred to as MPG Party; and RIVER RANCH LLC ("River Ranch").

RECITALS

This Agreement is entered into based on the following facts and circumstances which the Parties agree are true and correct.

A. The Board of Directors of Westlands WD certified the FEIR for the Mitigated Project under the California Environmental Quality Act on December 14, 1998.

B. On February 11, 1999, the Exchange Contractors and Newhall, which farms in and outside of the Exchange Contractors' service area, filed a petition for writ of mandate in Case 626573-0 against (1) Westlands WD as the respondent and (2) Baker Farming Co.,

a general partnership, Blackburn Farming Co., Inc., Britz Mendota, T.I.C., Coelho West, a general partnership, Conejo Farms, a general partnership, Fordel, Inc., Hansen Farms, a general partnership, Hansen, Hansen and Gardner, a general partnership, J.C. & S. Land Co., a general partnership, Meyers Farming I, a partnership, Terra Linda Farms I, a general partnership, Mendota Pool Group, an unincorporated association, Fresno County, City of Mendota, Farmers Water District, River Ranch LLC, and Borel Bank and Trust Co., as the real parties in interest, challenging the adequacy of the FEIR for the Mitigated Project. Fresno County was dismissed on March 12, 1999.

C. On March 2, 1999, the Exchange Contractors filed a complaint in Case 627638-0 against Baker Farming Co., a general partnership, Blackburn Farming Co., Inc., Britz Mendota, T.I.C., Coelho West, a general partnership, Conejo Farms, a general partnership, Fordel, Inc., Hansen Farms, a general partnership, Hansen, Hansen and Gardner, a general partnership, J.C. & S. Land Co., a general partnership, Meyers Farming I, a partnership, Terra Linda Farms I, a general partnership, Mendota Pool Group, an unincorporated association, and River Ranch LLC for declaratory relief and injunctive relief and related claims.

D. The dispute among the parties hereto in Cases 626573-0 and 627638-0 is as follows. The MPG desires to pump groundwater into the Mendota Pool and take delivery of such water directly through Westlands WD Laterals 6 and 7 or, by exchange with the Bureau, in the California Aqueduct. The Exchange Contractors question the right of the MPG to pump groundwater for the proposed use and believe that such groundwater pumping will, among other things, (1) cause water levels in the vicinity of the Mendota Pool to decline, (2) cause poorer water quality to reach the headworks of the Exchange Contractors' diversion facilities from the Mendota Pool, and (3) exacerbate land subsidence in the

vicinity of the Mendota Pool. The MPG disagrees with the Exchange Contractors regarding its right to pump groundwater as proposed and whether there will be any such adverse impacts as a result thereof.

E. On June 16, 1999, the Court filed an order in Case 627638-0, and on June 18, 1999, the Court filed a similar order in Case 626573-0 staying both proceedings "until further order of the Court, dismissal of the action, or written notice to the Court by any party," while the parties hereto and their technical consultants examined existing data and, in concert, developed an operating plan which would support a long-term groundwater pumping program by the MPG.

F. On June 25, 1999, the parties appeared for assignment of the proceedings to a trial department. The matter was assigned to the Honorable Judge Gene M. Gomes in Department 32. Judge Gomes ordered that the parties hereto should file status reports commencing September 1, 1999. The parties hereto have filed status reports in both cases based on the schedule contained in the Court's orders.

G. The 1999 test pumping and monitoring program developed by Luhdorff and Scalmanini, on behalf of the MPG, and Kenneth D. Schmidt & Associates, on behalf of the Exchange Contractors and Newhall, got underway on or about July 15, 1999. The primary focus of the test pumping and monitoring program was to determine the effects of the MPG pumping during 1999 on the Exchange Contractors and Newhall. The results of the test pumping and monitoring program are contained in the Phase I Report.

H. Following completion of the Phase I Report, the consultants of the parties hereto undertook to evaluate the long-term impacts of Transfer Pumping by the MPG on the Exchange Contractors and Newhall and to develop mitigation measures for any significant impacts identified. The Phase II Report was completed in December of 2000

and has served as a basis for the negotiation of this Agreement.

I. The parties hereto desire to settle their dispute through execution and performance of this Agreement. The express intent of MPG is to prevent injury and damage to the aquifers, water quality and the interests of the other parties to this Agreement.

NOW, THEREFORE, in consideration of the recitals set forth above, and the mutual covenants, conditions and promises set forth herein, the Exchange Contractors, Newhall, Baker, Blackburn, Britz, Coelho, Conejo, Fordel, Hansen H.G.H., J.C. & S., Meyers, Terra Linda, the MPG, and River Ranch hereby agree as follows:

ARTICLE I.

INTERPRETATION OF AGREEMENT

1.00 Introduction.

The rules of interpretation contained in this article I shall govern the interpretation of this Agreement.

1.01 Definitions.

The words and phrases defined in article II hereof shall govern the interpretation of this Agreement.

1.02 Applicable Law.

The Laws of the State of California without regard to conflict of law principles shall govern the interpretation of this Agreement.

1.03 Integration.

This Agreement is intended to implement the "Criteria for Agreement" set forth in

Chapter VIII of the Phase II Report, and shall be interpreted to be consistent with and to implement said criteria. This Agreement contains the entire agreement among the parties hereto with the respect to the subject of this Agreement and supersedes any other agreement, whether written or oral, among the parties hereto relating to the same subject. Any prior representations, promises, or the like that are not contained in this Agreement shall be of no force or effect.

1.04 Amendment of Agreement.

This Agreement may not be modified, changed, altered, amended or otherwise revised except by a duly executed written amendment.

1.05 Statutory Rules of Interpretation.

Any rule of interpretation that an ambiguity is to be resolved against the drafting party shall not be employed in the interpretation of this Agreement, any exhibit hereto, or any amendment hereof, and neither Civil Code section 1654, nor any similar law shall be applied to resolve any ambiguity in this Agreement.

1.06 Opinions and Determinations.

Except as may be otherwise provided in this Agreement, where any term of this Agreement provides for action to be based on the opinion, judgment, approval, consent, review, certification, or determination of a party, such term shall not be construed as permitting the opinion, judgment, approval, consent, review, certification, or determination to be arbitrary, capricious or unreasonable.

1.07 Waiver.

The waiver by any party hereto of any right with respect to a default or any other matter arising under this Agreement shall not constitute or be construed as constituting a waiver with respect to any other default or matter.

1.08 Exhibits.

All exhibits referred to in this Agreement are hereby incorporated by reference as if fully set forth in this Agreement.

1.09 Captions.

The captions of articles and sections of this Agreement do not define the scope, meaning or intent of this Agreement.

ARTICLE II.

DEFINITIONS

2.00 AF.

"AF" means acre feet.

2.01 AFY.

"AFY" means acre feet per Year.

2.02 A-Clay.

"A-Clay" means the clay layer about 10 to 15 feet thick that lies about 70 feet to 100 feet beneath the Mendota Pool and lands in the vicinity of the Mendota Pool.

2.03 Adjacent Overlying Lands.

"Adjacent Overlying Lands" means the lands that are identified as Adjacent Overlying Lands on Figure 3–1 of the Phase I Report, a copy of which is attached as Exhibit A, as lands owned by MPG members (irrigated in 1999) and lands owned by MPG members (not irrigated in 1999). A member of the MPG who owns any of such land may designate other land contiguous to lands shown in Exhibit A as Adjacent Overlying Land provided that a like amount of land, on an acreage basis, previously designated as Adjacent Overlying Land is deleted from such designation.

2.04 Bureau.

"Bureau" means the Bureau of Reclamation, a bureau within the Department of the Interior of the United States.

2.05 Case 626573-0.

"Case 626573-0" means the case now pending in the Superior Court of the State of California for the County of Fresno entitled SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY and THE NEWHALL LAND AND FARMING COMPANY, Petitioners v. WESTLANDS WATER DISTRICT, Respondent, and BAKER FARMING COMPANY et al, Real Parties in Interest, and assigned Case No. 626573-0.

2.06 Case 627638-0.

"Case 627638-0" means the case now pending in the Superior Court of the State of California for the County of Fresno entitled SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY v. BAKER FARMING COMPANY, BLACKBURN FARMING COMPANY, BRITZ MENDOTA T.I.C., COELHO WEST, CONEJO FARMS, FORDEL, HANSEN FARMS, HANSEN, HANSEN AND GARDNER, J.C. & S. LAND COMPANY, MEYERS FARMING I, TERRA LINDA FARMS I, MENDOTA POOL GROUP, and RIVER RANCH LLC, and assigned Case No. 627638-0.

2.07 Central California ID.

"Central California ID" means Central California Irrigation District, a California irrigation district organized and existing under Division 11 of the Water Code.

2.08 Columbia CC.

"Columbia CC" means Columbia Canal Company, a mutual water company organized and existing under the laws of the State of California.

2.09 Columbia Canal.

"Columbia Canal" means the canal of Columbia CC known as the Columbia Canal, the location of which is generally shown on Exhibit B.

2.10 DMC.

"DMC" means Delta Mendota Canal, a feature of the Bureau's Central Valley Project, the location of which is generally shown on Exhibit B.

2.11 Deep Zone.

"Deep Zone" means the aquifer or aquifers stratigraphically between the A-Clay, where present, or its equivalent depth, and the E-Clay.

2.12 Dry Year.

"Dry Year" means a Year determined to be dry by the MPG in the manner provided in section 3.04 hereof.

2.13 EC.

"EC" means electrical conductivity, expressed in micromhos per centimeter at 25° centigrade.

2.14 Effective Date.

"Effective Date" means January 1, 2001.

2.15 Exchange Contractors.

"Exchange Contractors" means the San Joaquin River Exchange Contractors Water Authority, a joint exercise of powers authority established under Chapter 5 (commencing with section 6500) of Division 7 of Title 1 of the Government Code and consisting of member agencies Central California ID, Columbia CC, Firebaugh Canal WD, and San Luis CC.

2.16 Farmers WD.

"Farmers WD" means Farmers Water District, a California water district organized and

existing under Division 13 of the Water Code.

2.17 DEIR and FEIR.

"DEIR" means the Draft Environmental Impact Report prepared at the direction of Westlands WD for a Mendota Pool water transfer groundwater pumping project, and "FEIR" means the Final Environmental Impact Report for a modified Mendota Pool water transfer groundwater pumping project that was certified by the Board of Directors of Westlands WD under the California Environmental Quality Act and described therein as the Mitigated Project.

2.18 Firebaugh Canal WD.

"Firebaugh Canal WD" means Firebaugh Canal Water District, a California water district organized and existing under Division 13 of the Water Code.

2.19 Firebaugh Intake Canal.

"Firebaugh Intake Canal" means the canal of Firebaugh Canal WD known as the Firebaugh Intake Canal, the location of which is generally shown on Exhibit B.

2.20 Fordel Extensometer.

"Fordel Extensometer" means the extensometer identified as Fordel Extensometer on Figure 7-1 of the Phase I Report, a copy of which is attached as Exhibit C.

2.21 Fresno Slough.

"Fresno Slough" means the tributary of the San Joaquin River, part of which created the southerly branch of the Mendota Pool after the construction of Mendota Dam.

2.22 Independent Consultant.

"Independent Consultant" means the person appointed by the parties hereto under section 3.11a hereof to mediate any disputes between or among the members of the Technical Committee under section 3.11b hereof and arbitrate any dispute under section 3.11d hereof.

2.23 MPG.

"MPG" means the Mendota Pool Group, an unincorporated association, that is made up of the following members: Baker Farming Co., a general partnership, Blackburn Farming Co., Inc., Britz Mendota, T.I.C., Coelho West, a general partnership, Conejo Farms, a general partnership, Fordel, Inc., Hansen Farms, a general partnership, H.G.H., a general partnership, J.C. & S. Land Co., a general partnership, Meyers Farming I, a partnership, and Terra Linda Farms I, a general partnership.

2.24 MPG Account.

"MPG Account" means the interest-bearing account to be established under section 3.07a hereof.

2.25 MPG Wells.

"MPG Wells" means water wells owned, operated or used by the MPG, a MPG Party, or River Ranch, for Transfer Pumping.

2.26 Main Canal.

"Main Canal" means the canal of Central California ID known as the Main Canal, the location of which is generally shown on Exhibit B.

2.27 Mendota Pool.

"Mendota Pool" means the pool at the confluence of the San Joaquin River and Fresno Slough created by Mendota Dam.

2.28 Mitigated Project.

"Mitigated Project" means the project certified in the FEIR.

2.29 Policy Committee.

"Policy Committee" means the committee established under section 3.10 hereof.

2.30 Newhall.

"Newhall" means The Newhall Land and Farming Company, a California limited partnership.

2.31 Normal Year.

"Normal Year" means a Year determined to be normal by the MPG in the manner provided in section 3.04 hereof.

2.32 Outside Canal.

"Outside Canal" means the canal of Central California ID known as the Outside Canal, the location of which is generally shown on Exhibit B.

2.33 Phase I Report.

"Phase I Report" means the report dated May 2000 entitled "Results of 1999 Test Pumping Program for Mendota Pool Group Wells" prepared by Kenneth D. Schmidt and Associates and Luhdorff and Scalmanini, Consulting Engineers, which is incorporated herein by reference, and a copy of which will be maintained at the office of the Exchange Contractors.

2.34 Phase II Report.

"Phase II Report" means the report dated December 2000 entitled "Long-Term Impacts of Transfer Pumping by the Mendota Pool Group" prepared by Kenneth D. Schmidt and Associates and Luhdorff and Scalmanini, Consulting Engineers which is incorporated herein by reference, and a copy of which will be maintained at the office of the Exchange Contractors.

2.35 Project.

"Project" means the project described in Chapter VI, Chapter VII and the Criteria for Agreement in Chapter VIII of the Phase II Report, and article III hereof to extract groundwater from beneath lands in the vicinity of the Mendota Pool for Transfer Pumping.

2.36 San Luis CC.

"San Luis CC" means San Luis Canal Company, a mutual water company organized and existing under the laws of the State of California.

2.37 Shallow Zone.

"Shallow Zone" means the aquifer or aquifers stratigraphically above the A-Clay, where present, or its equivalent depth.

2.38 Technical Committee.

"Technical Committee" means the committee established under section 3.09 hereof.

2.39 Transfer Pumping.

"Transfer Pumping" means the extraction of groundwater by the members of the MPG and River Ranch from beneath lands in the vicinity of Mendota Pool for use on lands other than Adjacent Overlying Lands.

2.40 Westlands WD.

"Westlands WD" means Westlands Water District, a California water district organized and existing under Division 13 of the Water Code.

2.41 Wet Year.

"Wet Year" means a Year determined to be wet by the MPG in the manner provided in section 3.04 hereof.

2.42 Year.

"Year" means a calendar year commencing January 1 and ending December 31.

2.43 Yearout Extensometer.

"Yearout Extensometer" means the extensometer identified as Yearout Extensometer on Figure 7-1 of the Phase I Report, a copy of which is attached as Exhibit C.

ARTICLE III.

THE PROJECT

3.00 The Project-Transfer Pumping

a. The purpose of the Project is to provide for Transfer Pumping while mitigating the impacts from Transfer Pumping including, without limitation: (a) drawdowns and other impacts at nearby wells; (b) land subsidence; and (c) water quality at the Exchange Contractors' canal intakes.

b. Transfer Pumping is based upon assumptions that were developed and adopted by the parties hereto based upon information and data provided by the parties and examined by their consultants. The assumptions upon which Transfer Pumping is based also include the technical analyses found in the Phase I and Phase II Reports. In the event that any of the predictions and assumptions, including those provided by the parties hereto and which form the basis of predictions and assumptions that are included in the Phase I and Phase II Reports turn out to be erroneous in any way the Technical and Policy Committees shall attempt to work out the issue presented, and respond to the change in assumption or new information.

c. The Mitigated Project shall not go forward absent express agreement of the Exchange Contractors and Newhall.

3.01 Transfer Pumping From Deep Zone.

Transfer Pumping from the Deep Zone: (a) shall be conducted primarily during March, April and May and from mid-September through mid-December of each Year other than a Wet Year and shall not be conducted during more than 10 months of any Year, (b) shall not be conducted in a Wet Year once the Year is classified as a Wet Year; and, (c) shall not exceed an amount that will cause subsidence at the Yearout Extensometer to average more than 0.005 feet per Year. The best information currently available indicates that Transfer Pumping from the

Deep Zone of 12,000 AFY in 8 out of 10 Years will cause subsidence at the Yearout Extensometer to average about 0.005 feet per Year. The amount of Transfer Pumping from the Deep Zone shall be subject to adjustment by the Technical Committee.

3.02 Transfer Pumping From Shallow Zone.

Transfer Pumping from the Shallow Zone: (a) shall not be conducted during more than 10 months of any Year, (b) shall not be conducted during a Wet Year once the Year is classified as a Wet Year, (c) shall not exceed 19,600 AFY during a Normal Year; and, (d) shall not exceed 28,000 AFY during a Dry Year. The amount of Transfer Pumping from the Shallow Zone shall be subject to adjustment by the Technical Committee.

3.03 Use of Groundwater On Adjacent Overlying Lands.

The amount of groundwater pumped for use on Adjacent Overlying Lands shall not be greater than 14,000 AFY unless there is a corresponding reduction in the amount of Transfer Pumping or the Technical Committee determines that there is a demonstrated reduction in Transfer Pumping impacts. Groundwater pumped by the MPG, a MPG Party, or River Ranch from wells within Farmers WD for use on Adjacent Overlying Lands shall only be used on Adjacent Overlying Lands within Farmers WD.

3.04 Classification of Years.

The MPG, in the spring of each Year, shall classify that Year as either a Dry Year, Normal Year, or Wet Year based on the expected surface water allocation to be available to members of the MPG that Year. During the term of this Agreement, the MPG may only classify two Years as Dry Years and six Years as Normal Years. The MPG may not classify two consecutive Years as Dry Years.

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3.05 Additional Limitations on Transfer Pumping.

a. Water Quality in Mendota Pool.

Water produced by Transfer Pumping from the MPG Wells along Fresno Slough shall not be introduced into the Mendota Pool (1) when the direction of flow in Fresno Slough is not southerly, or (2) if the EC measured by the continuous EC recorders at the intake of the Firebaugh Intake Canal, the intake for the Outside Canal, the intake of the Main Canal, or the intake of the Columbia Canal exceeds the EC of the inflow to the Mendota Pool from the DMC by more than 90 for three days. If the EC limitation is exceeded at the intakes of the Firebaugh Intake Canal, the Outside, or the Main Canal, the MPG shall shut off MPG Wells that produce water for introduction to Fresno Slough for Transfer Pumping, starting first with the MPG Wells that are the closest to the affected canal intake. If the EC limitation is exceeded at the intake of the Columbia Canal, the MPG shall shut off MPG Wells in Farmers WD that produce water for introduction to the San Joaquin River Branch of the Mendota Pool for Transfer Pumping. Transfer Pumping from such MPG Wells shall not resume until the EC at the affected canal intake is no more than 30 above the EC of the inflow to the Mendota Pool from the DMC for three days.

b. Water Quality in Deep Zone.

Transfer Pumping from the Shallow Zone shall be reduced if it is determined by the Technical Committee that Transfer Pumping from the Shallow Zone significantly affects the quality of water in the Deep Zone due to the interception of good quality water that would otherwise reach the Deep Zone or if other significant impacts are identified.

c. Overdraft.

Transfer Pumping from the Shallow Zone or the Deep Zone, or both, shall

be reduced if it is determined by the Technical Committee that such pumping is causing an overdraft of the groundwater basin.

d. Other.

If the MPG conducts any Transfer Pumping in a Year subsequently classified as a Wet Year, Transfer Pumping shall be reduced in the subsequent Year or Years so that the average Transfer Pumping during the term of this Agreement does not exceed 27,000 AFY.

3.06 Meters on Wells.

A separate water meter shall be installed, operated, maintained, repaired and replaced, as required (a) on each MPG Well or group of MPG Wells that have a common manifold; and b) on each non-MPG Well used to produce water for use on the Adjacent Overlying Lands. The MPG or its designated agent shall read the water meter on each MPG Well or group of MPG Wells and each non-MPG Well used to produce water for use on the Adjacent Overlying Lands each month during which water is produced from such well or group of wells. The meters shall be maintained on a schedule and protocol established by the Technical Committee.

3.07 Mitigation of Third Party Impacts.

a. The MPG Account.

The Exchange Contractors shall establish the interest-bearing MPG Account. The MPG shall pay the Exchange Contractors each Year when the MPG classifies the Year under section 3.04 hereof as a Dry Year or a Normal Year an amount equal to $25,000, less the current balance in the MPG Account, and such amount shall be deposited by the Exchange Contractors in the MPG Account. The MPG shall augment the funds in the MPG Account, when and as

required, so that the Exchange Contractors has sufficient funds in the MPG Account to compensate the persons entitled to compensation under this section. The Exchange Contractors, upon written authorization from the Policy Committee, shall disburse funds from the MPG Account to compensate such persons.

b. Persons Entitled to Compensation.

Each Year, upon request, the Exchange Contractors shall pay landowners or their duly authorized agents, who operate wells within (1) the Exchange Contractors' service area, (2) lands currently owned by Newhall, and (3) lands described as Assessor Parcel Numbers 013-050-06, 013-030-01, 013-020-26, 013-020-28, 013-030-64S, and 013-050-07S where drawdowns from Transfer Pumping are predicted by the Technical Committee to occur, an amount fixed and determined by the Technical Committee under section 3.07c hereof. No person shall be entitled to payment under this section unless (1) water production from an affected well where drawdowns from Transfer Pumping are predicted to equal or exceed 10 feet is properly metered and adequate production records are maintained, or (2) adequate energy and pump test records are maintained for affected wells where drawdowns from Transfer Pumping are predicted to be less than 10 feet. In order to qualify for compensation where drawdowns of ten feet or greater occur, meters will be required on wells in the drawdown area. To qualify for compensation where drawdowns of less that ten feet occur, kilowatt hours and current pump test calculations will be sufficient.

c. Determination of Compensation.

The Technical Committee as soon as practicable after the MPG classifies

the Year under section 3.04 hereof, shall determine and fix for each well predicted to be affected by Transfer Pumping that Year the incremental energy cost, expressed as dollars per acre foot, and all other predicted costs. The Technical Committee shall determine the actual costs, after the completion of the irrigation season and within a reasonable time after the Policy Committee is presented with all documentation reasonably required to support an application for payment.

d. Compensation Guidelines.

The Technical Committee shall consider the following guidelines in determining the incremental energy and other costs:

1. Additional energy costs from increased drawdown may persist beyond the Year. These costs shall be compensated on an annual basis and if they will extend beyond the term of this Agreement shall be estimated and paid prior to pumping in the last Year based upon a present value for such costs.

2. Additional drawdown may result in loss of efficiency of pumps or loss of production of wells resulting in the operation of wells during higher priced time of use periods.

3. Additional drawdown due to Transfer Pumping may result in the need to increase the horsepower of motors, lower or modify pump bowls, drill additional wells, or redrill, recase, or drill a new well. Any costs of such activities caused by Transfer Pumping, subject to review by the Technical Committee, shall be paid by MPG. The owner or operator of the well shall bear any cost for betterment or enhancement of the facility, if any. The owner or operator shall also pay for modifications or repairs,

which would normally be conducted at the time without the impacts of Transfer Pumping. For example, if a well were operating at normal efficiencies and performing satisfactorily for normal operations and it is necessary to extend the pump column due to Transfer Pumping, the total cost to do so and to provide the equivalent production prior to the modifications shall be born by the MPG. Likewise, if the extension of the pump column on a well is required due to Transfer Pumping and at the time the well is performing below normal efficiencies and in need of repair in the normal course of business, then the owner or operator shall be responsible for the cost which would normally be required to return the well to a reasonable efficiency for the existing facility and the MPG shall pay all other costs.

4. To the greatest degree possible, the costs estimated to be incurred and the determination of what occurred shall be measured against a standard of what a prudent but not infallible owner and operation of a well would do in circumstances which can be predicted or, if unpredicted impacts or conditions occurred, what that owner and operator should do to mitigate and reduce his, her or its damages in light of the availability of supplies, materials, time constraints, costs and like factors. Costs or preventive measures which are reasonable, even if in hindsight unnecessary, shall be compensated.

3.08 Monitoring Program.

The parties hereto shall conduct a monitoring program to determine the impacts of Transfer Pumping in the manner specified in Chapter VII of the Phase II Report.

3.09 Technical Committee.

a. Formation.

Each party hereto shall appoint one person to serve on the Technical Committee. The Exchange Contractors and Newhall may appoint the same person. Each person appointed shall be experienced in groundwater hydrology or hydrogeology. The initial members of the Technical Committee shall be Kenneth D. Schmidt and Joseph Scalmanini. Each person appointed to the Technical Committee shall serve at the pleasure of the party who appointed him or her.

b. Authority and Obligations.

The Technical Committee shall have the following authority and obligations under this Agreement:

1. To obtain and preserve all records required to perform and implement the rights and obligations of each party hereto under this Agreement.

2. To establish the amount of Transfer Pumping during each Year of the term of this Agreement commencing 2001.

3. To establish a maintenance schedule and protocol for the water meters to be maintained by the MPG under section 3.06 hereof.

4. To determine the appropriate level of mitigation under section 3.07 hereof.

5. To prepare the annual reports required under section 3.09d hereof.

6. To attempt to resolve any dispute between or among the parties hereto or between any party hereto and any person claiming any right under this Agreement.

Any action of the Technical Committee shall require the unanimous agreement of its members.

c. Compensation.

Each party who appoints a member to the Technical Committee shall be responsible for the compensation of such member for his or her services on the Technical Committee.

d. Annual Reports.

The Technical Committee shall prepare an annual report for each Year during which Transfer Pumping is conducted, commencing with the Year 2001. Each annual report shall be prepared after the conclusion of the irrigation season for that Year. Each annual report shall include:

1. The classification for the Year as Wet, Normal or Dry.

2. The amount of Transfer Pumping from the Deep Zone for the Year and the cumulative amount thereof to date.

3. The amount of Transfer Pumping from the Shallow Zone for the Year and the cumulative amount thereof to date.

4. The amount of groundwater pumped by the MPG, a MPG Party, or River Ranch for use on Adjacent Overlying Lands.

5. Current water levels and water level impacts for the Year in the Deep Zone and the Shallow Zone caused by Transfer Pumping.

6. Current water quality and water quality impacts for the Year in the Deep Zone and the Shallow Zone caused by Transfer Pumping.

7. Current water quality in the Mendota Pool and water quality impacts for the Year in the Mendota Pool caused by Transfer Pumping.

8. The amount of subsidence at the Yearout Extensometer and the Fordel Extensometer, the amount of such subsidence attributable to Transfer Pumping, and the cumulative amounts thereof to date.

9. Any additional matter required under Chapter VII of the Phase II Report.

10. Any recommended modification of or to the Project, provided, that any such recommended modifications shall not become effective unless approved by the Policy Committee.

e. Technical Committee Records.

The records and reports of the Technical Committee shall be kept at the office of the Exchange Contractors.

f. Limitation on Liability.

No member of the Technical Committee shall be liable to any party hereto, other than the party appointing him or her, for any claim of damage to such party, irrespective of its basis or nature, unless the claim is based on such member's actual fraud, bad faith, or intentional or willful conduct.

3.10 Policy Committee.

a. Formation.

The Exchange Contractors and Newhall shall each appoint one person and the MPG shall appoint two persons to serve on the four person Policy Committee. The initial members of the Policy Committee shall be Steve Chedester, John Frye, Marvin Meyers and Joe F. Coelho, Jr. Each person appointed to the Policy Committee shall serve at the pleasure of the party who appointed him or her.

b. Authority and Obligation.

The Policy Committee shall have the authority and obligation to resolve any dispute that cannot be resolved by the Technical Committee under section 3.11b hereof. Any action of the Policy Committee shall require the unanimous agreement of its members.

c. Compensation.

Each party who appoints a member to the Policy Committee shall be responsible for the compensation of such member for his or her services on the Policy Committee.

d. Policy Committee Records.

The records of the Policy Committee shall be kept at the office of the Exchange Contractors.

e. Limitation on Liability.

No member of the Policy Committee shall be liable to any party hereto, other than the party appointing him or her, for any claim of damage to such party, irrespective of its basis or nature, unless the claim is based on such member's actual fraud, bad faith, or intentional or willful conduct.

3.11 Dispute Resolution.

a. Appointment of Independent Consultant.

The parties hereto hereby appoint Dennis E. Williams, Ph.D., Geoscience Support Services, Inc., Claremont, California, (909) 920-0707, as the Independent Consultant. If the Independent Consultant becomes unavailable for any reason, the parties hereto shall designate another qualified person to provide such services.

b. Resolution of Technical Committee Disputes.

If the members of the Technical Committee are unable to unanimously agree on a matter within the jurisdiction of the Technical Committee, the Technical Committee shall request the Independent Consultant to review the relevant information and make a separate, independent recommendation to the Technical Committee. The members of the Technical Committee shall thereafter attempt to reach unanimous agreement on the matter. If the members of the Technical Committee are still unable to unanimously agree on the matter, the Technical Committee shall refer the matter to the Policy Committee for its resolution. The Policy Committee shall thereafter meet and confer and attempt to resolve the dispute.

c. Resolution of Policy Committee Disputes.

If the members of the Policy Committee cannot unanimously agree on a matter referred to it by the Technical Committee, then, with one exception hereinafter stated, the decision of the Policy Committee shall be deemed to be the decision of the member or members of the Technical Committee appointed by the Exchange Contractors and Newhall. If the Exchange Contractors and Newhall have each appointed a member to the Technical Committee and such members are not in agreement on the matter referred to the Policy Committee, the decision of the Policy Committee shall be deemed to be the average, or its equivalent, of separate decisions made by such members of the Technical Committee. The decision of the Policy Committee shall be final and not subject to any review, judicial or otherwise, with one exception, namely a decision regarding any right to compensation under section 3.07 hereof. If the members of the Policy

Committee cannot unanimously agree on a matter regarding a right to compensation under section 3.09 hereof, such matter shall be subject to arbitration under section 3.11d hereof.

d. Arbitration.

Any matter regarding a right to compensation under section 3.07 hereof that cannot be resolved under section 3.11c hereof shall be decided by the Independent Consultant. A hearing on the matter shall take place before the Independent Consultant in Los Banos, California at a time and place selected by the Independent Consultant. The Independent Consultant shall give each party hereto written notice of the time and place of the hearing at least 30 days before the date selected. At the hearing, all relevant evidence may be presented by any party hereto and the formal rules of evidence applicable to judicial proceedings shall not govern. The Independent Consultant shall hear and determine the matter, shall render a written report on the matter, and cause a copy thereof to be delivered to each of the parties hereto. The decision of the Independent Consultant shall be binding and conclusive on each of the parties hereto.

e. Termination of Agreement.

1. The Exchange Contractors, Newhall, so long as it obtains the written approval of the Exchange Contractors, and the MPG shall each have the right to terminate this Agreement at the end of any Year if the members of the Policy Committee cannot unanimously agree on a matter under section 3.11c hereof which is not subject to arbitration under section 3.11d hereof. No claim of vested rights or impairment or damage to property rights shall exist on the part of the MPG, any MPG Party, or River Ranch because of a change, reduction or termination of Transfer Pumping under the

terms of this Agreement. Neither the MPG, a MPG Party, nor River Ranch shall obtain prescriptive rights, estoppel claims, or any preference in any form in the use or enjoyment of groundwater as and against the lands of Newhall and the lands located within the Exchange Contractors' service area.

2. If this Agreement is terminated under section 3.11e1 hereof, (i) notice of such termination shall be provided to the Technical Committee, (ii) within 30 days of receipt of such notice, each member of the Technical Committee shall prepare and deliver to each party hereto a report setting forth his or her recommendation for Transfer Pumping during the next Year and the basis therefor. Similar reports shall be prepared for Years subsequent to the next Year if required by a court of competent jurisdiction.

3. If this Agreement is terminated under section 3.11e1 hereof, (i) each party hereto shall fully perform his, her or its obligations that accrue through the end of the Year of termination and any obligations associated with any reports prepared under section 3.11e2 hereof, (ii) Transfer Pumping or a similar pumping program may only continue if all costs established by this Agreement to mitigate impacts of Transfer Pumping or a similar pumping program are paid as set forth in this Agreement, (iii) any party hereto may commence such litigation as he, she or it determines to establish the rights and obligations of the parties hereto, and perhaps others, to extract groundwater from the basin, and (iv) except as provided in this section, nothing in this Agreement shall constitute an admission in any such litigation. If any party hereto commences such litigation, such party or any party hereto named as a party to such litigation, may request a stipulation from each other party hereto who is a party to such litigation whereby all parties to the stipulation, (i) waive all defenses to entry of a preliminary injunction or similar ancillary order establishing the terms and conditions for Transfer Pumping or a

similar pumping program pending entry of judgment, (ii) waive any right to a bond or undertaking in connection with such order, (iii) agree that the court may enter its order based on the terms of this Agreement, the reports of the members of the Technical Committee under section 3.11e2 hereof and the cross-examination of any member of the Technical Committee regarding the recommendations of such member and the basis therefore, provided that the order requires the payment of compensation consistent with the provisions of section 3.07 hereof, (iv) agree that the stipulation, such order, this Agreement, and such reports shall not be considered by the court or any other finder of fact in considering the merits of such litigation and reaching a judgment therein, and (v) waive any right to appeal such order. Each party hereto who is a party to such litigation shall execute such stipulation.

3.12 Allocation of Responsibility and Costs.

a. The Exchange Contractors.

The Exchange Contractors, at its cost, shall be responsible for the following activities:

1. The operation, maintenance, repair, replacement and reading of EC recorders on the Firebaugh Intake Canal, the Outside Canal, the Main Canal, and the Columbia Canal.

2. The existing normal monitoring of the water levels and water quality in groundwater production wells within its service area.

3. The operation, maintenance, repair, replacement, and reading of the Yearout Extensometer.

4. Its participation on the Technical and Policy Committees.

5. The activities of any of its employees, agents or consultants.

b. Newhall.

Newhall, at its cost, shall be responsible for the following activities:

1. The existing normal monitoring of the water levels and water quality in its groundwater production wells.

2. Its participation on the Technical and Policy Committees.

3. The activities of any of its employees, agents or consultants.

c. The MPG.

The MPG, at its cost, shall be responsible for the following activities:

1. The activities of the MPG required under section 3.06 hereof.

2. The monitoring of all MPG Wells and any non-MPG Well used to produce water for use of the Adjacent Overlying Lands.

3. The acquisition of meters for installation on wells of the persons described in section 3.07b hereof where drawdowns from Transfer Pumping are predicted by the technical Committee to equal or exceed ten feet during the Year.

4. Except as otherwise provided in this Agreement, the activities required under section 3.08 hereof.

5. The operation, maintenance, repair, replacement, and reading of the Fordel Extensometer..

6. Its participation on the Technical and Policy Committees.

7. The services of the Independent Consultant under section 3.11 hereof.

8. The activities of any of its employees, agents or consultants.

In addition, the MPG shall pay the Exchange Contractors the sum of $20,000 upon execution of this Agreement and on or before January 15 of each Year during the term of this Agreement,

commencing January 15, 2002, as compensation for the costs the Exchange Contractors and Newhall would not have incurred but for this Agreement.

3.13 Environmental Documents.

The environmental documents for the Project shall be the DEIR and FEIR, the Phase I Report, and the Phase II Report. The environmental documentation has evaluated the environmental impacts of Transfer Pumping only to the extent discussed in the Phase I and Phase II Reports. If this Agreement is terminated the controlling environmental documents for any Transfer Pumping or similar project shall be the DEIR/FEIR, the Phase I Report and the Phase II Report.

ARTICLE IV.

DISPOSITION OF LITIGATION

4.00 Disposition of Case 626573-0.

a. Agreement Regarding Environmental Documents.

In consideration for the dismissal of Case 626573-0, the parties hereto and Westlands WD shall execute an agreement in substantially the form attached hereto as Exhibit D before or concurrently with the execution of this Agreement. The MPG shall be responsible for obtaining the signature of Westlands WD.

b. Dismissal.

Within 10 days after the Effective Date the Exchange Contractors and Newhall shall execute a request for dismissal of Case 626573-0 in substantially the form attached as Exhibit E. The Exchange Contractors shall lodge the request with the court and thereafter provide Newhall and the MPG with an endorsed copy thereof.

4.01 Disposition of Case 627638-0.

Within 10 days after the Effective Date the Exchange Contractors shall execute a request for dismissal in Case 627638-0 in substantially the form attached as Exhibit F. The Exchange Contractors shall lodge the request with the court and thereafter provide the MPG with an endorsed copy thereof.

ARTICLE V.

GENERAL PROVISIONS

5.00 Term.

The term of this Agreement is 10 years from and after the Effective Date unless earlier terminated under section 3.11e hereof. This Agreement may be extended upon the mutual agreement of the parties hereto.

5.01 Venue.

The venue for any action or proceeding filed by any party hereto in any court, except a proceeding under the Bankruptcy Code, shall be in the Superior Court of the State of California in and for the County of Fresno.

5.02 Defense and Indemnity.

The MPG, the MPG Parties, and River Ranch shall defend, indemnify and hold harmless Newhall, the Exchange Contractors and the members thereof, Central California ID, San Luis CC, Firebaugh Canal WD, and Columbia CC, and their agents, employees, directors and technical representatives from any and all claims, liability or expense of whatsoever nature or kind arising directly or indirectly from claims by third parties or persons, including without excluding others, governmental agencies or any business forms that:

a. Damages have occurred to persons, property or resources from Transfer Pumping or use of water upon Adjacent Overlying Lands; or,

b. Laws, ordinances or regulations have been violated or not complied with; or,

c. Through actions or omissions of the Policy Committee, or Technical Committee, or through any other action including complying with the terms of this Agreement, that the indemnified and defended parties have become participants in the Project or portions thereof.

This obligation to defend, indemnify and hold harmless shall be joint and several and includes, without excluding other claims, costs and expenses,

(a) The payment of attorneys fees, expert witness fees and costs incurred by the indemnified parties. The indemnified parties shall choose their own counsel to provide their defense and each of the Exchange Contractors and Newhall shall be entitled to employ attorneys of their choosing in that defense.

(b) The release of any and all claims, including future and presently unknown claims which may exist in the future on the part of the MPG, a MPG Party, or River Ranch or any entity or person claiming through them that through the exercise of the authority granted to the Technical Committee , damages, injuries or loss has occurred to the MPG, a MPG Party or River Ranch, or any of them. This release and waiver shall extend to unknown claims and as a result those parties do hereby waive the benefits of Civil Code Section 1542 which states :

> "General Release. A General Release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him must have materially affected his settlement with the debtor."

(c) Claims that the indemnified and defended parties were negligent or unreasonably omitted to act with respect to the proceedings prior to this Agreement or in any proceeding or event related to the Technical Committee or the enforcement of this Agreement whether made by third parties, governmental agencies, the MPG, an MPG Party or River Ranch or any of them.

The indemnification and defense provided for herein shall survive the termination of this Agreement.

5.03 Reserved

5.04 Assignment.

No party hereto shall assign or transfer this Agreement or any right or interest therein or thereunder, or suffer or permit any such assignment or transfer to occur by operation of law without the prior written consent of the other parties hereto, which consent shall not be unreasonably withheld, provided, however, that (a) the MPG may assign or transfer its rights and obligations under this Agreement to another entity without the prior written consent of the other parties hereto if the equitable interests of the members of the MPG in such entity are substantially the same as their current interests in the MPG and (b) a member of the MPG or River Ranch may assign or transfer its rights under this Agreement without the prior written consent of the other parties hereto so long as any change in the place of use of any Transfer Pumping water extracted under this Agreement will not materially change any impacts caused by or attributable to Transfer Pumping and the assignor or transferor remains obligated under this Agreement. In the event of any authorized transfer or assignment, the transferee shall agree in writing with the other parties hereto or their successor or assigns, as the case may be, to personally assume, perform and be bound by the covenants, obligations and agreements contained in this Agreement jointly and severally.

5.05 Successors and Assigns.

Subject to section 5.04 hereof, this Agreement shall be binding upon the successors and assigns of the respective parties hereto.

5.06 Written Notice.

Any notice, request, tender, demand, delivery, approval or other communication provided for, required, or arising under this Agreement shall be in writing and shall be deemed delivered to a party hereto if delivered in person to an individual or to an officer or authorized representative of a legal entity or, if mailed three business days following deposit in the United States mails registered or certified return receipt requested postage prepaid, and addressed to such party at the address contained in this section. Any notice to the Exchange Contractors shall be addressed to the Exchange Contractors at P. O. Box 2115, Los Banos, CA 93635 with a copy addressed to Michael V. Sexton of Minasian, Spruance, Baber, Meith, Soares & Sexton, LLP, P. O. Box 1679, Oroville, CA 95965-1679. Any notice to Newhall shall be addressed to Newhall at 23823 Valencia Blvd., Valencia, CA 91355 with a copy to Gary Sawyers of Sawyers and Aldridge, LLP, 575 Alluvial Avenue, Suite 101, Fresno, CA 93720. Any notice to the MPG, shall be addressed to John Bryner at 39984 North Mendota, CA 93640 with a copy addressed to William C. Kuhs of Kuhs, Parker & Stanton, P. O. Box 2205, Bakersfield, CA 93303. Any party hereto may change the address to which notice is to be given by giving notice in the manner specified in this section.

5.07 Representations and Warranties.

Each person who executes this Agreement on behalf of a party hereto represents and warrants that: (a) the party on whose behalf he or she executes this Agreement, if other than a natural person, (1) is a legally constituted legal entity and (2) has authority to execute this Agreement and (b) he or she is authorized to execute this Agreement.

5.08 As a Precedent

Nothing in this Agreement is intended or shall be construed as a precedent or other basis for any contention that the participants to this Agreement have waived or compromised their rights which may be available under state or federal law except as to the matters addressed in this Agreement.

5.09 Subject to Valid Laws.

Performance under this Agreement is subject at all times to any and all valid laws, ordinances, and governmental regulations whether federal or state including, without limitation, current laws, regulations, policies and procedures which govern the transfer and sale of groundwater.

5.10 Counterparts of Agreement.

This Agreement may be signed in any number of counterparts by the parties hereto, each of which shall be deemed to be an original, and all of which together shall be deemed one and the same instrument. This Agreement, if executed in counterparts, shall be valid and binding on a party as if fully executed all on one copy.

5.11 Attorneys' Fees.

In the event of any arbitration or litigation between the parties hereto arising out of, or in connection with, the provisions of this Agreement or any documents executed and delivered pursuant to this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees, expert witness costs, costs of suit, and necessary disbursements, in addition to whatever damages or other relief such party is entitled to in connection with such dispute.

5.12 Representation By Counsel.

This Agreement is entered into freely and voluntarily. The parties hereto acknowledge that they have been represented by counsel of their own choice, or that they have had the

opportunity to consult with counsel of their own choosing, in the negotiations that preceded the execution of this Agreement, and in connection with the preparation and execution of this Agreement. Each of the parties hereto executes this Agreement with full knowledge of its significance and with the express intent of effecting its legal consequences.

5.13 Compromise.

This Agreement is the result of a good faith compromise settlement of a disputed claim, and this Agreement and the release contained herein shall not be taken or construed to be an admission of any liability, responsibility, fault, or wrongdoing by any of the parties hereto, each of whom continues to deny and disclaim any such liability, responsibility, fault, or wrongdoing. Each of the parties hereto is entering into this Agreement to avoid the expense, disruption and uncertainty of litigation.

5.14 No Agency, Partnership or Joint Undertaking

Nothing in this Agreement shall create or be construed to create any form of joint undertaking, partnership or agency in which the MPG, a MPG Party or River Ranch shall be construed to be acting on behalf of Newhall or the Exchange Contractors. Newhall, and the Exchange Contractors, and their officers, employees, directors and independent consultants, including Technical Committee representatives acting under the terms of this Agreement, shall not be deemed to be a principal, an authorizing party, or a participant in the actions of the MPG, a MPG Party or River Ranch and those parties shall be solely and exclusively responsible for any damages, harm or injury resulting from their actions. The sole purpose of this Agreement is to attempt to provide means by which damages, injury or claims may be prevented and Newhall and the Exchange Contractors make no warranty or representation and undertake no liability should the measures provided herein or the functioning of the Technical Committee not result in

full protection from injury, or damage, or should the knowing or unknowing failure to enforce rights under this Agreement result in injury or damage.

5.15 Remedies Not Exclusive

Except as otherwise provided in this Agreement, the application by any party hereto of any remedy provided in this Agreement for the enforcement of this Agreement is not exclusive and shall not deprive such party of, or limit the application of, any other remedy provided by law, in equity, or otherwise.

IN WITNESS WHEREOF, the Exchange Contractors, Newhall, the MPG, the MPG Parties and River Ranch have caused this Agreement to be executed as of the Effective Date.

SAN JOAQUIN RIVER EXCHANGE
CONTRACTORS WATER AUTHORITY

By _____
James O'Banion, President

By _____
Steve Chedester, Secretary

THE NEWHALL LAND AND FARMING COMPANY
(a California Limited Partnership)

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP, Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION, Managing General Partner

By: _____
John R. Frye, Assistant Secretary

MENDOTA POOL GROUP

By: _____
John Bryner, Agent

BAKER FARMING CO., a general partnership

By _____
Barry Baker, Its general partner

BLACKBURN FARMING CO., INC.,
a California corporation

By _____
Cortland J. Blackburn, Its President

By _____
Mark H. Turmon, Its Secretary

BRITZ MENDOTA, T.I.C., a general partnership

By _____
David Britz, Its general partner

COELHO WEST, a general partnership

By _____
Anthony P. Coelho, Jr., Its general partner

CONEJO FARMS, a general partnership

By see page 40
Frank Coelho, Jr., Its general partner

FORDEL, INC., a California corporation

By Randall S. Johnston
Randall S. Johnston, Its President

By W R Bob Johnston II SEC.
W. R. Bob Johnston II, Its Secretary

HANSEN FARMS, a general partnership

By
Richard Hansen, Its general partner

H. G. H., a general partnership

By James B. Hansen
James B. Hansen, Trustee of the James B. and
Betsy A. Hansen Living Trust dated March 9, 1993

J.C. & S. LAND CO., a general partnership

By: Carol L. Holmes Farming, LLC.

By Carol L Holmes
Carol L. Holmes, Manager

MEYERS FARMING I, a general partnership

By Marvin Meyers
Marvin Meyers, Its general partner

TERRA LINDA FARMS I, a general partnership

By_____
Joe F. Coelho, Jr., Its general partner

RIVER RANCH LLC., a limited liability company

By_____
Joe F. Coelho, Jr., Manager

C:\My Documents\DISTRICT\Exchange Contractors\Mendota CEQA\MPG Agreement\MPG Final Agr\MPG Final 42401.wpd

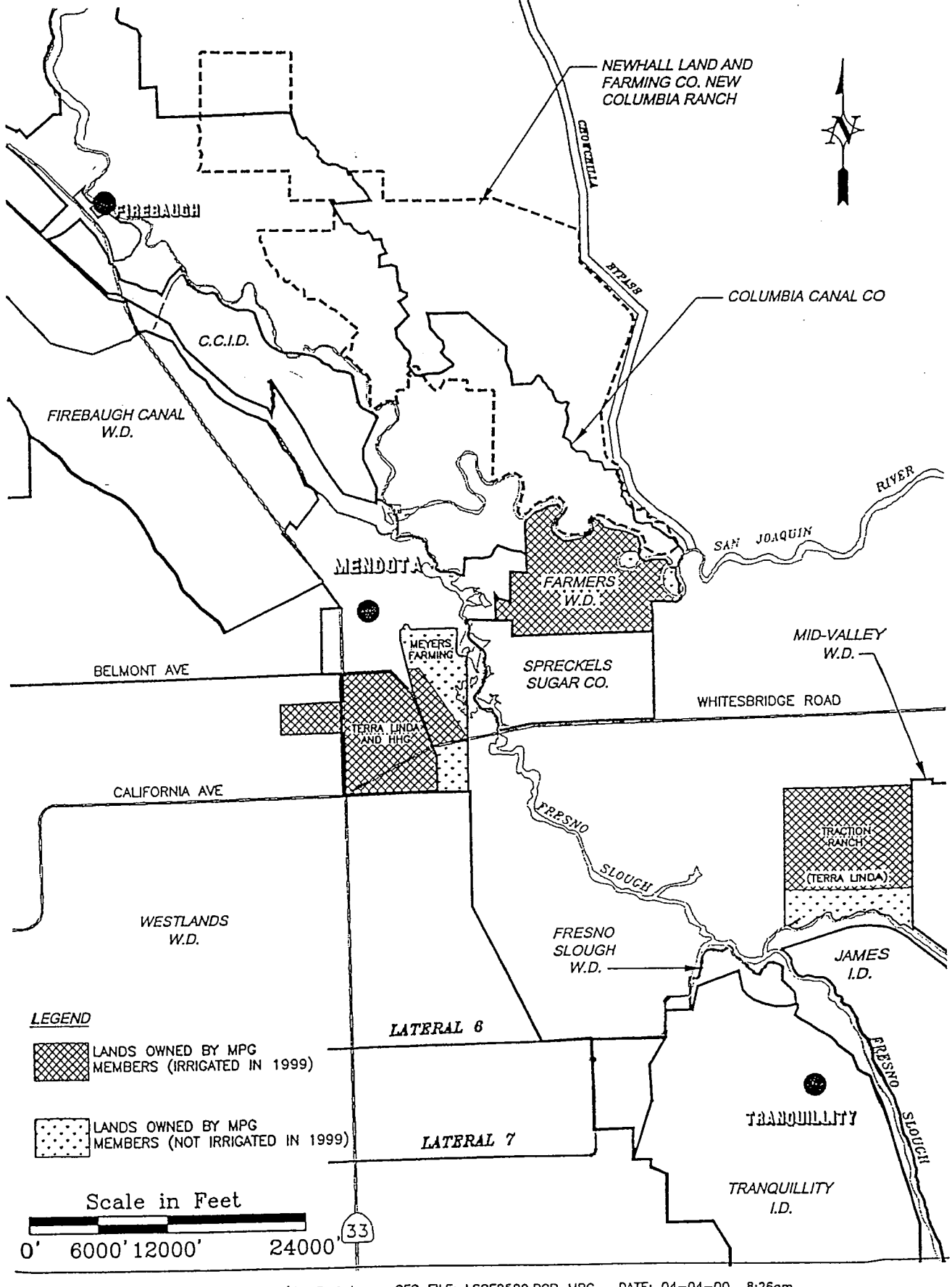
CONEJO FARMS, a general partnership

By _____
Frank Coelho, Jr., Its general partner

By _____
John Coelho, Its general partner

By _____
Edward Coelho, Its general partner

By _____ 5-23-01
Vincent Coelho, Its general partner

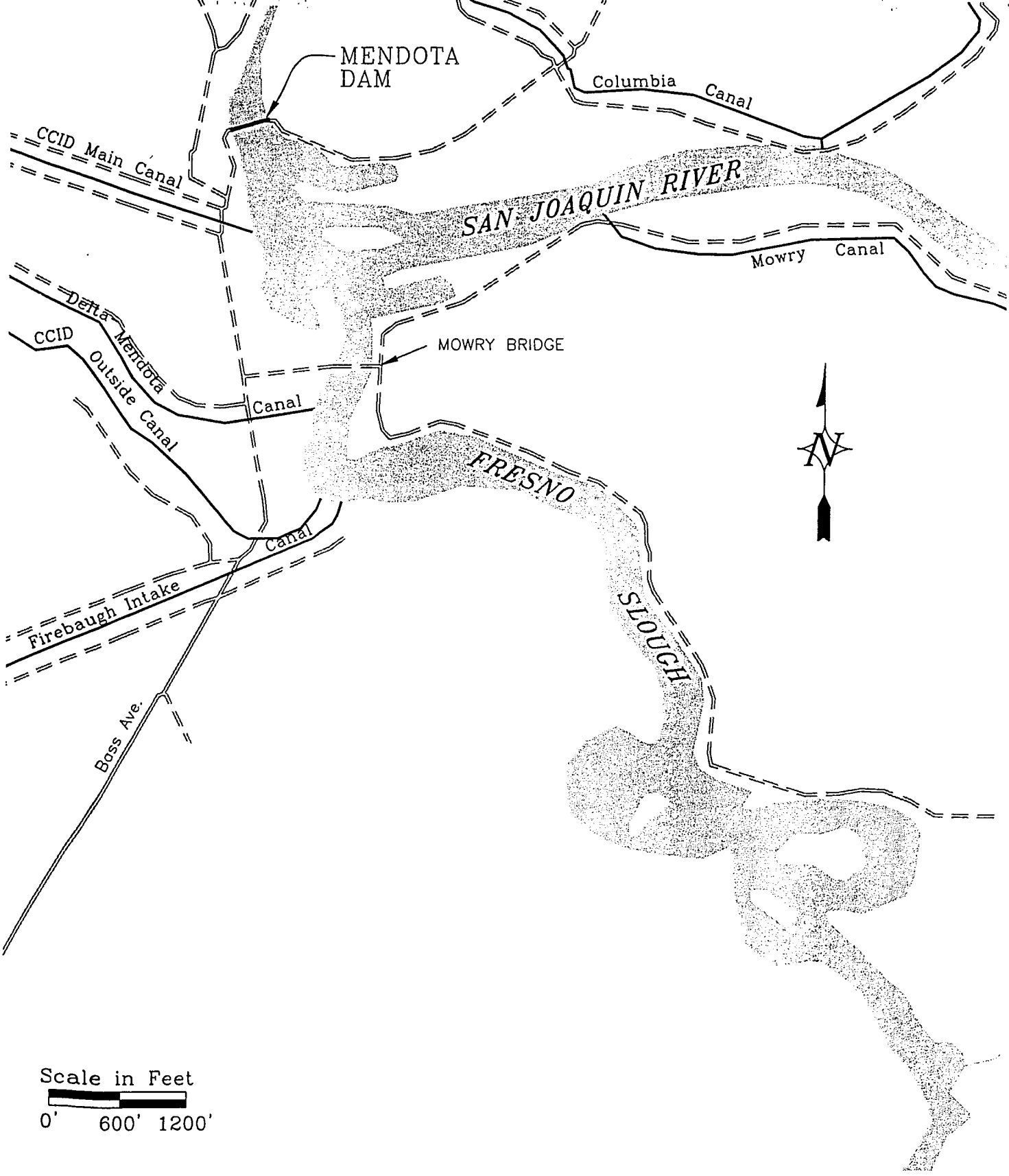


CAD FILE: G:/Projects/Mendota Pool/99-1-018/Fig_3-1.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 04-04-00 8:26am

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Figure 3-1
Adjacent Lands Owned By Members of Mendota Pool Group

EXHIBIT A

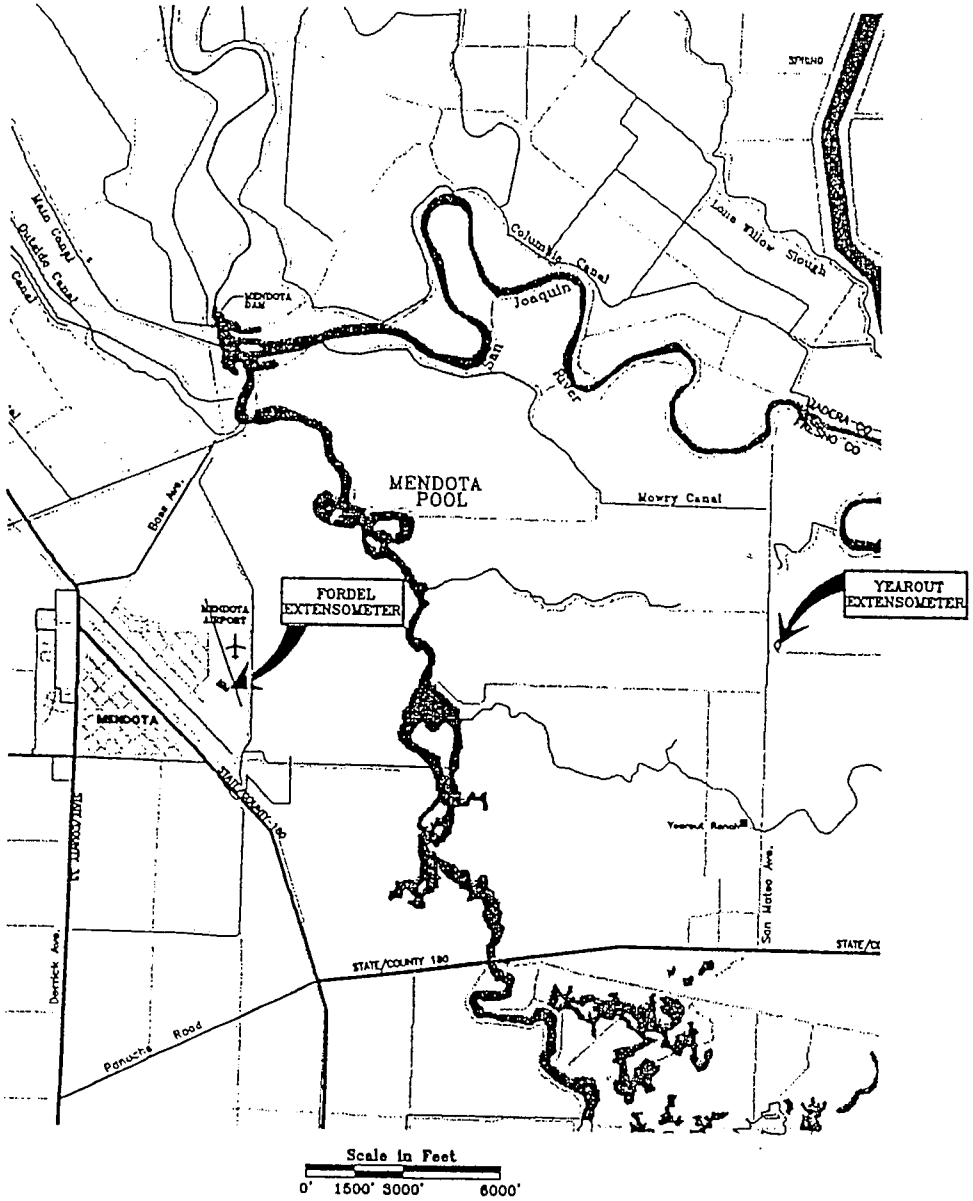


CAD FILE: G:/Projects/Mendota Pool/99-1-018/Annual Report 2000/Exhibit B.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 04-26-01 9:38am

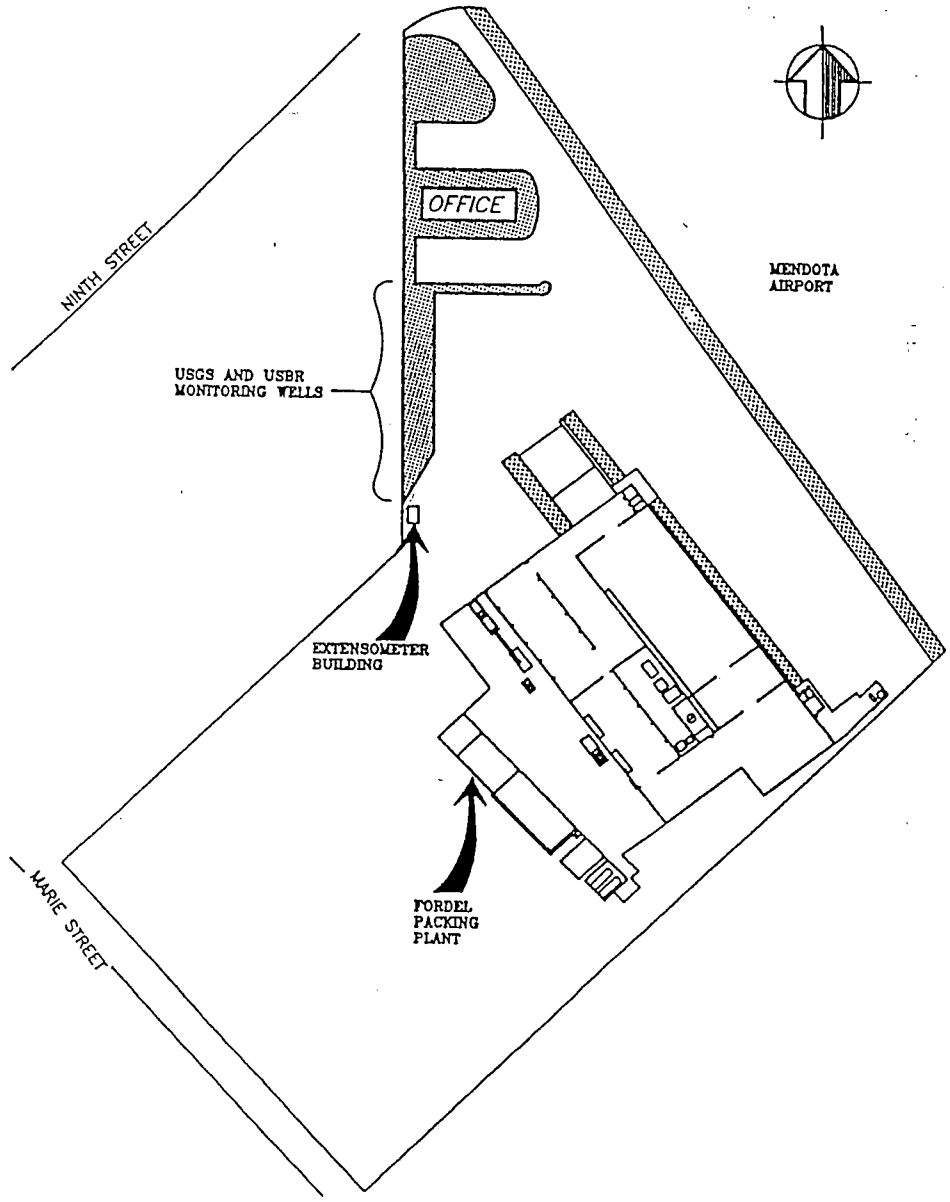
LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Exhibit B
Canals at the North End of Mendota Pool

EXHIBIT C



VICINITY MAP



SITE MAP (FORDEL, INC.)

CAD FILE: G:/Projects/Mendota Pool Group/99-1-018/Fig_7-1.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 12-15-99 4:44pm

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 7-1
Extensometer Location Map

MENDOTA POOL TRANSFER PUMPING PROJECT

AGREEMENT REGARDING ENVIRONMENTAL DOCUMENTS

THIS AGREEMENT (the or this "Agreement") is executed as of the Effective Date by and among WESTLANDS WATER DISTRICT, a California water district organized and existing under Division 13 of the Water Code ("Westlands WD"), the SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY, a joint exercise of powers authority established under Chapter 5 (commencing with section 6500) of Division 7 of Title 1 of the Government Code (the "Exchange Contractors"), THE NEWHALL LAND AND FARMING COMPANY, a California limited partnership ("Newhall"), the MENDOTA POOL GROUP ("MPG"), an unincorporated association, and River Ranch LLC ("River Ranch").

RECITALS

A. The Exchange Contractors, Newhall, the MPG, the MPG Parties, and River Ranch are concurrently executing an agreement entitled "Agreement for Mendota Pool Transfer Pumping Project" (the "Settlement Agreement"), a copy of which has been provided to Westlands WD, Farmers WD, and Borel Bank and Trust Company for their information. The Recitals and the definitions contained in article II of the Settlement Agreement are incorporated into this Agreement as if set forth in full.

B. The parties hereto desire to settle their dispute through execution and performance of this Agreement.

NOW, THEREFORE, Westlands WD, the Exchange Contractors, Newhall, the MPG, and River Ranch hereby agree as follows:

EXHIBIT D

1. The Project-Transfer Pumping

a. The purpose of the Project is to provide for Transfer Pumping while mitigating the impacts from Transfer Pumping including, without limitation: (a) drawdowns and other impacts at nearby wells; (b) land subsidence; and (c) water quality at the Exchange Contractors' canal intakes.

b. Transfer Pumping is based upon assumptions that were developed and adopted by the Exchange Contractors, Newhall and the MPG based upon information and data provided by such parties and examined by their consultants. The assumptions upon which Transfer Pumping is based also include the technical analyses found in the Phase I and Phase II Reports. In the event that any of the predictions and assumptions which form the basis of predictions an assumptions that are included in the Phase I and Phase II Reports turn out to be erroneous in any way the Technical and Policy Committees shall attempt to work out the issue presented, and respond to the change in assumption or new information.

2. Environmental Documents

The environmental documents for the Project shall be the DEIR and FEIR, the Phase I Report, and the Phase II Report. The environmental documentation has evaluated the environmental impacts of Transfer Pumping described in the Phase II Report and only to the extent discussed in the Phase I and Phase II Reports. If the Settlement Agreement is terminated, the controlling environmental documents for any Transfer Pumping or similar project shall be the DEIR/FEIR, the Phase I Report and the Phase II Report.

3. Mitigated Project

The Mitigated Project shall not go forward absent express agreement of the Exchange

Contractors and Newhall.

4. Survival of Agreement

This Agreement shall not be affected by the termination of the Settlement Agreement.

IN WITNESS WHEREOF, Westlands WD, the Exchange Contractors, Newhall, the MPG, and River Ranch have caused this Agreement to be executed as of the Effective Date.

SAN JOAQUIN RIVER EXCHANGE
CONTRACTORS WATER AUTHORITY

By _____
James O'Banion, President

By _____
Steve Chedester, Secretary

WESTLANDS WATER DISTRICT

By: _____
, Its President

By: _____
Its Secretary

THE NEWHALL LAND AND FARMING COMPANY
(a California Limited Partnership)

By: NEWHALL MANAGEMENT LIMITED PARTNERSHIP, Managing General Partner

By: NEWHALL MANAGEMENT CORPORATION, Managing General Partner

By: _____
John R. Frye, Assistant Secretary

EXHIBIT D

MENDOTA POOL GROUP

By: _____
John Bryner, Agent

RIVER RANCH LLC., a limited liability company

By_____
Joe F. Coelho, Jr., Manager

EXHIBIT D

ATTORNEY OR PARTY WITHOUT ATTORNEY (Name and Ac	TELEPHONE NO.:	FOR COURT USE ONLY
Michael V. Sexton, SBN 119354 Minasian, Spruance, Baber, Meith, Soares & Sexton, LLP Post Office Box 1679 Oroville, CA 95965-1679	(530) 533-2885 (530) 533-0197	
ATTORNEY FOR (Name): San Joaquin River Exchange Contractors Water Authority		
Insert name of court and name of judicial district and branch court, if any: Fresno County Superior Court		
PLAINTIFF/PETITIONER: SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY DEFENDANT/RESPONDENT: WESTLANDS' WATER DISTRICT		

REQUEST FOR DISMISSAL

CASE NUMBER: 626573-0

- ☐ Personal Injury, Property Damage, or Wrongful Death
  - ☐ Motor Vehicle ☐ Other
- ☐ Family Law
- ☐ Eminent Domain
- ☒ Other *(specify)*: Writ of Mandate, Complaint for Injunctive Relief

- A conformed copy will not be returned by the clerk unless a method of return is provided with the document. -

1. **TO THE CLERK:** Please **dismiss** this action as follows:
   a. (1) ☐ With prejudice (2) ☒ Without prejudice

   b. (1) ☒ Complaint (2) ☒ Petition
   (3) ☐ Cross-complaint filed by *(name)*: on *(date)*:
   (4) ☐ Cross-complaint filed by *(name)*: on *(date)*:
   (5) ☐ Entire action of all parties and all causes of action
   (6) ☐ Other: *(specify)*:*

Date:

Michael V. Sexton
(TYPE OR PRINT NAME OF ☐ ATTORNEY ☐ PARTY WITHOUT ATTORNEY)

▶ _____
(SIGNATURE)

Attorney or party without attorney for:
☐ Plaintiff/Petitioner ☐ Defendant/Respondent
☐ Cross-complainant

* If dismissal requested is of specified parties only, of specified causes of action only, or of specified cross-complaints only, so state and identify the parties, causes of action, or cross-complaints to be dismissed.

2. **TO THE CLERK:** Consent to the above dismissal is hereby given.**
Date:

_____
(TYPE OR PRINT NAME OF ☐ ATTORNEY ☐ PARTY WITHOUT ATTORNEY)

▶ _____
(SIGNATURE)

Attorney or party without attorney for:
☐ Plaintiff/Petitioner ☐ Defendant/Respondent
☐ Cross-complainant

** If a cross-complaint - or Response (Family Law) seeking affirmative relief - is on file, the attorney for the cross-complainant (respondent) must sign this consent if required by Code of Civil Procedure section 581(i) or (j).

(To be completed by clerk)

3. ☐ Dismissal entered as requested on *(date)*:
4. ☐ Dismissal entered on *(date)*: as to only *(name)*:
5. ☐ Dismissal **not entered** as requested for the following reasons *(specify)*:

6. ☐ a. Attorney or party without attorney notified on *(date)*:
   b. Attorney or party without attorney not notified. Filing party failed to provide
   ☐ a copy to conform ☐ means to return conformed copy

Date: Clerk, by _____, Deput

ATTORNEY OR PARTY WITHOUT ATTORNEY (Name and A	TELEPHONE NO.:	FOR COURT USE ONLY
Michael V. Sexton, SBN 119354 Minasian, Spruance, Baber, Meith, Soares & Sexton, LLP Post Office Box 1679 Oroville, CA 95965-1679	(530) 533-2885 (530) 533-0197	
ATTORNEY FOR (Name): San Joaquin River Exchange Contractors Water Authority		
Insert name of court and name of judicial district and branch court, if any: Fresno County Superior Court		
PLAINTIFF/PETITIONER: SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY DEFENDANT/RESPONDENT: BAKER FARMING COMPANY, etc., et al.		

REQUEST FOR DISMISSAL

CASE NUMBER: 627638-0

- ☐ Personal Injury, Property Damage, or Wrongful Death
  - ☐ Motor Vehicle ☐ Other
- ☐ Family Law
- ☐ Eminent Domain
- ☒ Other *(specify)*: Complaint for Nuisance, Declaratory and Injunctive Relief

- A conformed copy will not be returned by the clerk unless a method of return is provided with the document. -

1. **TO THE CLERK:** Please dismiss this action as follows:
   a. (1) ☐ With prejudice (2) ☒ Without prejudice

   b. (1) ☒ Complaint (2) ☐ Petition
   (3) ☐ Cross-complaint filed by *(name)*: on *(date)*:
   (4) ☐ Cross-complaint filed by *(name)*: on *(date)*:
   (5) ☐ Entire action of all parties and all causes of action
   (6) ☐ Other: *(specify)*:*

Date:

Michael V. Sexton
(TYPE OR PRINT NAME OF ☒ ATTORNEY ☐ PARTY WITHOUT ATTORNEY)

▶ _____
(SIGNATURE)

Attorney or party without attorney for:
☐ Plaintiff/Petitioner ☐ Defendant/Respondent
☐ Cross-complainant

* If dismissal requested is of specified parties only, of specified causes of action only, or of specified cross-complaints only, so state and identify the parties, causes of action, or cross-complaints to be dismissed.

2. **TO THE CLERK:** Consent to the above dismissal is hereby given.**
Date:

_____
(TYPE OR PRINT NAME OF ☐ ATTORNEY ☐ PARTY WITHOUT ATTORNEY)

▶ _____
(SIGNATURE)

Attorney or party without attorney for:
☐ Plaintiff/Petitioner ☐ Defendant/Respondent
☐ Cross-complainant

** If a cross-complaint - or Response (Family Law) seeking affirmative relief - is on file, the attorney for the cross-complainant (respondent) must sign this consent if required by Code of Civil Procedure section 581(i) or (j).

(To be completed by clerk)

3. ☐ Dismissal entered as requested on *(date)*:
4. ☐ Dismissal entered on *(date)*: as to only *(name)*:
5. ☐ Dismissal **not entered** as requested for the following reasons *(specify)*:

6. ☐ a. Attorney or party without attorney notified on *(date)*:
   b. Attorney or party without attorney not notified. Filing party failed to provide
   ☐ a copy to conform ☐ means to return conformed copy

Date: Clerk, by _____, Deput

Appendix L – Exhibit 4 of the James Irrigation District Comment Letter

AGREEMENT NO. 2
FOR MENDOTA POOL
TRANSFER PUMPING PROJECT

THIS AGREEMENT No. 2 ("Agreement No. 2") is executed in triplicate as of the Effective Date by and among the SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY ("Exchange Contractors"), PARAMOUNT LAND COMPANY LLC and PARAMOUNT POMEGRANATE ORCHARDS LLC, Delaware limited liability companies (collectively "Paramount"), and the following named parties jointly and severally:

BAKER FARMING CO., a California limited liability company ("Baker");

M. BRITZ, T.I.C., a general partnership ("Britz");

COELHO WEST and related entities, a general partnership ("Coelho");

CASACA VINEYARDS, a general partnership ("Casaca");

DADDY'S PRIDE FARMING, a sole proprietorship ("DPF");

SOLO MIO FARMS, a sole proprietorship ("SMF");

VISTA VERDE FARMS, a California corporation ("Vista Verde");

FRANK A. LOGOLUSO FARMS, a California corporation ("Logoluso");

MEYERS FARMS FAMILY TRUST ("Meyers");

TERRA LINDA FARMS I, a general partnership ("Terra Linda"); and

PANOCHE CREEK TRUST ("PCT");

collectively referred to as the MENDOTA POOL GROUP ("MPG"), and individually referred to as MPG Party; and RIVER RANCH LLC, a California limited liability company ("River Ranch"). FARMERS' WATER DISTRICT, a California water district ("Farmers' WD"), is a party to this Agreement No. 2 for the purposes only of performing and complying with the conditions of section 3.05c hereof.

RECITALS

This Agreement No. 2 is entered into based on the following facts and circumstances which the parties agree are true and correct.

A. The Board of Directors of Westlands Water District ("Westlands WD") certified the FEIR for the Mitigated Project under the California Environmental Quality Act on December 14, 1998.

B. On February 11, 1999, the Exchange Contractors and The Newhall Land and Farming Company ("Newhall"), which farmed in and outside of the Exchange Contractors' service area, filed a petition for writ of mandate in Case 626573-0 against (1) Westlands WD as the respondent, and (2) Baker Farming Co., a general partnership, Blackburn Farming Co., Inc., Britz Mendota, T.I.C., Coelho West, a general partnership, Conejo Farms, a general partnership, Fordel, Inc., Hansen Farms, a general partnership, Hansen, Hansen and Gardner, a general partnership, J.C. & S. Land Co., a general partnership, Meyers Farming I, a partnership, Terra Linda Farms I, a general partnership, Mendota Pool Group, an unincorporated association, Fresno County, City of Mendota, Farmers' WD, River Ranch LLC, and Borel Bank and Trust Co., as the real parties in interest, challenging the adequacy of the FEIR for the Mitigated Project. Fresno County was dismissed on March 12, 1999.

C. On March 2, 1999, the Exchange Contractors filed a complaint in Case 627638-0 against Baker Farming Co., a general partnership, Blackburn Farming Co., Inc., Britz Mendota, T.I.C., Coelho West, a general partnership, Conejo Farms, a general partnership, Fordel, Inc., Hansen Farms, a general partnership, Hansen, Hansen and Gardner, a general partnership, J.C. & S. Land Co., a general partnership, Meyers Farming I, a partnership, Terra Linda Farms I, a general partnership, Mendota Pool Group, an unincorporated

association, and River Ranch LLC for declaratory relief and injunctive relief and related claims.

D. The dispute among the parties thereto in Cases 626573-0 and 627638-0 were as follows. The MPG desired to pump groundwater into the Mendota Pool and take delivery of such water directly through Westlands WD Laterals 6 and 7 or, by exchange with the Bureau, in the California Aqueduct. The Exchange Contractors questioned the right of the MPG to pump groundwater for the proposed use and believed that such groundwater pumping would, among other things, (1) cause water levels in the vicinity of the Mendota Pool to decline, (2) cause poorer water quality to reach the headworks of the Exchange Contractors' diversion facilities from the Mendota Pool, and (3) exacerbate land subsidence in the vicinity of the Mendota Pool. The MPG disagreed with the Exchange Contractors regarding its right to pump groundwater as proposed and whether there would be any such adverse impacts as a result thereof.

E. On June 16, 1999, the Court filed an order in Case 627638-0, and on June 18, 1999, the Court filed a similar order in Case 626573-0 staying both proceedings "until further order of the Court, dismissal of the action, or written notice to the Court by any party," while the parties thereto and their technical consultants examined existing data and, in concert, developed an operating plan which would support a long-term groundwater pumping program by the MPG.

F. On June 25, 1999, the parties appeared for assignment of the proceedings to a trial department. The matter was assigned to the Honorable Judge Gene M. Gomes in Department 32. Judge Gomes ordered that the parties thereto should file status reports commencing September 1, 1999. The parties thereto filed status reports in both cases based on the schedule contained in the Court's orders.

G. The 1999 test pumping and monitoring program developed by Luhdorff and Scalmanini, on behalf of the MPG, and Kenneth D. Schmidt & Associates, on behalf of the Exchange Contractors and Newhall, got underway on or about July 15, 1999. The primary focus of the test pumping and monitoring program was to determine the effects of the MPG pumping during 1999 on the Exchange Contractors and Newhall. The results of the test pumping and monitoring program are contained in the Phase I Report.

H. Following completion of the Phase I Report, the consultants of the parties thereto undertook to evaluate the long-term impacts of Transfer Pumping by the MPG on the Exchange Contractors and Newhall and to develop mitigation measures for any significant impacts identified. The results of the evaluation of the long-term impacts of Transfer Pumping by the MPG on the Exchange Contractors and Newhall and mitigation measures for any significant impacts was described in a Phase II Report completed in December 2000.

I. The parties entered into an agreement ("Agreement No. 1"), effective January 1, 2001, for a 10-year term for MPG Transfer Pumping with the express intent of the MPG to prevent injury and damage to the aquifers, water quality and the interests of the other parties to Agreement No. 1. The term of Agreement No. 1 was through December 31, 2010. Agreement No. 1 allowed for:

(a) Transfer Pumping in 8 of the 10 Years.

(b) Total Transfer Pumping of 269,600 acre feet (AF).

(c) Total Transfer Pumping from the Deep Zone of 96,000 AF.

(d) Total Transfer Pumping from the Shallow Zone of 173,600 AF.

Agreement No. 1 included prescribed constraints on water quality in the Mendota Pool and land subsidence, as affected by Transfer Pumping, and constraints on groundwater

quality and drawdowns, as affected by Transfer Pumping, as determined by the Technical Committee. Agreement No. 1 strictly prescribed annual monitoring, the results of which were presented in annual reports. The environmental impacts of the 10-year Transfer Pumping (the Project) were addressed in a Draft Environmental Impact Statement (DEIS) in March 2003, and a Final Environmental Impact Statement (FEIS) was approved in March 2005. The Record of Decision (ROD) for the Project was signed on March 30, 2005. The DEIS and FEIS were developed in compliance with the National Environmental Policy Act (NEPA). The Bureau was the NEPA lead agency. Based on a full consideration of the impact analyses and the comparison of the alternatives in the FEIS, the Bureau concluded that the Project is considered the environmentally preferred alternative and the least damaging practical alternative. The Project would avoid significant impacts to the maximum extent feasible while fully meeting the purpose and need and Project objectives.

J. MPG Transfer Pumping as contemplated in Agreement No. 1 was conducted from 2001 through 2010. Transfer Pumping was conducted in 6 of the 10 Years as follows:

(a) Total Transfer Pumping was 125,149 AF.

(b) Total Transfer Pumping from the Deep Zone of 65,156 AF.

(c) Total Transfer Pumping from the Shallow Zone of 59,993 AF.

The constraints on water quality in the Mendota Pool and land subsidence were not exceeded. The Technical Committee's annual analysis of the program found impacts to groundwater quality and drawdowns in and around the Exchange Contractors and Paramount lands (formerly Newhall Lands); however, they did not rise to a significant level and were not considered irreversible as affected by Transfer Pumping, to a degree as to limit Transfer Pumping in subsequent Years. Monitoring was conducted by the

MPG in each of the 10 Years as required by the Agreement No. 1 and the results of the monitoring were presented in annual reports for each of the 10 Years.

K. On December 1, 2005 Paramount purchased the land and associated wells of Newhall and assumed Newhall's interest in Agreement No. 1.

L. The parties hereto desire to implement Agreement No. 2 for a 4-year term to coincide with the term of the FEIS. The intent of the parties is to cooperate in good faith to ensure compliance with NEPA, CEQA, and any other applicable laws in order to analyze and consider a longer term project and agreement.

NOW, THEREFORE, in consideration of the recitals set forth above, and the mutual covenants, conditions and promises set forth herein, the Exchange Contractors, Paramount, Baker, Britz, Coelho, Casaca, DPF, SMF, Vista Verde, Logoluso, Meyers, Terra Linda, PCT, the MPG, River Ranch, and Farmers' WD hereby agree as follows:

ARTICLE I.

INTERPRETATION OF AGREEMENT NO. 2

1.00 Introduction.

The rules of interpretation contained in this Article I shall govern the interpretation of this Agreement No.2.

1.01 Definitions.

The words and phrases defined in Article II hereof shall govern the interpretation of this Agreement No. 2.

1.02 Applicable Law.

The Laws of the State of California without regard to conflict of law principles shall govern the interpretation of this Agreement No. 2.

1.03 Integration.

This Agreement No. 2 contains the entire agreement among the parties hereto with the respect to the subject of this Agreement No. 2 and supersedes any other agreement, whether written or oral, among the parties hereto relating to the same subject including Agreement No. 1. Any prior representations, promises, or the like that are not contained in this Agreement No. 2 shall be of no force or effect.

1.04 Amendment of Agreement No.2.

This Agreement No. 2 may not be modified, changed, altered, amended or otherwise revised except by a duly executed written amendment.

1.05 Statutory Rules of Interpretation.

Any rule of interpretation that an ambiguity is to be resolved against the drafting party shall not be employed in the interpretation of this Agreement No. 2, any exhibit hereto, or any amendment hereof, and neither Civil Code section 1654, nor any similar law shall be applied to resolve any ambiguity in this Agreement No. 2.

1.06 Opinions and Determinations.

Except as may be otherwise provided in this Agreement No. 2, where any term of this Agreement No. 2 provides for action to be based on the opinion, judgment, approval, consent, review, certification, or determination of a party, such term shall not be construed as permitting the opinion, judgment, approval, consent, review, certification, or determination to be arbitrary, capricious or unreasonable.

1.07 Waiver.

The waiver by any party hereto of any right with respect to a default or any other matter arising under this Agreement No. 2 shall not constitute or be construed as constituting a waiver with respect to any other default or matter.

1.08 Exhibits.

All exhibits referred to in this Agreement No. 2 are hereby incorporated by reference as if fully set forth in this Agreement No. 2.

1.09 Captions.

The captions of articles and sections of this Agreement No. 2 do not define the scope, meaning or intent of this Agreement No. 2.

ARTICLE II.

DEFINITIONS

2.00 AF.

"AF" means acre feet.

2.01 AFY.

"AFY" means acre feet per Year.

2.02 A-Clay.

"A-Clay" means the clay layer about 10 to 15 feet thick that lies about 70 feet to 100 feet beneath the Mendota Pool and lands in the vicinity of the Mendota Pool.

2.03 Adjacent Overlying Lands.

"Adjacent Overlying Lands" means the lands that are identified as Adjacent Overlying Lands in Exhibit A, as lands owned by MPG members (irrigated in 2011) and lands owned by MPG members (not irrigated in 2011). A member of the MPG who owns any of such land may

designate other land contiguous to lands shown in Exhibit A as Adjacent Overlying Land provided that a like amount of land, on an acreage basis, previously designated as Adjacent Overlying Land is deleted from such designation.

2.04 Bureau.

"Bureau" means the Bureau of Reclamation, a bureau within the Department of the Interior of the United States.

2.05 Case 626573-0.

"Case 626573-0" means the case filed in the Superior Court of the State of California for the County of Fresno entitled *SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY* and *THE NEWHALL LAND AND FARMING COMPANY, Petitioners v. WESTLANDS WATER DISTRICT*, Respondent, and *BAKER FARMING COMPANY et al,* Real Parties in Interest, and assigned Case No. 626573-0.

2.06 Case 627638-0.

"Case 627638-0" means the case filed in the Superior Court of the State of California for the County of Fresno entitled *SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY v. BAKER FARMING COMPANY, BLACKBURN FARMING COMPANY, BRITZ MENDOTA T.I.C., COELHO WEST, CONEJO FARMS, FORDEL, HANSEN FARMS, HANSEN, HANSEN AND GARDNER, J.C. & S. LAND COMPANY, MEYERS FARMING I, TERRA LINDA FARMS I, MENDOTA POOL GROUP, and RIVER RANCH LLC,* and assigned Case No. 627638-0.

2.07 Central California ID.

"Central California ID" means Central California Irrigation District, a California irrigation district organized and existing under Division 11 of the Water Code.

2.08 Columbia CC.

"Columbia CC" means Columbia Canal Company, a mutual water company organized and existing under the laws of the State of California.

2.09 Columbia Canal.

"Columbia Canal" means the canal of Columbia CC known as the Columbia Canal, the location of which is generally shown on Exhibit B.

2.10 DMC.

"DMC" means Delta Mendota Canal, a feature of the Bureau's Central Valley Project.

2.11 Deep Zone.

"Deep Zone" means the aquifer or aquifers stratigraphically between the A-Clay, where present, or its equivalent depth, and the E-Clay.

2.12 EC.

"EC" means electrical conductivity, expressed in micromhos per centimeter (umhos/cm) at 25 degrees centigrade.

2.13 Effective Date.

"Effective Date" means January 1, 2011.

2.14 EIS.

"EIS" means Final Environmental Impact Statement (FEIS) dated December 3, 2004, and announced in a Notice of Availability by U.S. Environmental Protection Agency (EPA) dated December 10, 2004.

2.15 Exchange Contractors.

"Exchange Contractors" means the San Joaquin River Exchange Contractors Water Authority, a joint exercise of powers authority established under Chapter 5 (commencing with

section 6500) of Division 7 of Title 1 of the Government Code and consisting of member agencies Central California ID, Columbia CC, Firebaugh Canal WD, and San Luis CC.

2.16 Farmers' WD.

"Farmers' WD" means Farmers' Water District, a California water district organized and existing under Division 13 of the Water Code.

2.17 DEIR and FEIR.

"DEIR" means the Draft Environmental Impact Report prepared at the direction of Westlands WD for a Mendota Pool water transfer groundwater pumping project, and "FEIR" means the Final Environmental Impact Report for a modified Mendota Pool water transfer groundwater pumping project that was certified by the Board of Directors of Westlands WD under the California Environmental Quality Act and described therein as the Mitigated Project.

2.18 Firebaugh Canal WD.

"Firebaugh Canal WD" means Firebaugh Canal Water District, a California water district organized and existing under Division 13 of the Water Code.

2.19 Firebaugh Intake Canal.

"Firebaugh Intake Canal" means the canal of Firebaugh Canal WD known as the Firebaugh Intake Canal, the location of which is generally shown on Exhibit B.

2.20 Fordel Extensometer.

"Fordel Extensometer" means the extensometer identified as Fordel Extensometer on the figure attached as Exhibit C.

2.21 Fresno Slough.

"Fresno Slough" means the tributary of the San Joaquin River, part of which created the southerly branch of the Mendota Pool after the construction of Mendota Dam.

2.22 Independent Consultant.

"Independent Consultant" means the person appointed by the parties hereto under section 3.11a hereof to mediate any disputes between or among the members of the Technical Committee under section 3.11b hereof and arbitrate any dispute under section 3.11d hereof.

2.23 MPG.

"MPG" means the Mendota Pool Group, an unincorporated association, that is made up of the following members: Baker Farming Co., a general partnership, Britz Mendota, T.I.C., a general partnership, Coelho West, a general partnership, Casaca Vineyards, a general partnership, Daddy's Pride Farming, a general partnership, Solo Mio Farms, a general partnership, Vista Verde Farms, a general partnership, Frank A. Logoluso Farms, a California corporation, Meyers Farms Family Trust, a general partnership, Terra Linda Farms I, a general partnership, and Panoche Creek Trust, a general partnership.

2.24 MPG Account.

"MPG Account" means the interest-bearing account to be established under section 3.07a hereof.

2.25 MPG Wells.

"MPG Wells" means water wells owned, operated or used by the MPG, a MPG Party, Farmers' WD or River Ranch, for Transfer Pumping.

2.26 Main Canal.

"Main Canal" means the canal of Central California ID known as the Main Canal, the location of which is generally shown on Exhibit B.

2.27 Mendota Pool.

"Mendota Pool" means the pool at the confluence of the San Joaquin River and Fresno Slough created by Mendota Dam.

2.28 Mitigated Project.

"Mitigated Project" means the Project certified in the FEIR and the EIS.

2.29 Outside Canal.

"Outside Canal" means the canal of Central California ID known as the Outside Canal, the location of which is generally shown on Exhibit B.

2.30 Paramount

"Paramount" means Paramount Land Company LLC, a Delaware limited liability company and Paramount Pomegranate Orchards LLC, a Delaware limited liability company.

2.31 Phase I Report.

"Phase I Report" means the report dated May 2000 entitled "Results of 1999 Test Pumping Program for Mendota Pool Group Wells" prepared by Kenneth D. Schmidt and Associates and Luhdorff and Scalmanini, Consulting Engineers, which is incorporated herein by reference, and a copy of which will be maintained at the office of the Exchange Contractors.

2.32 Phase II Report.

"Phase II Report" means the report dated December 2000 entitled "Long-Term Impacts of Transfer Pumping by the Mendota Pool Group" prepared by Kenneth D. Schmidt and Associates and Luhdorff and Scalmanini, Consulting Engineers which is incorporated herein by reference, and a copy of which will be maintained at the office of the Exchange Contractors.

2.33 Policy Committee.

"Policy Committee" means the committee established under section 3.10 hereof.

2.34 Project.

"Project" means the project described in Chapter VI, Chapter VII and the Criteria for Agreement No. 1 in Chapter VIII of the Phase II Report, and Article III hereof to extract groundwater from beneath lands in the vicinity of the Mendota Pool for Transfer Pumping.

2.35 San Luis CC.

"San Luis CC" means San Luis Canal Company, a mutual water company organized and existing under the laws of the State of California.

2.36 Shallow Zone.

"Shallow Zone" means the aquifer or aquifers stratigraphically above the A-Clay, where present, or its equivalent depth.

2.37 Technical Committee.

"Technical Committee" means the committee established under section 3.09 hereof.

2.38 Transfer Pumping.

"Transfer Pumping" means the extraction of groundwater by the members of the MPG, Farmers' WD and River Ranch from beneath lands in the vicinity of Mendota Pool for use on lands other than Adjacent Overlying Lands.

2.39 Westlands WD.

"Westlands WD" means Westlands Water District, a California water district organized and existing under Division 13 of the Water Code.

2.40 Year.

"Year" means a calendar year commencing January 1 and ending December 31.

2.41 Yearout Extensometer.

"Yearout Extensometer" means the extensometer identified as Yearout Extensometer on the figure is attached as Exhibit C.

ARTICLE III.

THE PROJECT

3.00 The Project-Transfer Pumping.

a. The purpose of the Project is to provide for Transfer Pumping to the extent it can be accomplished while minimizing detrimental impacts and while mitigating the impacts from Transfer Pumping including, without limitation: (a) drawdowns and other impacts at nearby wells; (b) land subsidence; and (c) water quality in the Mendota Pool and at the Exchange Contractors' canal intakes.

b. Transfer Pumping is based upon assumptions that were developed and adopted by the parties hereto based upon information and data provided by the parties and examined by their consultants. The assumptions upon which the Transfer Pumping conducted under Agreement No. 1 was based included the technical analyses found in the Phase I and Phase II Reports. The assumptions upon which the Transfer Pumping conducted under Agreement No. 2 are based include the technical analyses found in the Phase I and Phase II Reports as since modified based on the results of the Transfer Pumping conducted from 2001 through 2010, as described in annual reports prepared by the Technical Committee. In the event that any of the predictions and assumptions, including those provided by the parties hereto and which form the basis of predictions and assumptions that are included in the Phase I and Phase II Reports and since modified based on the results of the Transfer Pumping conducted from 2001 through 2010, as described in annual reports prepared by the Technical Committee turn out to be erroneous in any way the Technical and Policy Committees shall attempt to work out the issue presented, and respond to the change in assumption or new information.

c. The Mitigated Project may start in each of the 4 Years of the term of Agreement No. 2 starting on about March 1 of each Year; continued and completed operation of the

Mitigated Project in each of these Years, however, will not occur absent express agreement of the Exchange Contractors and Paramount, and further provided the Transfer Pumping does not exceed the agreed-upon annual and 4-year program maximum limits outlined in Exhibit D. If agreement of the Exchange Contractors and Paramount for that Year's Mitigated Project is not provided by April 15 of that Year, operation of the Project will be suspended until agreement can be achieved.

d. Commencing July 1, 2011 the parties shall commence work to identify CEQA and NEPA alternatives and scoping considerations for compliance with the requirements of those statutes beyond the 2014 term Year. The intent of the parties is to cooperate in good faith and to provide for compliance with NEPA, CEQA, and any other applicable laws in order to analyze and consider a longer term project and agreement.

3.01 Transfer Pumping From Deep Zone.

Transfer Pumping from the Deep Zone: (a) shall be conducted primarily during March, April, and May and from September through November. No Transfer Pumping from the Deep Zone shall occur during June, July, and August of any Year unless expressly permitted by the Exchange Contractors and Paramount and shall not be conducted during more than 10 months of any Year, (b) shall not exceed 12,000 AFY during any one Year or 40,000 AF for the term of Agreement No. 2, but (c) shall not exceed an amount that will cause subsidence at the Yearout Extensometer due to Transfer Pumping to average more than 0.005 feet per Year. The amount of Transfer Pumping from the Deep Zone shall be subject to adjustment by the Technical Committee.

3.02 Transfer Pumping From Shallow Zone.

Transfer Pumping from the Shallow Zone initially: (a) shall not be conducted during more than 10 months of any Year, and (b) shall not exceed 50,000 AF for the term of Agreement

No. 2. The amount of Transfer Pumping from the Shallow Zone shall be subject to adjustment by the Technical Committee. Total Transfer Pumping from the Deep Zone and Shallow Zone shall not exceed 25,000 AF during any Year or 90,000 AF for the term of Agreement No. 2.

3.03 Use of Groundwater On Adjacent Overlying Lands.

The amount of groundwater pumped for use on Adjacent Overlying Lands shall not be greater than 12,000 AF in any Year unless there is a corresponding reduction in the amount of Transfer Pumping that Year or the Technical Committee determines that there is a demonstrated reduction in Transfer Pumping impacts. Groundwater pumped by the MPG, a MPG Party, or River Ranch from wells within Farmers' WD for use on Adjacent Overlying Lands shall only be used on Adjacent Overlying Lands within Farmers' WD.

3.04 Declaration of Intent.

By March 1st of each Year, the MPG shall declare its intent to conduct Transfer Pumping for that Year and to provide a proposed schedule and amounts for that Year based on the expected surface water allocation to be available to members of the MPG that Year. This declaration shall be subject to all Technical Committee procedures.

3.05 Additional Limitations on Transfer Pumping.

a. Water Quality in Mendota Pool.

Water produced by Transfer Pumping from the MPG Wells along Fresno Slough shall not be introduced into the Mendota Pool (1) when the direction of flow in the Fresno Slough is not southerly, or (2) if the EC measured by the continuous EC recorders at the intake of the Firebaugh Intake Canal, the intake for the Outside Canal, the intake of the Main Canal, or the intake of the Columbia Canal exceeds the EC of the inflow to the Mendota Pool from the DMC by more than 90 umhos/cm for 3 days. If the EC limitation is exceeded at the intakes of the Firebaugh Intake Canal, the Outside, or the Main Canal,

the MPG shall shut off MPG Wells that produce water for introduction to Fresno Slough for Transfer Pumping, starting first with the MPG Wells that are the closest to the affected canal intake. If the EC limitation is exceeded at the intake of the Columbia Canal, the MPG shall shut off MPG Wells in Farmers' WD that produce water for introduction to the San Joaquin River Branch of the Mendota Pool for Transfer Pumping. Transfer Pumping from such MPG Wells shall not resume until the EC at the affected canal intake is no more than 30 umhos/cm above the EC of the inflow to the Mendota Pool from the DMC for 3 days.

b. Water Quality in Deep Zone.

Transfer Pumping from the Shallow Zone shall be reduced if it is determined by the Technical Committee that Transfer Pumping from the Shallow Zone significantly affects the quality of water in the Deep Zone in the Exchange Contractor and Paramount service areas due to the interception of good quality water that would otherwise reach the Deep Zone in the Exchange Contractor and Paramount service areas or if other significant impacts are identified.

c. Additional Pumping Within Farmers' WD.

During the term of Agreement No. 1, an issue arose regarding the pumping of groundwater by a non-MPG member within the boundary of Farmers' WD for use on lands outside Farmers' WD. Farmers' WD currently owns and operates 10 wells and related facilities within its Fresno County boundaries and other persons currently own and operate six wells and related facilities within the Fresno County boundaries of Farmers' WD. If any non-MPG member pumps groundwater from a well within Farmers' WD for use on lands outside Farmers' WD, the amount of such water pumped in any Year shall be determined by the Technical Committee and such amount shall be

deducted from the amount of water permitted to be pumped from wells within Farmers' WD under this Agreement No. 2 for such Year. If such non-MPG member pumping causes or contributes to causing water quality degradation, subsidence, or other limitations contained in this Agreement No. 2, the limitations provided in this Agreement No. 2 shall be enforced to reduce or eliminate Transfer Pumping until such conditions no longer exist. Farmers' WD shall cooperate with the other parties to this Agreement No. 2 to determine the amount of any such pumping by a non-MPG member and, to the extent authorized by law, shall exercise its authority to enforce the provisions of this section 3.05c.

3.06 Meters on Wells.

A separate water meter shall be installed, operated, maintained, repaired and replaced, as required (a) on each MPG Well or group of MPG Wells that have a common manifold; and b) on each non-MPG Well used to produce water for use on the Adjacent Overlying Lands. The MPG or its designated agent shall read the water meter on each MPG Well or group of MPG Wells and each non-MPG Well used to produce water for use on the Adjacent Overlying Lands each month during which water is produced from such well or group of wells. The meters shall be maintained on a schedule and protocol established by the Technical Committee.

3.07 Mitigation of Third Party Impacts.

a. The MPG Account.

The Exchange Contractors shall continue to maintain the interest-bearing MPG Account. The MPG shall pay the Exchange Contractors each Year when the MPG declares its intent to pump for Transfer Pumping under section 3.04 hereof an amount equal to $25,000, less the current balance in the MPG Account,

and such amount shall be deposited by the Exchange Contractors in the MPG Account. The MPG shall augment the funds in the MPG Account, when and as required, so that the Exchange Contractors have sufficient funds in the MPG Account to compensate the persons entitled to compensation under this section. The Exchange Contractors, upon written authorization from the Policy Committee, shall disburse funds from the MPG Account to compensate such persons.

b. Persons Entitled to Compensation.

Each Year, upon request, the Exchange Contractors shall pay landowners or their duly authorized agents, who operate wells within (1) the Exchange Contractors' service area, and (2) lands owned by Paramount as defined as New Columbia Ranch on Exhibit E, where drawdowns from Transfer Pumping are predicted by the Technical Committee to occur, an amount fixed and determined by the Technical Committee under section 3.08c hereof. No person shall be entitled to payment under this section unless (1) water production from an affected well where drawdowns from Transfer Pumping are predicted to equal or exceed 10 feet is properly metered and adequate production records are maintained, or (2) adequate energy and pump test records are maintained for affected wells where drawdowns from Transfer Pumping are predicted to be less than 10 feet. In order to qualify for compensation where drawdowns of 10 feet or greater occur, meters will be required on wells in the drawdown area. To qualify for compensation where drawdowns of less than 10 feet occur, kilowatt hours and current pump test calculations will be sufficient.

c. Determination of Compensation.

The Technical Committee shall determine the incremental energy costs due to Transfer Pumping for the wells identified in section 3.08.b. hereof, after the completion of the irrigation season and within a reasonable time after the Policy Committee is presented with all documentation reasonably required to support an application for payment.

d. Compensation Guidelines.

The Technical Committee shall consider the following guidelines in determining the incremental energy and other costs:

1. Additional energy costs from increased drawdown may persist beyond the Year. These costs shall be compensated on an annual basis and if they will extend beyond the term of this Agreement No. 2 shall be estimated and paid prior to pumping in the last Year based upon a present value for such costs.

2. Additional drawdown may result in loss of efficiency of pumps or loss of production of wells resulting in the operation of wells during higher priced time of use periods.

3. Additional drawdown due to Transfer Pumping may result in the need to increase the horsepower of motors, lower or modify pump bowls, drill additional wells, or redrill, recase, or drill a new well. Any costs of such activities caused by Transfer Pumping, subject to review by the Technical Committee, shall be paid by the MPG. The owner or operator of the well shall bear any cost for betterment or enhancement of the facility, if any. The owner or operator shall also pay for modifications or repairs, which would normally be conducted at the time without the impacts of Transfer Pumping. For example, if a well were operating at

normal efficiencies and performing satisfactorily for normal operations and it is necessary to extend the pump column due to Transfer Pumping, the total cost to do so and to provide the equivalent production prior to the modifications shall be borne by the MPG. Likewise, if the extension of the pump column on a well is required due to Transfer Pumping and at the time the well is performing below normal efficiencies and in need of repair in the normal course of business, then the owner or operator shall be responsible for the cost which would normally be required to return the well to a reasonable efficiency for the existing facility and the MPG shall pay all other costs.

4. To the greatest degree possible, the costs estimated to be incurred and the determination of what occurred shall be measured against a standard of what a prudent but not infallible owner and operation of a well would do in circumstances which can be predicted or, if unpredicted impacts or conditions occurred, what that owner and operator should do to mitigate and reduce his, her or its damages in light of the availability of supplies, materials, time constraints, costs and like factors. Costs or preventive measures which are reasonable, even if in hindsight unnecessary, shall be compensated.

3.08 Monitoring Program.

a. The parties hereto shall conduct a monitoring program to determine the impacts of Transfer Pumping in the manner specified in Chapter VII of the Phase II Report.

b. The effectiveness of the monitoring program will be reviewed each Year by the Technical Committee and the Technical Committee will make recommendations each Year to improve the program and to make it more cost effective.

3.09 Technical Committee.

a. Formation.

Exchange Contractors, Paramount, and the MPG shall appoint one person to serve on the Technical Committee. The Exchange Contractors and Paramount may appoint the same person. Each person appointed shall be experienced in groundwater hydrology or hydrogeology. The initial members of the Technical Committee shall be Kenneth D. Schmidt and Glenn Browning. Each person appointed to the Technical Committee shall serve at the pleasure of the party who appointed him or her.

b. Authority and Obligations.

The Technical Committee shall have the following authority and obligations under this Agreement No. 2:

1. To obtain and preserve all records required to perform and implement the rights and obligations of each party hereto under this Agreement No. 2.

2. To establish the amount of recommended Transfer Pumping during each Year of the term of this Agreement No. 2 commencing 2011.

3. To establish a maintenance schedule and protocol for the water meters to be maintained by the MPG under section 3.07 hereof.

4. To determine the appropriate level of mitigation under section 3.07 hereof.

5. To prepare the annual reports required under section 3.08.d. hereof.

6. To attempt to resolve any dispute between or among the parties hereto or between any party hereto and any person claiming any right under this Agreement No. 2.

Any action of the Technical Committee shall require the unanimous agreement of its members.

c. Compensation.

Each party who appoints a member to the Technical Committee shall be responsible for the compensation of such member for his or her services on the Technical Committee.

d. Annual Reports.

The Technical Committee shall prepare an annual report for each Year during which Transfer Pumping is conducted, commencing with the Year 2011. Each annual report shall be prepared after the conclusion of the irrigation season for that Year. Each annual report shall include:

1. The amount of Transfer Pumping from the Deep Zone for the Year and the cumulative amount thereof to date including the quantities described in section 3.05 hereof.

2. The amount of Transfer Pumping from the Shallow Zone for the Year and the cumulative amount thereof to date.

3. The amount of groundwater pumped by the MPG, a MPG Party, or River Ranch for use on Adjacent Overlying Lands.

4. Current water levels and water level impacts for the Year in the Deep Zone and the Shallow Zone caused by Transfer Pumping.

5. Current water quality and water quality impacts for the Year in the Deep Zone and the Shallow Zone caused by Transfer Pumping.

6. Current water quality in the Mendota Pool and water quality impacts for the Year in the Mendota Pool caused by Transfer Pumping.

7. The amount of subsidence at the Yearout Extensometer and the Fordel Extensometer, the amount of such subsidence attributable to Transfer Pumping, and the cumulative amounts thereof to date.

8. Any recommended modification of or to the Project, provided, that any such recommended modifications shall not become effective unless approved by the Policy Committee.

e. Technical Committee Records.

The records and reports of the Technical Committee shall be kept at the office of the Exchange Contractors.

f. Limitation on Liability.

No member of the Technical Committee shall be liable to any party hereto, other than the party appointing him or her, for any claim of damage to such party, irrespective of its basis or nature, unless the claim is based on such member's actual fraud, bad faith, or intentional or willful conduct.

3.10 Policy Committee.

a. Formation.

The Exchange Contractors and Paramount shall each appoint one person and the MPG shall appoint two persons to serve on the four-person Policy Committee. The initial members of the Policy Committee shall be Steve Chedester, Roy Catania, Jim Stillwell, and Joe F. Coelho, Jr. Each person

appointed to the Policy Committee shall serve at the pleasure of the party who appointed him or her.

b. Authority and Obligation.

The Policy Committee shall have the authority and obligation to resolve any dispute that cannot be resolved by the Technical Committee under section 3.12b hereof. Any action of the Policy Committee shall require the unanimous agreement of its members.

c. Compensation.

Each party who appoints a member to the Policy Committee shall be responsible for the compensation of such member for his or her services on the Policy Committee.

d. Policy Committee Records.

The records of the Policy Committee shall be kept at the office of the Exchange Contractors.

e. Limitation on Liability.

No member of the Policy Committee shall be liable to any party hereto, other than the party appointing him or her, for any claim of damage to such party, irrespective of its basis or nature, unless the claim is based on such member's actual fraud, bad faith, or intentional or willful conduct.

3.11 Dispute Resolution.

a. Appointment of Independent Consultant.

The parties hereto hereby appoint Dennis E. Williams, Ph.D., Geoscience Support Services, Inc., Claremont, California, (909) 920-0707, as the Independent Consultant. If the Independent Consultant becomes unavailable for any reason, the parties hereto shall designate another qualified person to provide such services.

b. Resolution of Technical Committee Disputes.

If the members of the Technical Committee are unable to unanimously agree on a matter within the jurisdiction of the Technical Committee, the Technical Committee shall request the Independent Consultant to review the relevant information and make a separate, independent recommendation to the Technical Committee. The members of the Technical Committee shall thereafter attempt to reach unanimous agreement on the matter. If the members of the Technical Committee are still unable to unanimously agree on the matter, the Technical Committee shall refer the matter to the Policy Committee for its resolution. The Policy Committee shall thereafter meet and confer and attempt to resolve the dispute.

c. Resolution of Policy Committee Disputes.

If the members of the Policy Committee cannot unanimously agree on a matter referred to it by the Technical Committee, then, with one exception hereinafter stated, the decision of the Policy Committee shall be deemed to be the decision of the member or members of the Technical Committee appointed by the Exchange Contractors and Paramount. If the Exchange Contractors and

Paramount have each appointed a member to the Technical Committee and such members are not in agreement on the matter referred to the Policy Committee, the decision of the Policy Committee shall be deemed to be the average, or its equivalent, of separate decisions made by such members of the Technical Committee. The decision of the Policy Committee shall be final and not subject to any review, judicial or otherwise, with one exception, namely a decision regarding any right to compensation under section 3.10 hereof. If the members of the Policy Committee cannot unanimously agree on a matter regarding a right to compensation under section 3.10 hereof, such matter shall be subject to arbitration under section 3.12d hereof.

d. Arbitration.

Any matter regarding a right to compensation under section 3.10 hereof that cannot be resolved under section 3.12c hereof shall be decided by the Independent Consultant. A hearing on the matter shall take place before the Independent Consultant in Los Banos, California at a time and place selected by the Independent Consultant. The Independent Consultant shall give each party hereto written notice of the time and place of the hearing at least 30 days before the date selected. At the hearing, all relevant evidence may be presented by any party hereto and the formal rules of evidence applicable to judicial proceedings shall not govern. The Independent Consultant shall hear and determine the matter, shall render a written report on the matter, and cause a copy thereof to be delivered to each of the parties hereto. The decision of the Independent Consultant shall be binding and conclusive on each of the parties hereto.

e. Termination of Agreement No. 2.

1. The Exchange Contractors, and Paramount, so long as it obtains the written approval of the Exchange Contractors, and the MPG shall have the right to terminate this Agreement No. 2 at the end of any Year if the members of the Policy Committee cannot unanimously agree on a matter under section 3.12c hereof which is not subject to arbitration under section 3.12d hereof. No claim of vested rights or impairment or damage to property rights shall exist on the part of the MPG, any MPG Party, or River Ranch because of a change, reduction or termination of Transfer Pumping under the terms of this Agreement No. 2. Neither the MPG, a MPG Party, nor River Ranch shall obtain prescriptive rights, estoppel claims, or any preference in any form in the use or enjoyment of groundwater as and against the lands owned by Paramount and the lands located within the Exchange Contractors' service area.

2. If this Agreement No. 2 is terminated under section 3.12e1 hereof, (i) notice of such termination shall be provided to the Technical Committee, (ii) within 30 days of receipt of such notice, each member of the Technical Committee shall prepare and deliver to each party hereto a report setting forth his or her recommendation for Transfer Pumping during the next Year and the basis therefore. Similar reports shall be prepared for Years subsequent to the next Year if required by a court of competent jurisdiction.

3. If this Agreement No. 2 is terminated under section 3.12e1 hereof, (i) each party hereto shall fully perform his, her or its obligations that accrue through the end of the Year of termination and any obligations associated with any reports prepared under section 3.12e2 hereof, (ii) Transfer Pumping or a similar pumping program may only continue if all costs established by this Agreement No. 2 to mitigate impacts of Transfer

Pumping or a similar pumping program are paid as set forth in this Agreement No. 2, (iii) any party hereto may commence such litigation as he, she or it determines to establish the rights and obligations of the parties hereto, and perhaps others, to extract groundwater from the basin, and (iv) except as provided in this section, nothing in this Agreement No. 2 shall constitute an admission in any such litigation. If any party hereto commences such litigation, such party or any party hereto named as a party to such litigation, may request a stipulation from each other party hereto who is a party to such litigation whereby all parties to the stipulation, (i) waive all defenses to entry of a preliminary injunction or similar ancillary order establishing the terms and conditions for Transfer Pumping or a similar pumping program pending entry of judgment, (ii) waive any right to a bond or undertaking in connection with such order, (iii) agree that the court may enter its order based on the terms of this Agreement No. 2, the reports of the members of the Technical Committee under section 3.12e2 hereof and the cross-examination of any member of the Technical Committee regarding the recommendations of such member and the basis therefore, provided that the order requires the payment of compensation consistent with the provisions of section 3.08 hereof, (iv) agree that the stipulation, such order, this Agreement No. 2, and such reports shall not be considered by the court or any other finder of fact in considering the merits of such litigation and reaching a judgment therein, and (v) waive any right to appeal such order. Each party hereto who is a party to such litigation shall execute such stipulation.

3.12 Allocation of Responsibility and Costs.

a. The Exchange Contractors.

The Exchange Contractors, at its cost, shall be responsible for the following activities:

1. The operation, maintenance, repair, replacement and reading of EC recorders on the Firebaugh Intake Canal, the Outside Canal, the Main Canal, and the Columbia Canal.

2. The existing normal monitoring of the water levels and water quality in groundwater production wells within its service area.

3. The operation, maintenance, repair, replacement, and reading of the Yearout Extensometer.

4. Its participation on the Technical and Policy Committees.

5. The activities of any of its employees, agents or consultants.

b. Paramount.

Paramount, at its cost, shall be responsible for the following activities:

1. The existing normal monitoring of the water levels and water quality in its groundwater production wells.

2. Its participation on the Technical and Policy Committees.

3. The activities of any of its employees, agents or consultants.

c. The MPG.

The MPG, at its cost, shall be responsible for the following activities:

1. The activities of the MPG required under section 3.07 hereof.

2. The monitoring of all MPG Wells and any non-MPG Well used to produce water for use of the Adjacent Overlying Lands.

3. The acquisition of meters for installation on wells of the persons described in section 3.08b hereof where drawdowns from Transfer Pumping are predicted by the technical Committee to equal or exceed 10 feet during the Year.

4. Except as otherwise provided in this Agreement No. 2, the activities required under section 3.09 hereof.

5. The operation, maintenance, repair, replacement, and reading of the Fordel Extensometer.

6. Its participation on the Technical and Monitoring Committees.

7. The services of the Independent Consultant under section 3.12 hereof.

8. The activities of any of its employees, agents or consultants.

In addition, the MPG shall pay the Exchange Contractors the sum of $20,000 upon execution of this Agreement No. 2 and on or before January 15 of each Year during the term of this Agreement No. 2, commencing January 15, 2011, as compensation for the costs the Exchange Contractors and Paramount would not have incurred but for this Agreement No. 2.

3.13 Environmental Documents.

The environmental documents for the Project shall be the DEIS and FEIS, the Phase I Report, and the Phase II Report, and as the interpretations therein have been modified by the monitoring results for the Transfer Pumping Years from 2001 to 2010. The environmental documentation evaluated the environmental impacts of Transfer Pumping only to the extent discussed in the Phase I and Phase II Reports. If this Agreement No. 2 is terminated the controlling environmental documents for any Transfer Pumping or similar project shall be the DEIS/FEIS, the Phase I Report and the Phase II Report and as the interpretations therein have been modified by the monitoring results for the Transfer Pumping Years from 2001 to 2010.

ARTICLE IV.

GENERAL PROVISIONS

4.00 Term.

The term of this Agreement No. 2 is 4 Years from and after the Effective Date unless earlier terminated under section 3.11e hereof. This Agreement No. 2 may be extended upon the mutual agreement of the parties hereto.

4.01 Venue.

The venue for any action or proceeding filed by any party hereto in any court, except a proceeding under the Bankruptcy Code, shall be in the Superior Court of the State of California in and for the County of Fresno.

4.02 Defense and Indemnity.

The MPG, the MPG Parties, and River Ranch shall defend, indemnify and hold harmless Paramount, the Exchange Contractors and the members thereof, Central California ID, San Luis CC, Firebaugh Canal WD, and Columbia CC, and their agents, employees, directors and technical representatives from any and all claims, liability or expense of whatsoever nature or kind arising directly or indirectly from claims by third parties or persons, including without excluding others, governmental agencies or any business forms that:

a. Damages have occurred to persons, property or resources from Transfer Pumping or use of water upon Adjacent Overlying Lands; or,

b. Laws, ordinances or regulations have been violated or not complied with; or,

c. Through actions or omissions of the Policy Committee, or Technical Committee, or through any other action including complying with the terms of this Agreement No. 2, that the indemnified and defended parties have become participants in the Project or portions thereof.

This obligation to defend, indemnify and hold harmless shall be joint and several and includes, without excluding other claims, costs and expenses,

(a) The payment of attorneys fees, expert witness fees and costs incurred by the indemnified parties. The indemnified parties shall choose their own counsel to provide their defense and each of the Exchange Contractors and Paramount shall be entitled to employ attorneys of their choosing in that defense.

(b) The release of any and all claims, including future and presently unknown claims which may exist in the future on the part of the MPG, a MPG Party, or River Ranch or any entity or person claiming through them that through the exercise of the authority granted to the Technical Committee , damages, injuries or loss has occurred to the MPG, a MPG Party or River Ranch, or any of them. This release and waiver shall extend to unknown claims and as a result those parties do hereby waive the benefits of Civil Code Section 1542 which states:

> "General Release. A General Release does not extend to claims which the creditor does not know or suspect to exist in his/her favor at the time of executing the release, which if known by him/her must have materially affected his/her settlement with the debtor."

(c) Claims that the indemnified and defended parties were negligent or unreasonably omitted to act with respect to the proceedings prior to this Agreement No. 2 or in any proceeding or event related to the Technical Committee or the enforcement of this Agreement No. 2 whether made by third parties, governmental agencies, the MPG, an MPG Party or River Ranch or any of them.

The indemnification and defense provided for herein shall survive the termination of this Agreement No. 2.

4.03 Assignment.

No party hereto shall assign or transfer this Agreement No. 2 or any right or interest therein or thereunder, or suffer or permit any such assignment or transfer to occur by operation of law without the prior written consent of the other parties hereto, which consent shall not be unreasonably withheld, provided, however, that (a) the MPG may assign or transfer its rights and obligations under this Agreement No. 2 to another entity without the prior written consent of the other parties hereto if the equitable interests of the members of the MPG in such entity are substantially the same as their current interests in the MPG and (b) a member of the MPG or River Ranch may assign or transfer its rights under this Agreement No. 2 without the prior written consent of the other parties hereto so long as any change in the place of use of any Transfer Pumping water extracted under this Agreement No. 2 will not materially change any impacts caused by or attributable to Transfer Pumping and the assignor or transferor remains obligated under this Agreement No. 2.(c) Paramount may assign or transfer its rights and obligations under this Agreement No. 2 to its affiliates without the prior written consent of the parties so long as such assignee of transferee holds title to the New Columbia Ranch and such assignment or transfer does not materially change the obligations of the MPG or its members under this agreement. In the event of any authorized transfer or assignment, the transferee shall agree in writing with the other parties hereto or their successor or assigns, as the case may be, to personally assume, perform and be bound by the covenants, obligations and agreements contained in this Agreement No. 2 jointly and severally.

4.04 Successors and Assigns.

Subject to section 5.04 hereof, this Agreement No. 2 shall be binding upon the successors and assigns of the respective parties hereto.

4.05 Written Notice.

Any notice, request, tender, demand, delivery, approval or other communication provided for, required, or arising under this Agreement No. 2 shall be in writing and shall be deemed delivered to a party hereto if delivered in person to an individual or to an officer or authorized representative of a legal entity or, if mailed three business days following deposit in the United States mails registered or certified return receipt requested postage prepaid, and addressed to such party at the address contained in this section. Any notice to the Exchange Contractors shall be addressed to the Exchange Contractors at P. O. Box 2115, Los Banos, CA 93635 with a copy addressed to Paul R. Minasian of Minasian, Spruance, Baber, Meith, Soares & Sexton, LLP, P.O. Box 1679, Oroville, CA 95965-1679. Any notice to Paramount shall be addressed to Paramount Farming Company, attention Kimberly Brown at 33141 E. Lerdo Hwy, Bakersfield, California 93308 with a copy to Paramount Farming Company, attention Roy Catania at 10302 Ave 7 1/2, Firebaugh, California 93622. Any notice to the MPG, shall be addressed to William Pipes c/o AMEC, Inc. at 1281 E. Alluvial Ave., Fresno, CA 93720 with a copy addressed to Robert G. Kuhs of Kuhs & Parker, P. O. Box 2205, Bakersfield, CA 93303. Any party hereto may change the address to which notice is to be given by giving notice in the manner specified in this section.

4.06 Representations and Warranties.

Each person who executes this Agreement No. 2 on behalf of a party hereto represents and warrants that: (a) the party on whose behalf he or she executes this Agreement No. 2, if other than a natural person, (1) is a legally constituted legal entity and (2) has authority to execute this Agreement No. 2 and (b) he or she is authorized to execute this Agreement No. 2.

4.07 As a Precedent.

Nothing in this Agreement No. 2 is intended or shall be construed as a precedent or other basis for any contention that any parties to this Agreement No. 2 has waived or compromised his, her, or its rights which may be available under state or federal law except as to the matters addressed in this Agreement No. 2.

4.08 Subject to Valid Laws.

Performance under this Agreement No. 2 is subject at all times to any and all valid laws, ordinances, and governmental regulations whether federal or state including, without limitation, current laws, regulations, policies and procedures which govern the transfer and sale of groundwater.

4.09 Counterparts of Agreement No. 2.

This Agreement No. 2 may be signed in any number of counterparts by the parties hereto, each of which shall be deemed to be an original, and all of which together shall be deemed one and the same instrument. This Agreement No. 2, if executed in counterparts, shall be valid and binding on a party as if fully executed all on one copy.

4.10 Attorneys' Fees.

In the event of any arbitration or litigation between the parties hereto arising out of, or in connection with, the provisions of this Agreement No. 2 or any documents executed and delivered pursuant to this Agreement No. 2, the prevailing party shall be entitled to reasonable attorneys' fees, expert witness costs, costs of suit, and necessary disbursements, in addition to whatever damages or other relief such party is entitled to in connection with such dispute.

4.11 Representation By Counsel.

This Agreement No. 2 is entered into freely and voluntarily. The parties hereto acknowledge that they have been represented by counsel of their own choice, or that they have had the opportunity to consult with counsel of their own choosing, in the negotiations that preceded the execution of this Agreement No. 2, and in connection with the preparation and execution of this Agreement No. 2. Each of the parties hereto executes this Agreement No. 2 with full knowledge of its significance and with the express intent of effecting its legal consequences.

4.12 Compromise.

This Agreement No. 2 is the result of a good faith compromise settlement of a disputed claim, and this Agreement No. 2 and the release contained herein shall not be taken or construed to be an admission of any liability, responsibility, fault, or wrongdoing by any of the parties hereto, each of whom continues to deny and disclaim any such liability, responsibility, fault, or wrongdoing. Each of the parties hereto is entering into this Agreement No. 2 to avoid the expense, disruption and uncertainty of litigation.

4.13 No Agency, Partnership or Joint Undertaking.

Nothing in this Agreement No. 2 shall create or be construed to create any form of joint undertaking, partnership or agency in which the MPG, a MPG Party or River Ranch shall be construed to be acting on behalf of Paramount or the Exchange Contractors. Paramount, and the Exchange Contractors, and their officers, employees, directors and independent consultants, including Technical Committee representatives acting under the terms of this Agreement No. 2, shall not be deemed to be a principal, an authorizing party, or a participant in the actions of the MPG, a MPG Party or River Ranch and those parties shall be solely and exclusively responsible for any damages, harm or injury resulting from their actions. The sole purpose of this

Agreement No. 2 is to attempt to provide means by which damages, injury or claims may be prevented and Paramount and the Exchange Contractors make no warranty or representation and undertake no liability should the measures provided herein or the functioning of the Technical Committee not result in full protection from injury, or damage, or should the knowing or unknowing failure to enforce rights under this Agreement No. 2 result in injury or damage.

4.14 Remedies Not Exclusive

Except as otherwise provided in this Agreement No. 2, the application by any party hereto of any remedy provided in this Agreement No. 2 for the enforcement of this Agreement No. 2 is not exclusive and shall not deprive such party of, or limit the application of, any other remedy provided by law, in equity, or otherwise.

IN WITNESS WHEREOF, the Exchange Contractors, Paramount, the MPG, River Ranch, and Farmers' WD have caused this Agreement No. 2 to be executed as of the Effective Date.

SAN JOAQUIN RIVER EXCHANGE
CONTRACTORS WATER AUTHORITY

By_____
James O'Banion, President

By_____
Steve Chedester, Secretary

PARAMOUNT LAND COMPANY LLC and
PARAMOUNT POMEGRANATE ORCHARDS LLC,
Delaware limited liability companies

By_____, _____

MENDOTA POOL GROUP

By _____
William Pipes, Agent

BAKER FARMING CO.,
a California limited liability company

By _____
Barry Baker, Its general partner

PANOCHE CREEK TRUST

By _____, Trustee
Mark H. Turmon, Its trustee

M. BRITZ, T.I.C., a general partnership

By _____
David Britz, Its general partner

COELHO WEST and related entities, a general partnership

By _____
Anthony P. Coelho, Jr., Its general partner

CASACA VINEYARDS, a general partnership

By _____
John Coelho, Jr., Its general partner

DADDY'S PRIDE FARMING, a sole proprietorship

By _____
Vince Coelho, Its owner

SOLO MIO FARMS, a sole proprietorship

By _____
Ed Coelho, Its owner

VISTA VERDE FARMS, a California corporation

By _____
Ken Gardner, Its secretary

FRANK A. LOGOLUSO FARMS, a California corporation

By _____
Frank Logoluso, Its ~~general partner~~ Chairman

MEYERS FARMS FAMILY TRUST

By _____
Marvin Meyers, its trustee

TERRA LINDA FARMS I, a general partnership

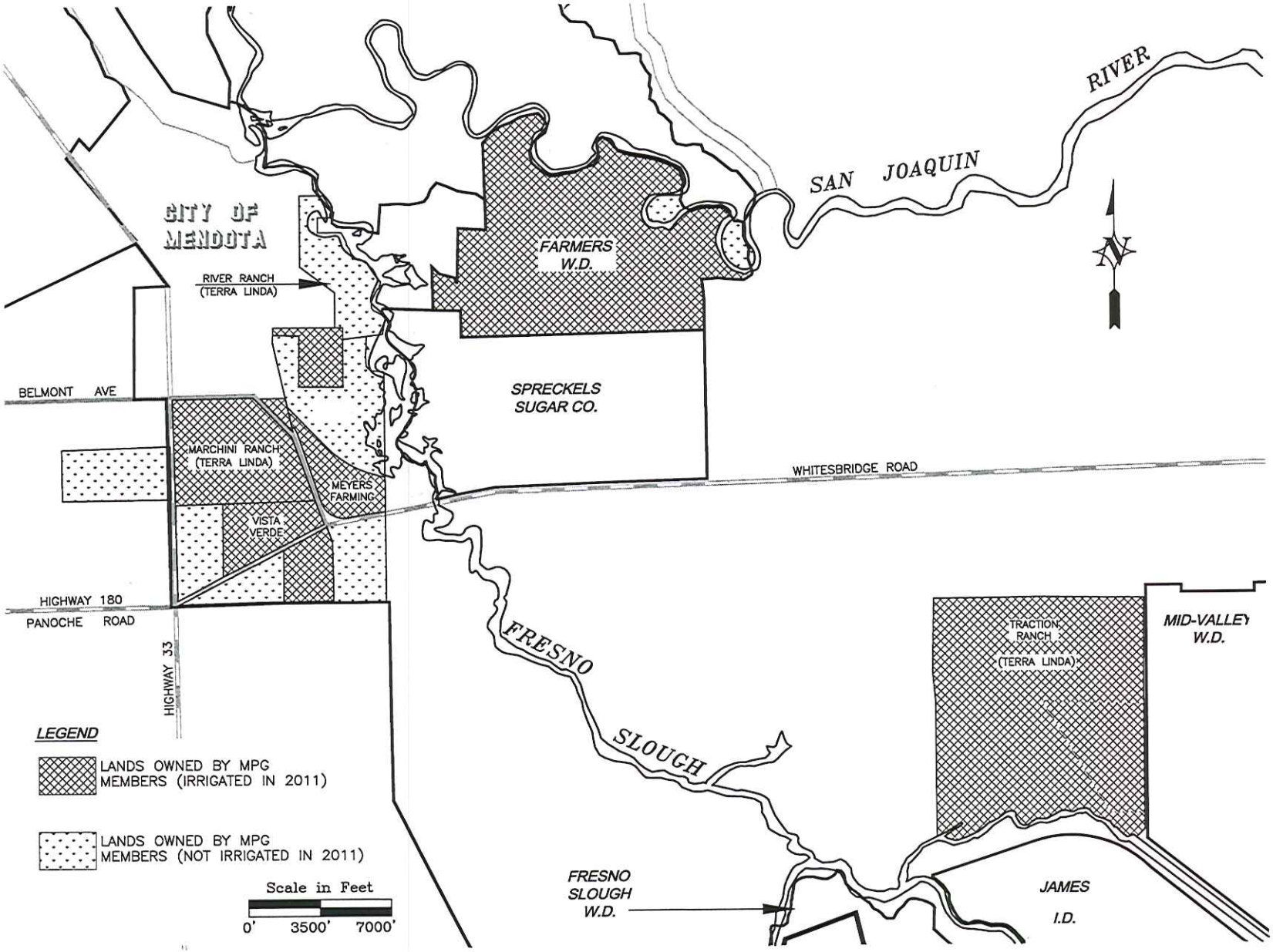
By _____
Joe F. Coelho, Jr., Its general partner

RIVER RANCH LLC,
a California limited liability company

By _____
Joe F. Coelho, Jr., Manager

FARMERS' WATER DISTRICT

By _____
James K. Merrill, Its president



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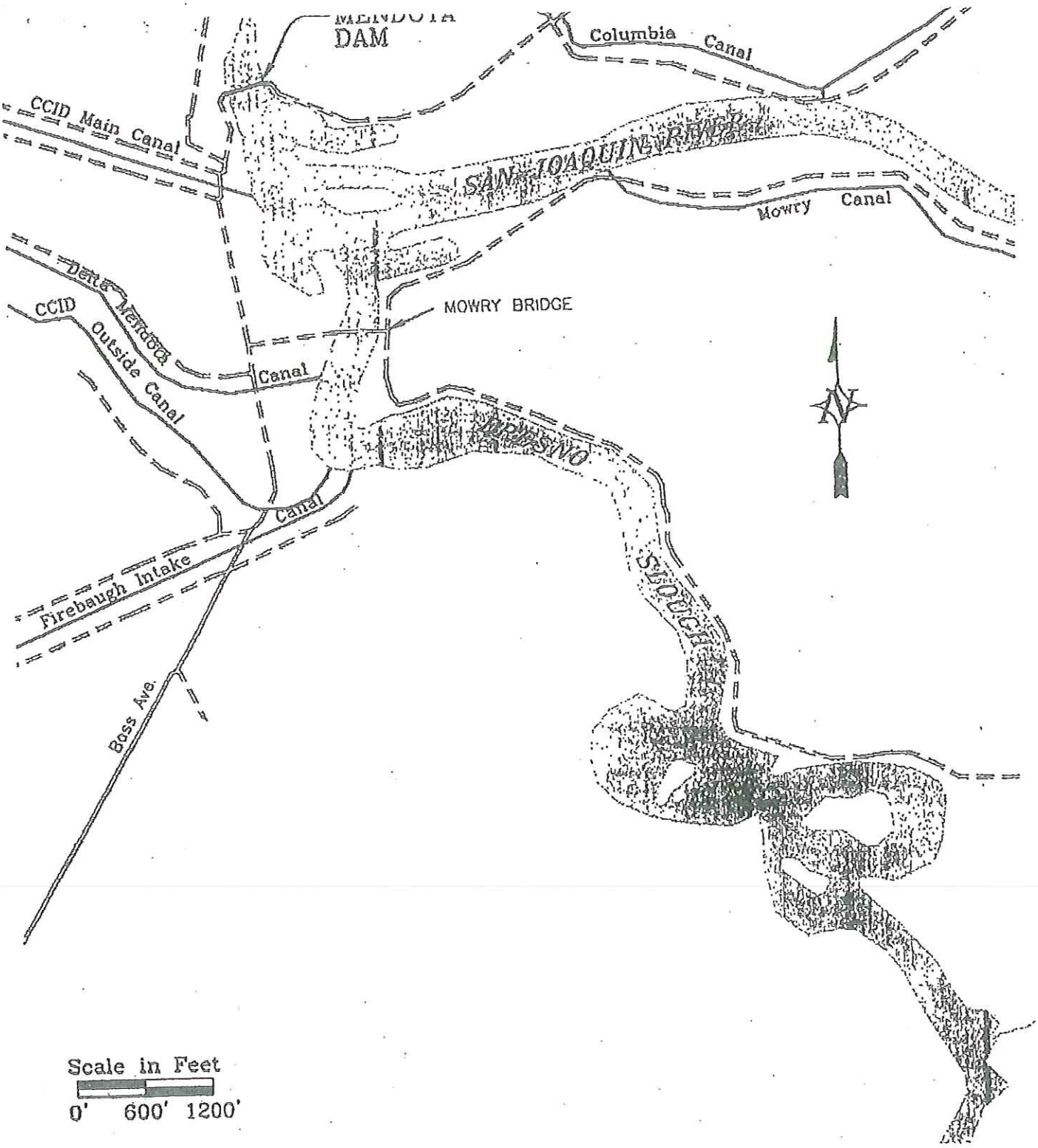
LUHDORFF & SCALMANINI CONSULTING ENGINEERS

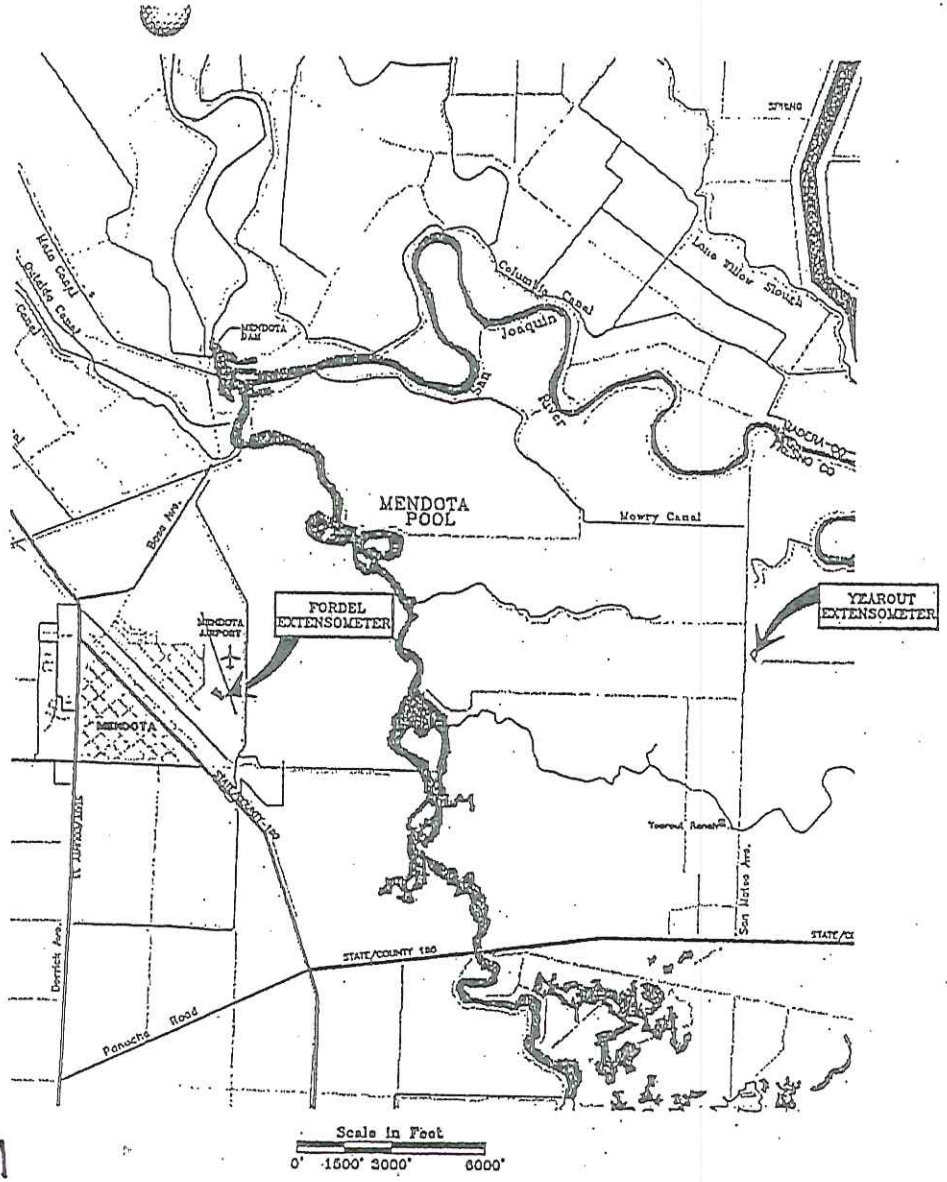
Exhibit A
Adjacent Lands Owned By Members of Mendota Pool Group



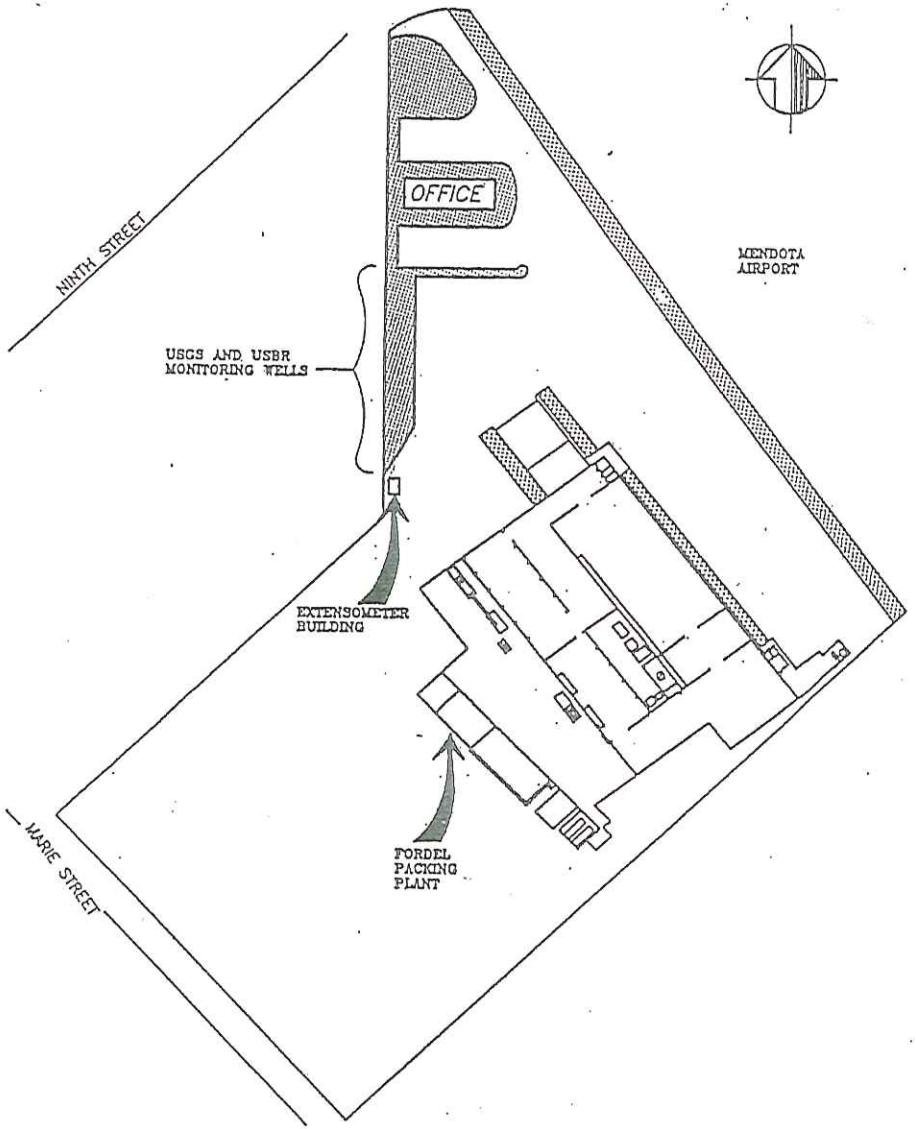
CAD FILE: G:/Projects/Mendota Pool/99-1-018/Annual Report 2000/Exhibit B.dwg CFC FILE: LSCE2500.PCP_MRG DATE: 04-26-01 9:38am

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Exhibit B
Canals at the North End of Mendota Pool



VICINITY MAP



SITE MAP (FORDEL, INC.)

CAD FILE: G:/Projects/Mendota Pool Group/99-1-018/Fig_7-1.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 12-15-99 4:44pm

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure 7-1
Extensometer Location Map

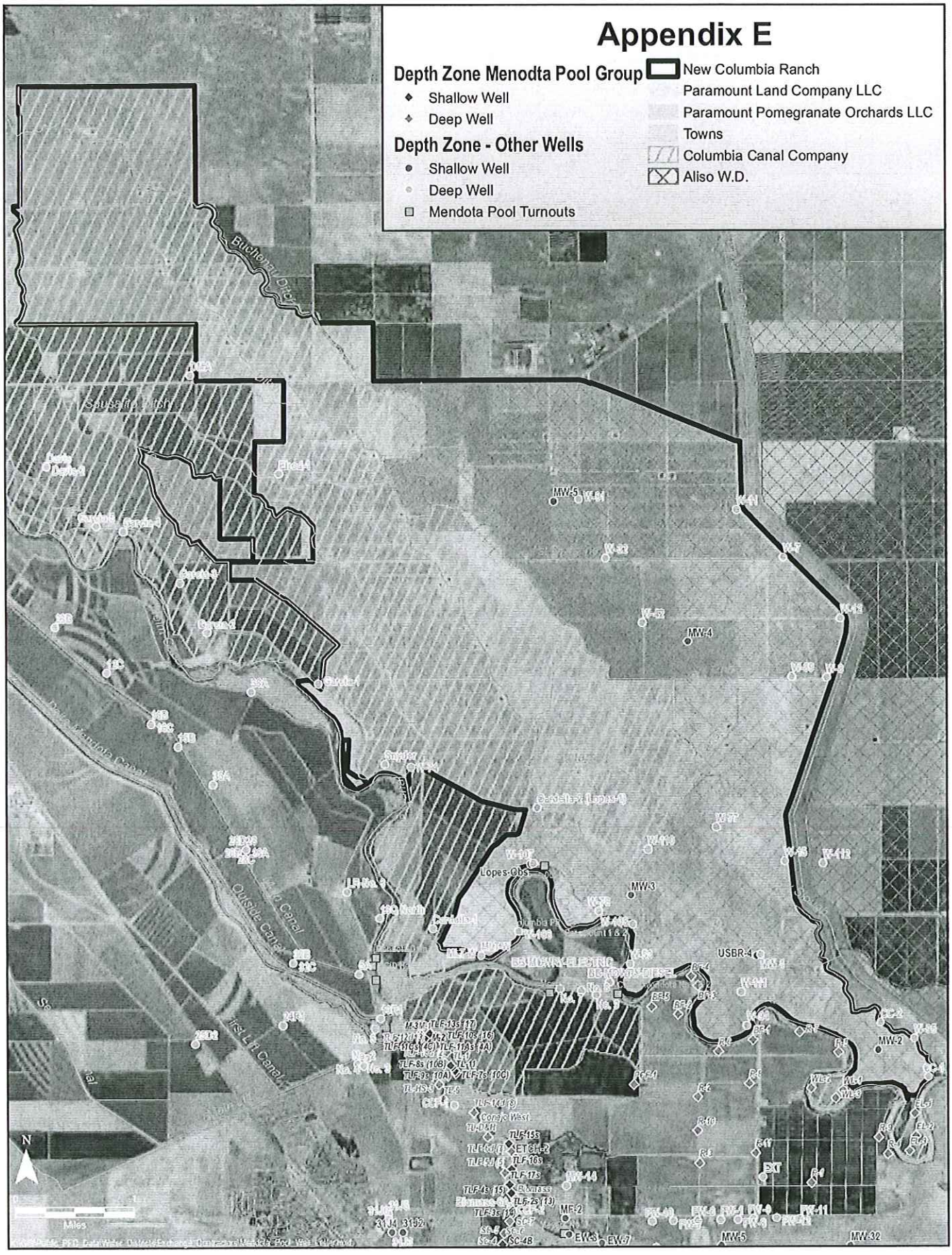
EXHIBIT C

Exhibit D
Mendota Pool Group Pumping Program Limits

Category	Year Type	MPG Pumping Program Limits	
		Agreement No. 1 (2001-2010)	Agreement No. 2 (2011-2014)
Overall Transfer Pumping Limits	Normal	31,600 afy (max 6 yrs)	NA
	Dry	40,000 afy (max 2 yrs)	NA
	Wet	0 afy (min 2 yrs)	NA
	All	NA	25,000 afy[1]
	Cumulative Total	269,600 af	90,000 af[1]
Transfer Pumping from Deep Wells[2]	All	12,000 afy	12,000 afy[3]
	Cumulative Total	96,000 af	40,000 af[1]
Transfer Pumping from Shallow Wells	Normal	19,600 afy (max 6 yrs)	NA
	Dry	28,000 afy (max 2 yrs)	NA
	All	NA	NA
	Cumulative Total	173,600 af	50,000 af[1]
Pumping for Adjacent Use	All	14,000 afy (or reduce transfer)	12,000 afy (or reduce transfer)

1. Subject to adjustment by the Technical Committee.
2. Shall not exceed an amount that will cause subsidence at the Yearout Extensometer due to MPG transfer pumping to average more than 0.005 foot per year.
3. Includes any non-MPG transfer pumping in Farmers' WD. Shall be conductred primarily during March through May and September through November. No transfer pumping from the deep zone shall occur in June, July, and August unless specifically permitted by the Exchange Contractors and Paramount.

Appendix E


Depth Zone Menodta Pool Group
Shallow Well
Deep Well
Depth Zone - Other Wells
Shallow Well
Deep Well
Mendota Pool Turnouts
New Columbia Ranch
Paramount Land Company LLC
Paramount Pomegranate Orchards LLC
Towns
Columbia Canal Company
Aliso W.D.
Buchanan Drain
Outside Canal
First Lift Canal
Lopes Obs
Corcoran West
N
Miles

Appendix L – Exhibit 5 of the James Irrigation District Comment Letter

CONTRACT No. 14-06-200-700-A

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES OF AMERICA AND THE JAMES IRRIGATION DISTRICT PROVIDING FOR WATER SERVICE AND FOR ADJUSTMENT AND SETTLEMENT OF CERTAIN CLAIMED WATER RIGHTS

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R.O. Draft 11/4-1963
Rev. W.O. 11/15-1963

Contract 14-06-200-700A

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT BETWEEN THE UNITED STATES OF AMERICA AND THE JAMES IRRIGATION DISTRICT PROVIDING FOR WATER SERVICE AND FOR ADJUSTMENT AND SETTLEMENT OF CERTAIN CLAIMED WATER RIGHTS

THIS CONTRACT, made this 23d day of December 1963, in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory thereof or supplementary thereto, all collectively hereinafter referred to as the Federal reclamation laws, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, and the JAMES IRRIGATION DISTRICT, hereinafter referred to as the District, a political subdivision of the State of California, duly organized, existing, and acting pursuant to the laws thereof, with its principal place of business in San Joaquin, California,

WITNESSETH, That:

EXPLANATORY RECITALS

WHEREAS, the United States is constructing and operating the Central Valley Project, California, for the purpose, among others, of furnishing water for irrigation, municipal, domestic, and other beneficial uses; and

WHEREAS, the United States has constructed the Delta-Mendota Canal which will be operated and used, in part, for the furnishing of water to the District pursuant to the terms of this contract; and

WHEREAS, investigations of the District lands and present water supply indicate that irrigated and irrigable lands within the boundaries of the District are at present in need of additional water for irrigation, and that an additional water supply to meet these present and potential needs can be made available by and through the works constructed and to be constructed by the United States; and

WHEREAS, the District desires to contract, pursuant to the Federal reclamation laws and the laws of the State of California, for the furnishing by the United States of a supplemental water supply from the Central Valley Project for which the District will make payment to the United States upon the basis, at the rates, and pursuant to the conditions hereinafter set forth; and

WHEREAS, the District on behalf of individuals owning lands lying within the District adjacent to Fresno Slough has asserted claims that the construction and operation of the Central Valley Project has interfered with claimed rights in and to the use of the waters of the San Joaquin River by impairing the quantity thereof, and the District is authorized and willing to accept an annual delivery of nine thousand seven hundred (9,700) acre-feet of water from Mendota Pool as an adjustment and settlement of these asserted claims; and

WHEREAS, in the interest of conservation of water by avoiding high conveyance losses incurred in using its Kings River water the District has entered into an agreement entitled "James-Kings River Water and Storage Agreement", whereby certain other Kings River water users will be entitled to utilize the yield of the District's right to Kings River water concurrently with the term of this contract; and

WHEREAS, the District desires, in these circumstances, to purchase a firm supply of Central Valley Project water; and

WHEREAS, investigations of the streamflow in the Sacramento River, the Trinity River, the American River, and the San Joaquin River and their tributaries indicate that there will be available for furnishing to the District from the Delta-Mendota Canal, a feature of the Central Valley Project, an additional water supply for surface diversion and direct application for irrigation; and

WHEREAS, the United States is willing to furnish water service to the District from Mendota Pool, subject to the terms and conditions following;

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is mutually agreed as follows:

DEFINITIONS

1. When used herein, unless otherwise distinctly expressed or manifestly incompatible with the intent hereof, the term:

(a) "Secretary" or "Contracting Officer" shall mean the Secretary of the United States Department of the Interior or his duly authorized representative;

(b) "Project" shall mean the Central Valley Project, California, of the Bureau of Reclamation;

(c) "Schedule 2 water" shall mean all Project water delivered without charge under the authority of Section 14 of the Reclamation Project Act of 1939 (53 Stat. 1187, 1197) as a permanent adjustment and settlement of the District's asserted claims of rights to water in Fresno Slough tributary to the San Joaquin River;

(d) "supplemental water" shall mean all Project water in addition to Schedule 2 water delivered or required to be delivered under the terms and conditions of this contract;

(e) "year" shall mean the calendar year;

(f) "agricultural use" shall mean use of water primarily in the commercial production of agricultural crops or livestock including domestic use incidental thereto on tracts of land operated in units of more than two (2) acres; and

(g) "municipal, industrial, and domestic use" shall mean use of water other than for agricultural use.

TERM OF CONTRACT

2. This contract shall be effective on the date first hereinabove written and insofar as it pertains to the furnishing of supplemental water shall remain in effect for a period of forty (40) years; Provided, That under terms and conditions mutually agreeable to the parties hereto, renewals of this contract for furnishing of supplemental water may be made for successive periods not to exceed forty (40) years each. The terms and conditions of each renewal shall be agreed upon not later than one (1) year prior to the expiration of the then existing contract; Provided further, That upon written request by the District of the Secretary not later than one (1) year prior to expiration of this contract, whenever, account being taken of the amount then credited to the costs of construction of water supply works allocated to irrigation, the remaining amount of costs so allocated which is properly assignable for ultimate return by the District as established by the Secretary of the Interior pursuant to (3) of Section 1 of Public Law 643 (70 Stat. 483) probably can be repaid to the United States within the term of a contract under subsection (d), Section 9 of the 1939 Reclamation Project Act (53 Stat. 1187), this contract insofar as it pertains to the furnishing of supplemental water for agricultural use may be converted to a contract under said subsection (d) upon terms and conditions mutually agreeable to the United States and the District.

WATER TO BE FURNISHED TO THE DISTRICT

3. (a) Each year, commencing with the year following that in which this contract is executed, the United States shall furnish to the District nine thousand seven hundred (9,700) acre-feet of Schedule 2 water at times and in quantities called for as provided in subdivision (a) of Article 4 hereof under the following basic table:

Month	Quantities in Acre-feet
January	0
February	600
March	800
April	1,300
May	1,900
June	2,500
July	2,000
August	400
September	200
October	0
November	0
December	0;

Provided, That in any year when (1) the forecasted full natural inflow to Shasta Lake for the current water year (October 1 of the preceding year through September 30 of the current year), as such forecast is

made by the United States, on or before February 15, and reviewed as frequently thereafter as conditions and information warrant, is equal to or less than three million two hundred thousand (3,200,000) acre-feet, or (2) the total accumulated actual deficiencies below four million (4,000,000) acre-feet in the immediately prior water year or series of successive prior water years, each of which had inflows of less than four million (4,000,000) acre-feet, together with the forecasted deficiency for the current water year, exceed eight hundred thousand (800,000) acre-feet, the United States shall furnish to the District seven thousand six hundred (7,600) acre-feet of Schedule 2 water at times and in quantities called for as provided in subdivision (a) of Article 4 hereof under the following basic table:

Month	Quantities (Acre-feet)
January	0
February	600
March	800
April	1,000
May	1,500
June	1,900
July	1,400
August	300
September	100
October	0
November	0
December	0

For the purpose of determining (1) and (2) set out above, the computed inflow to Shasta Lake under present upstream development above Shasta Lake shall be used as the full natural inflow to Shasta Lake. In the event that major construction occurs above Shasta Lake after the date of this contract which materially alters the present regimen of the stream systems contributing to Shasta Lake, the computed inflow to Shasta Lake will be adjusted to eliminate the effect of such material alterations. The United States will select the forecast to be used and will submit the details of the forecast to the District. The same forecasts used by the United States for the operation of the Project shall be used to make the forecasts hereunder. Schedule 2 water made available by the United States for furnishing to the District in accordance with the aforesaid schedule and not accepted by the District shall be deemed to have been accepted by the District at the time and in the quantities specified in said schedule.

(b) Commencing with the year following that in which this contract is executed and each year thereafter during the remainder of the term of this contract, the United States shall furnish to the District and the District shall accept and pay for thirty-five thousand three hundred (35,300) acre-feet of supplemental water from Mendota Pool at the times and in the quantities specified in the schedule submitted by the District in accordance with subdivision (a) of

Article 4 hereof: Provided, That the parties hereto may at any time or times by mutual agreement increase or decrease the quantity of supplemental water required thereafter to be furnished each year to the District by the United States during the remaining years of the term of this contract.

(c) To the extent that additional Project water is available, as determined by the Contracting Officer, and in the event the District in any year requires a quantity of supplemental water in addition to the quantity it is obligated to accept and pay for, such additional water shall be furnished by the United States in accordance with a schedule revision submitted pursuant to Article 4. The furnishing by the United States and acceptance by the District of such additional quantities of water shall neither entitle nor obligate the District to receive such quantities in subsequent years.

(d) If in any year, after the Contracting Officer has approved a schedule or any revision thereof submitted by the District pursuant to Article 4 hereof, the United States is unable to furnish any portion of supplemental water in the quantities and at the times requested in the schedule and the District does not elect to receive and does not receive such water at other times during such year, the District shall be entitled to an adjustment as provided in Article 6.

TIME FOR DELIVERY OF WATER

4. (a) Before January 1 of each year the District shall submit a schedule in writing to the Contracting Officer subject to the provisions of Article 3 hereof and satisfactory to the Contracting Officer, indicating the desired times and quantities for the delivery of all water pursuant to this contract during such year. In such schedule or revision thereof, the District may reallocate the quantities of Schedule 2 water for the months of February through June appearing in the applicable table in subdivision (a) of Article 3 hereof so long as the total for such months does not thereby exceed the total for such months in that table. Within the provisions hereof the United States shall attempt to deliver such water in accordance with said schedule or any revision thereof satisfactory to the Contracting Officer submitted by the District within a reasonable time before the desired change of times or quantities, or both, for delivery, subject to the provisions of subdivision (b) of Article 8 hereof: Provided, That the United States shall not be obligated to deliver water to the District during the months of December and January.

(b) With the written consent of the Contracting Officer the District may exchange supplemental water in any year with any other district which has contracted with the United States for water for irrigation from the Delta-Mendota Canal or Mendota Pool, or both,

of the Central Valley Project. No supplemental water shall be sold or otherwise disposed of for use outside the District without the written consent of the Contracting Officer.

RATE AND METHOD OF PAYMENT FOR WATER

5. (a) On or before December 15 of each year the Contracting Officer shall furnish to the District written notice of the rate of payment to be made by the District for supplemental water to be delivered pursuant to this contract during the ensuing year, but in no event shall the rate so announced be in excess of Three Dollars and Fifty Cents ($3.50) per acre-foot.

(b) The District shall make payments to the United States each year at the rate fixed as provided in subdivision (a) of this article for the quantity of supplemental water which the District is required to accept and pay for during such year pursuant to the provisions of Article 3 hereof. Prior to the delivery of supplemental water but no later than February 15 the District shall pay one-half (1/2) of the amount payable for said water scheduled for the year and shall pay the remainder of the amount payable for said water at the time the quantity of water furnished to the District equals the quantity for which payment has been made, but in no event later than July 1 or such other later date or dates of the respective year as may be specified by the Contracting Officer in a written notice to

the District. Supplemental water requested by the District in excess of the quantity it has scheduled shall be paid for in full at the time or times such requests are made.

(c) In event the District is unable, fails, or refuses to accept delivery of the quantities of water available for delivery to and required to be accepted or paid by it pursuant to this contract or in the event the District in any year fails to submit a schedule for delivery as provided in subdivision (a) of Article 4 hereof, said inability, failure, or refusal shall not relieve the District of its obligation to pay for said water and the District agrees to make payment therefor in the same manner as if said water had been delivered to and accepted by it in accordance with this contract.

ADJUSTMENTS

6. The amount of any overpayment by the District by reason of the quantity of supplemental water actually available for the District during any year, as conclusively determined by the Contracting Officer, having been less than the quantity of such water which the District otherwise under the provisions of this contract would have been required to receive and pay for shall be applied first to any accrued indebtedness arising out of this contract then due and owing to the United States by the District and any amount of such overpayment then remaining shall, at the option of the District, be refunded to the

District or credited upon amounts to become due to the United States from the District under the provisions hereof in the ensuing year.

POINTS OF DELIVERY, MAINTENANCE OF FLOWS AND LEVELS, MEASUREMENT AND RESPONSIBILITY FOR DISTRIBUTION OF WATER

7. (a) The water to be furnished to the District pursuant to this contract shall be delivered from Mendota Pool at diversion points mutually agreed upon by the Contracting Officer and the District.

(b) All water furnished pursuant to this contract shall be measured by the United States at the points of delivery established pursuant to subdivision (a) of this article with equipment installed, operated, and maintained by the United States. Upon the request of the District the accuracy of such measurements shall be investigated by the Contracting Officer and any errors appearing therein adjusted.

(c) The United States shall not be responsible for the control, carriage, handling, use, disposal, or distribution of water which may be furnished at the delivery points established pursuant to subdivision (a) of this article, nor for claim of damage of any nature whatsoever, including but not limited to property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such water beyond such delivery points: Provided, that the United States reserves the right to the use of all waste, seepage, and return-flow water derived

from supplemental water furnished to the District hereunder which escapes or is discharged beyond the District's boundaries and nothing herein shall be construed as an abandonment or a relinquishment by the United States of the right to use any such water, but this shall not be construed as claiming for the United States any right, as waste, seepage, or return flow, to water being used pursuant to this contract for surface irrigation or underground storage within the District's boundaries by the District or those claiming by, through, or under the District.

(d) The United States may temporarily discontinue or reduce the quantity of water to be furnished to the District as herein provided for the purpose of such investigation, inspection, maintenance, repair, or replacement as may be reasonably necessary of any of the Project facilities used for the furnishing of water to the District or any part thereof, but so far as feasible the United States shall give the District due notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which case no notice need be given. In the event of any such discontinuance or reduction, upon the resumption of service to the extent it may be possible to do so and within the ability of the District to accept the same, the United States shall deliver the quantity of water which would have been furnished to the District in the absence of such contingency.

(e) The right to the beneficial use of supplemental water furnished to the District pursuant to the terms of Article 3 and other applicable provisions of this contract and any renewal thereof, insofar as the renewal relates to the furnishing of water for agricultural use, shall not be disturbed so long as the District shall fulfill all of its obligations under this contract and any such renewal.

UNITED STATES NOT LIABLE FOR WATER SHORTAGE

8. (a) There may occur at times during any year a shortage in the quantity of water available for furnishing to the District through and by means of the Project, but in no event shall any liability accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising from a shortage on account of errors in operation, drought, or other causes. In any year in which there may occur a shortage from any cause, the United States will furnish Schedule 2 water in accordance with Article 3 hereof and reserves the right to apportion the available supplemental water supply among the District and others entitled under the then existing contracts to receive water from the Delta-Mendota Canal or Mendota Pool, or both, in accordance with conclusive determinations of the Contracting Officer, as follows:

(1) A determination shall be made of the total quantity of supplemental water agreed to be accepted during the respective

year under all contracts then in force for the delivery of water from the Delta-Mendota Canal or Mendota Pool, or both, the quantity so determined being hereinafter referred to as the contractual commitments;

(ii) A determination shall be made of the total quantity of water from the Delta-Mendota Canal or Mendota Pool, or both, which is in excess of the quantity necessary to meet the requirements of the Amended Contract for Exchange of Waters, No. Ilr-1144, dated March 17, 1956, and which is available for meeting the contractual commitments, the quantity so determined being hereinafter referred to as the available supply;

(iii) The total quantity of supplemental water agreed to be furnished to the District by the United States during the respective year under Article 3 hereof shall be divided by the contractual commitments, the quotient thus obtained being hereinafter referred to as the District's contractual entitlement; and

(iv) The available supply shall be multiplied by the District's contractual entitlement and the result shall be the quantity of supplemental water required to be delivered by the United States to the District for the respective year.

Insofar as determined by the Contracting Officer to be practicable, in the event a shortage appears probable the United States shall notify the District of such determination in advance of the irrigation season.

(b) In the event that in any year there is delivered to the District, by reason of any shortage or apportionment as provided in subdivision (a) of this article or any discontinuance or reduction of service as set forth in subdivision (d) of Article 7 hereof, less than the quantity of supplemental water which the District otherwise would be entitled to receive, there shall be made an adjustment on account of the amounts paid to the United States by the District for water for said year in a manner similar to that provided for in Article 6 hereof. To the extent of such deficiency, such adjustment shall constitute the sole remedy of the District or anyone having or claiming to have by, through, or under the District the right to the use of any of the water supply provided for herein.

(c) The rights of the District to supplemental water under this contract are subject to the terms of the Amended Contract for Exchange of Waters, No. Ilr-1144, dated March 17, 1956.

MUNICIPAL, INDUSTRIAL, AND DOMESTIC USE OF WATER FURNISHED TO DISTRICT

9. (a) Supplemental water furnished in accordance with Article 3 of this contract is for agricultural use but may be furnished by the District for municipal, industrial, and domestic use subject to the terms and conditions hereinafter stated.

(b) Within thirty (30) days after a statement therefor has been furnished to the District by the United States, the District shall pay for the quantity of supplemental water so used for municipal, industrial, and domestic purposes at a rate per acre-foot equal to the difference between the rate paid for said water for agricultural use and Ten Dollars ($10).

(c) Supplemental water furnished by the District pursuant to this article shall be measured by the District with equipment installed, operated, and maintained by the District. Said equipment and its installation, service, and use shall be approved by the Contracting Officer. The United States shall have full and reasonable access at all reasonable times to inspect said measuring equipment for the purpose of determining the accuracy and condition thereof, and any errors in measurement disclosed by said inspection shall be adjusted. If said facilities are found to be defective or inaccurate they shall be readjusted, repaired, or replaced by the District. In

the event the District neglects or fails to make such repairs or replacements within a reasonable time as may be necessary to satisfy the operating requirements of the Contracting Officer, the United States may cause the repairs or replacements to be made and the costs thereof charged to the District, which charge the District shall pay to the United States before April 1 of the year following that in which the cost was incurred and a statement thereof furnished by the United States.

(d) The District shall maintain, in a manner satisfactory to the Contracting Officer, records of the quantity of supplemental water furnished for use pursuant to subdivision (a) of this article and shall submit a report to the United States before the 7th day of each month following the month in which water is so furnished showing the quantities of water used.

(e) It is understood and agreed that use of water pursuant to this article shall not be construed in any manner as to constitute a right or commitment during the term of this contract or any renewal thereof for delivery of water in addition to that provided pursuant to Article 3 hereof.

QUALITY OF WATER

10. (a) The quality of water furnished under this contract shall be the best that the United States, following its established operating

procedures, can deliver by means of the Delta-Mendota Canal and shall be at all times suitable irrigation water for use upon the lands served by the District. The fact that the requirements of such water quality are herein stated only in terms of parts per million of total dissolved solids should not be construed as meaning that this particular measurement of water quality is the sole indication of requisite water quality. The best data presently available on the character of the possible sources of water supplying the Delta-Mendota Canal indicate that as concentration changes there will be no significant change in the character of the water with respect to the proportions of the various constituents; however, if such water meets the following specific requirements it shall be deemed conclusively to be suitable irrigation water hereunder:

(i) Daily: The quality of water shall not exceed a mean daily value of eight hundred (800) parts per million of total dissolved solids. The mean daily values are to be computed by weighting the instantaneous values on the basis of time of occurrence during each day;

(ii) Monthly: The quality of water shall not exceed a mean monthly value of six hundred (600) parts per million of total dissolved solids. The mean monthly value is to be computed

by weighting each mean daily value of total dissolved solids on the basis of the quantity of water delivered each day of the month;

(iii) Annual: The quality of water shall not exceed a mean annual value during the year of four hundred and fifty (450) parts per million of total dissolved solids. The mean annual value is to be computed by weighting each mean daily value of total dissolved solids on the basis of quantity of water delivered each day of the year; and

(iv) Five-year: The average quality of water for any five (5) consecutive years shall not exceed a mean value of four hundred (400) parts per million of total dissolved solids. The 5-year average shall be computed by weighting each mean daily value of total dissolved solids on the basis of quantity of water delivered each day of the five (5) consecutive years ending with the current year.

(b) The quality of water delivered from the San Joaquin River shall be determined at the present location of the Whitehouse gaging station, and from the Delta-Mendota Canal shall be measured by a salinity recorder as presently installed in said Canal. The quality determination made at said gaging station and the rating of said recorder shall be from bottle samples taken twice each month

from which total dissolved solids will be determined by chemical analysis. When water is being delivered from the Delta-Mendota Canal and from the San Joaquin River simultaneously, the quality of all water so delivered shall be determined by computing the weighted average quality of all water so delivered. All quality determinations shall be made by the Contracting Officer.

DRAINAGE STUDIES AND FACILITIES

11. To aid in determining the source and solution of future potential drainage problems the District shall, in a manner satisfactory to the Contracting Officer, maintain a grid of observation wells and shall furnish annually to the Contracting Officer during the term of this contract and any renewal thereof records and analyses of well readings as they relate to potential drainage problems. When a continuing rise in the ground water indicates the need therefor, the District shall construct drainage works to protect the irrigability of lands within the District.

WATER RIGHTS SETTLEMENT

12. Neither the District nor any landowner therein shall divert, dispose of, or otherwise use San Joaquin water under any claims of water rights so long as the United States delivers or is ready, able, and willing to deliver to the District Schedule 2 water in accordance with the terms of this contract. Performance by the United States

of its obligations hereunder with respect to the delivery of Schedule 2 water shall release the United States from liability with respect to such claims.

ACCESS TO FRESNO SLOUGH

13. To the extent the District has the power to grant such use, the United States may use the roads within the boundaries of the District as the same may exist from time to time for ingress and egress to and from Fresno Slough.

CHARGES A GENERAL OBLIGATION--LEVIES THEREFOR

14. (a) The District as a whole is obligated to pay to the United States the charges becoming due as provided in this contract notwithstanding the default in the payment to the District by individual water users of assessments, tolls, or other charges levied by the District.

(b) The District will cause to be levied and collected all necessary assessments, tolls, and other charges, and will use all of the authority and resources of the District to meet its obligations hereunder.

ALL BENEFITS CONDITIONED UPON PAYMENT

15. Should any assessment or assessments required by the terms of this contract and levied by the District against any tract of land or water user in the District and necessary to meet the obligations

of the District thereunder be judicially determined to be irregular or void, or should the District or its officers be enjoined or restrained from making or collecting any assessments upon such land or from such water user as provided for herein, then such tract shall have no right to any supplemental water furnished to the District pursuant to this contract, and no supplemental water made available by the United States pursuant hereto shall be furnished for the benefit of any such lands or water users, except upon the payment by the landowner of his assessment or a toll charge for such water, notwithstanding the existence of any contract between the District and the owner or owners of such tract. Contracts, if any, between the District and the water users involving supplemental water furnished pursuant to this contract shall provide that such use shall be subject to the terms of this contract. It is further agreed that the payment of charges at the rate and upon the terms and conditions provided for herein is a prerequisite to the right to the use of supplemental water furnished to the District pursuant to this contract, and no irregularity in levying taxes or assessments by the District nor lack of authority in the District, whether affecting the validity of District taxes or assessments or not, shall be held to authorize or permit any water user of the District to demand supplemental water made available

pursuant to this contract, unless charges at the rate and upon the terms and conditions provided therefor by the District have been paid by such water user.

REFUSAL OF WATER IN CASE OF DEFAULT

16. No supplemental water shall be furnished to the District or by the District to or for the use of any lands or parties therein during any period in which the District may be in arrears in the advance payment of charges accruing under this contract. No supplemental water shall be furnished to or by the District pursuant to this contract for lands or parties which are in arrears in the payment to the District of any assessments, rates, tolls, or rental charges of the District levied or established by the District and necessary for the purpose of raising revenues to meet the payment by the District to the United States of the District's obligation under this contract.

PENALTY FOR DELINQUENT PAYMENTS

17. The District shall pay a penalty on installments or charges which become delinquent computed at the rate of one-half of one percent per month of the amount of such delinquent installments or charges for each day from the date of such delinquency until paid: Provided, That no penalty shall be charged to the District unless such delinquency continues for more than thirty (30) days.

BOOKS, RECORDS, AND REPORTS

18. The District shall establish and maintain accounts and other books and records pertaining to its financial transactions, land use and crop production, water use, and to such other matters as the Contracting Officer may require. Reports thereon shall be furnished to the United States in such form and on such date or dates as may be required by the Contracting Officer. Each party shall have the right, during office hours, to examine and make copies of the other party's books and official records relating to matters covered by this contract.

CHANGES IN DISTRICT ORGANIZATION

19. (a) While this contract is in effect and excepting a total of five hundred (500) acres of inclusions and exclusions, upon prior notice to the Contracting Officer, no change shall be made in the District, by inclusion or exclusion of lands, by dissolution, consolidation, or merger or otherwise, except upon the Contracting Officer's written consent thereto.

(b) In the event lands are annexed to or excluded from the District as provided herein, the parties hereto may by supplemental agreement increase or decrease the quantity of supplemental water which is to be furnished by the United States to the District and which the District is required to receive and pay for pursuant to this contract.

LANDS NOT TO RECEIVE WATER FURNISHED TO DISTRICT BY UNITED STATES UNTIL OWNERS THEREOF EXECUTE CERTAIN CONTRACTS

20. (a) No supplemental water made available pursuant to this contract shall be furnished to any excess lands as defined in Article 22 hereof unless the owners thereof shall have executed valid recordable contracts in form prescribed by the United States, agreeing to the provisions of this article and Articles 21 and 22 of this contract; agreeing to the appraisal provided for in Article 21 hereof and that such appraisal shall be made on the basis of the actual bona fide value of such lands at the date of the appraisal without reference to the construction of the Project, all as hereinafter provided, and agreeing to the sale of such excess lands under terms and conditions satisfactory to the Secretary and at prices not to exceed those fixed as hereinafter provided. No sale of any excess lands shall carry the right to receive supplemental water made available pursuant to this contract unless and until the purchase price involved in such sale is approved by the Contracting Officer and upon proof of fraudulent representation as to the true consideration involved in such sales, the United States may instruct the District by written notice to refuse to furnish any supplemental water subject to this contract to the land involved in such fraudulent sales, and the District thereafter shall not furnish said water to such lands.

(b) If supplemental water furnished to the District pursuant to this contract reaches the underground strata of excess land owned by a large landowner, as defined in subdivision (a) of Article 22 hereof, who has not executed a recordable contract and the large landowner pumps such supplemental water from the underground, the District will not be deemed to have furnished such water to said lands within the meaning of this contract if such water reached the underground strata of the aforesaid excess land as an unavoidable result of the furnishing of supplemental water by the District to nonexcess lands or to excess lands with respect to which a recordable contract has been executed.

VALUATION AND SALE OF EXCESS LANDS

21. (a) The value of the excess irrigable lands within the District held in private ownership of large landowners as defined in the next succeeding article hereof, for the purposes of this contract, shall be appraised in a manner to be prescribed by the Secretary. At the option of a large landowner, however, the value of such land may be appraised, subject to the approval thereof by the Secretary, by three appraisers. One of said appraisers shall be designated by the Secretary and one shall be designated by the District and the two appraisers so appointed shall name the third. If the appraisers so designated by the Secretary and the District are unable to agree

upon the appointment of the third, the Presiding Justice of the Fifth District Court of Appeal of the State of California shall be requested to designate the third appraiser.

(b) The following principles shall govern the appraisal:

(i) No value shall be given such lands on account of the existing or prospective possibility of securing supplemental water from the Project;

(ii) The value of improvements on the land at the time of said appraisal shall be included therein, but also shall be set forth separately in such appraisal.

(c) The excess land of any large landowner shall be reappraised at the instance of the United States or at the request of said landowner. The cost of the first two appraisals of each tract of excess land shall be paid by the United States. The cost of each appraisal thereafter shall be paid by the party requesting such appraisal.

(d) Any improvements made or placed on the appraised land after the appraisal hereinabove provided for prior to sale of the land by a large landowner shall be appraised in like manner.

(e) Excess irrigable lands sold by large landowners within the District shall not carry the right to receive supplemental water made available pursuant to this contract for such lands and the District agrees to refuse to furnish such water to lands so sold until, in

addition to compliance with the other provisions hereof, a verified statement showing the sale price upon any such sale shall have been filed with the District and said sale price is not in excess of the appraised value fixed as provided herein.

(f) The District agrees to take all reasonable steps requested by the Contracting Officer to ascertain the occurrence and conditions of all sales of irrigable land of large landowners in the District made subsequent to the execution of this contract and to inform the United States concerning the same.

(g) A true copy of this contract, of each recordable contract executed pursuant to this article and Articles 20 and 22 hereof, and of each appraisal made pursuant thereto shall be furnished to the District by the United States and shall be maintained on file in the office of the District and like copies in such offices of the Bureau of Reclamation as may be designated by the Contracting Officer and shall be made available for examination during the usual office hours by all persons who may be interested therein.

EXCESS LANDS

22. (a) As used herein the term "excess land" means that part of the irrigable land within the District in excess of one hundred and sixty (160) acres held in the beneficial ownership of any single person; or in excess of three hundred and twenty (320) acres held in the

beneficial ownership of husband and wife jointly, as tenants in common or by the entirety, or as community property. The term "large landowner" means an owner of excess lands and the term "nonexcess land" means all irrigable land within the District which is not excess land as defined herein.

(b) Each large landowner as a further condition precedent to the right to receive supplemental water made available pursuant to this contract for any of his excess land shall:

(i) Before any supplemental water is furnished by the District to his excess land, execute a valid recordable contract in form prescribed by the United States, agreeing to the provisions contained in this article and Articles 20 and 21 hereof and agreeing to dispose of his excess land in accordance therewith to persons who can take title thereto as nonexcess land as herein provided and at a price not to exceed the approved, appraised value of such excess land and within a period of ten (10) years after the date of the execution of said recordable contract and agreeing further that if said land is not so disposed of within said period of ten (10) years, the Secretary shall have the power to dispose of said land at the appraised value thereof fixed as provided herein or such lower price as may be approved by the owner of such land, subject to the same conditions on behalf

of such large landowner; and the District agrees that it will refuse to furnish said water to any large landowner other than for his nonexcess land until such owner meets the conditions precedent herein stated;

(ii) Within thirty (30) days after the date of notice from the United States requesting such large landowner to designate his irrigable lands within the District which he desires to designate as nonexcess lands, file in the office of the District, in duplicate, one copy thereof to be furnished by the District to the Bureau of Reclamation, his written designation and description of lands so selected to be nonexcess land and upon failure to do so the District shall make such designation and mail a notice thereof to such large landowner, and in the event the District fails to act within such period of time as the Contracting Officer considers reasonable, such designation will be made by the Contracting Officer, who will mail a notice thereof to the District and the large landowner. The large landowner shall become bound by any such action on the part of the District or the Contracting Officer and the District will furnish said water only to the land so designated to be nonexcess land. A large landowner may, with the consent of the Contracting Officer, designate land other than that previously designated as nonexcess land: Provided,

That an equal acreage of the land previously designated as non-excess shall, upon such new designation, become excess land thereafter subject to the provisions of this article and Articles 20 and 21 of this contract and shall be described in an amendment of such recordable contract as may have been executed by the large landowner in the same manner as if such land had been excess land at the time of the original designation.

AMENDMENT OF FEDERAL RECLAMATION LAWS

23. In the event that the Congress of the United States repeals the so-called excess-land provisions of the Federal reclamation laws, Articles 20, 21, and 22 of this contract will no longer be of any force or effect, and, in the event that the Congress amends the excess-land provisions or other provisions of the Federal reclamation laws, the United States agrees, at the option of the District, to negotiate amendments of appropriate articles of this contract, all consistently with the provisions of such repeal or amendment.

WATER ACQUIRED BY DISTRICT OTHER THAN FROM THE UNITED STATES

24. (a) Supplemental water furnished pursuant to the terms of this contract may be transported by means of the same distribution facilities as Schedule 2 water and other water now available or which may become available to the District or landowners within the District other than pursuant to the terms of this contract for the reason that

the Contracting Officer has determined that such mingling is necessary to avoid a duplication of facilities; notwithstanding such mingling of water, the provisions of this contract relating to supplemental water shall be applicable to the quantity of supplemental water furnished to the District pursuant to the terms hereof, but such mingling of water shall not in any manner subject to the provisions of this contract relating to supplemental water any Schedule 2 water or any other quantity of water acquired by or available to the District or landowners within the District other than from the United States.

(b) With respect to the distribution facilities or portions thereof in which mingling is permitted as provided in subdivision (a) hereof, the District:

(i) Will be responsible for the operation and maintenance of separate outlets from the distribution system for nonexcess and excess lands as defined in Article 22 hereof. At the request of the Contracting Officer, the District will be responsible for the installation, operation, and maintenance of water-measuring equipment at delivery points to excess lands and, further, will be responsible for the installation, operation, and maintenance of similar equipment for measuring the water available to the District or landowners within the District other than supplemental water and the Contracting Officer may check and inspect said equipment at any time;

(ii) Agrees that the quantity of supplemental water furnished to it by the United States during each 24-hour period will be delivered by the District only to eligible land through aforesaid outlets to eligible lands. The District shall be deemed to be in breach of this article and Articles 20, 21, and 22 of this contract if at any time there is furnished to all excess lands not covered by recordable contracts and served by the distribution facilities or portions thereof in which mingling is permitted, a quantity of water which is greater than the Schedule 2 water and that which the District or landowners within the District have introduced into said system from the supply available other than pursuant to this contract. For purposes of this article only, the quantity of Schedule 2 water for each 24-hour period in any month shall be derived by dividing the Schedule 2 water for that month by the number of days in that month: Provided, That in August and September the District may schedule releases in specific quantities of supplemental water and Schedule 2 water within the entitlements for each month.

CONTINGENT ON APPROPRIATION OR ALLOTMENT OF FUNDS

25. The expenditure of any money or the performance of any work by the United States hereunder which may require appropriation of money by the Congress or the allotment of funds shall be contingent upon such

appropriation or allotment being made. The failure of the Congress so to appropriate funds or the absence of an allotment of funds shall not relieve the District from any obligations then accrued under this contract and no liability shall accrue to the United States in case such funds are not appropriated or allotted.

OFFICIALS NOT TO BENEFIT

26. (a) No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this contract or to any benefit that may arise herefrom, but this restriction shall not be construed to extend to this contract if made with a corporation or company for its general benefit.

(b) No official of the District shall receive any benefit that may arise by reason of this contract other than as a landowner within the District and in the same manner as other landowners within the District.

NOTICES

27. (a) Any notice authorized or required to be given to the United States shall be deemed to have been given when mailed, postage prepaid, or delivered to the Regional Director, Region 2, Bureau of Reclamation, Post Office Box 2511, Sacramento, California. Any notice authorized or required to be given to the District shall be deemed to have been given when mailed in a postage-prepaid or franked envelope,

or delivered to the James Irrigation District, Post Office Box 787, San Joaquin, California. This article shall not preclude the effective service of any such notice or announcement by other means.

(b) The designation of the addressee or the address given above may be changed by notice given in the same manner as provided in this article for other notices.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

28. The provisions of this contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this contract or any part or interest therein shall be valid until approved by the Secretary.

REMEDIES UNDER CONTRACT NOT EXCLUSIVE--WAIVERS

29. Nothing contained in this contract shall be construed as in in any manner abridging, limiting, or depriving the United States of any means of enforcing any remedy, either at law or in equity, for the breach of any of the provisions hereof which it would otherwise have. Any waiver at any time by either party to this contract of its rights with respect to a default, or any matter arising in connection with this contract, shall not be deemed to be a waiver with respect to any subsequent default or matter.

DETERMINATIONS

30. (a) In the event the District questions any factual determination made by any representative of the Secretary as required in the administration of this contract, any findings as to the facts in dispute thereafter made by the Secretary shall be made only after consultation with the District's Board of Directors.

(b) Where the terms of this contract provide for action to be based upon the opinion or determination of either party to this contract, whether or not stated to be conclusive, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations.

RULES AND REGULATIONS

31. The United States may prescribe and from time to time may modify rules and regulations not inconsistent with terms of this contract to carry out its purposes.

ASSURANCE RELATING TO VALIDITY OF CONTRACT

32. Promptly after the execution and delivery of this contract the District shall file and prosecute to a final decree, including any appeal therefrom to the highest court of the State of California, in a court of competent jurisdiction a special proceeding for the judicial examination, approval, and confirmation of the proceedings had for the organization of the District and the proceedings of the District Board

of Directors and of the District leading up to and including the making of this contract and the validity of the provisions thereof; and this contract shall not be binding on the United States until said District organization, proceedings, and contract shall have been so confirmed by a court of competent jurisdiction or pending appellate action in any court if ground for appeal be laid: Provided, That nothing herein contained shall require the District to assume the responsibility of prosecuting judicial review beyond the highest court of the State of California.

IN WITNESS WHEREOF, the parties hereto have executed this contract the day and year first above written.

APPROVED AS TO LEGAL FORM AND SUFFICIENCY

ASSISTANT REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE UNITED STATES OF AMERICA

By _____
Regional Director, Region 2
Bureau of Reclamation

(SEAL) Attested

JAMES IRRIGATION DISTRICT

By _____
President

ATTEST:

_____
Secretary

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.

On this 23rd day of December, 1963, before me, GENEVA KELLY, a Notary Public in and for said county and state, residing therein, duly commissioned and sworn, personally appeared R. J. PAFFORD, JR., known to me to be the Regional Director, Region 2, Bureau of Reclamation, Department of the Interior of THE UNITED STATES OF AMERICA, which executed the within CONTRACT PROVIDING FOR WATER SERVICE AND FOR ADJUSTMENT AND SETTLEMENT OF CERTAIN CLAIMED WATER RIGHTS, and known to me to be the person who executed the within contract on behalf of The United States of America, and acknowledged to me that The United States of America executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate above written.

Geneva Kelly

My Commission Expires:
June 11, 1965

GENEVA KELLY
NOTARY PUBLIC - CALIFORNIA
PRINCIPAL OFFICE IN
FRESNO COUNTY

* * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.

On this 23rd day of December, 1963, before me, GENEVA KELLY, a Notary Public in and for said county and state, residing therein, duly commissioned and sworn, personally appeared Harold Hale, known to me to be the President, and Don A. Wright, known to me to be the Secretary of JAMES IRRIGATION DISTRICT, the district that executed the within CONTRACT PROVIDING FOR WATER SERVICE AND FOR ADJUSTMENT AND SETTLEMENT OF CERTAIN CLAIMED WATER RIGHTS, and known to me to be the persons who executed the within contract on behalf of the district therein named, and acknowledged to me that such district executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate above written.

Geneva Kelly

My Commission Expires:
June 11, 1965

GENEVA KELLY
NOTARY PUBLIC - CALIFORNIA
PRINCIPAL OFFICE IN
FRESNO COUNTY

RESOLUTION
OF THE BOARD OF DIRECTORS OF
JAMES IRRIGATION DISTRICT
APPROVING AND AUTHORIZING EXECUTION
OF CONTRACT WITH THE UNITED STATES OF
AMERICA PROVIDING FOR WATER SERVICE
AND ADJUSTMENT AND SETTLEMENT
OF CERTAIN CLAIMED WATER RIGHTS

WHEREAS, the James Irrigation District is in need of supplemental irrigation water for the lands served by the District and in need of a more reliable and regular source of delivery of irrigation waters to the District than now exists, all over and above and in addition to the ground water sources of supply available to the District by pumping; and

WHEREAS, the irrigation water rights of the District on the Kings River and the storage thereof are in amounts irregular and inconsistent annually and impracticable of efficient delivery to the District; and

WHEREAS, the United States has offered to supply to the said District, for a period of forty (40) years, supplemental water, in more regular and consistent amounts annually, at a reasonable price, partly in lieu of the District's Kings River supplies and partly in supplement to the entire District water resources; and

WHEREAS, concurrently herewith, the District is renting to other entities on the Kings River, for a period of forty (40) years, the Kings River water and storage rights of the District, for the same price and terms being offered by the United States, but for quantities of said Kings River water rights undiminished by the losses of delivery incurred by this District when using same; and

WHEREAS, the District and lands therein has heretofore had certain riparian rights on the San Joaquin River, which the United States desires to acquire permanently and divert elsewhere and, in exchange therefor, the United States offers to provide free an equivalent annual supply of water at the Mendota Pool, adjacent to the District, and a permanent exchange of water rights; and

WHEREAS, the electorate of this District has approved that certain contract offered by the United States providing for said supplemental water and said exchange of water rights,

which is entitled as follows:

CONTRACT BETWEEN THE UNITED STATES OF AMERICA AND THE JAMES IRRIGATION DISTRICT PROVIDING FOR WATER SERVICE AND FOR ADJUSTMENT AND SETTLEMENT OF CERTAIN CLAIMED WATER RIGHTS. R.O. Draft 11/4-1963, Rev. W.O. 11/15-1963;

and

WHEREAS, the California Districts Securities Commission has also approved the execution of said proposed contract with the United States, by the James Irrigation District; and

WHEREAS, it appears to be in the best interests of the District to enter into and execute said contract,

NOW, THEREFORE, BE IT RESOLVED: That the President and Secretary of this Board be, and they are hereby authorized and instructed to execute, on behalf of said District, that certain contract above described with the United States Department of the Interior Bureau of Reclamation, and to affix the seal of the District thereto, and to deliver such executed contract to the Contracting Authority for the United States for their concurrent execution thereof on behalf of the United States.

PASSED AND ADOPTED this 16th day of December, 1963, by the following vote, to-wit:

AYES: Three

NOES: None

ABSENT: Two

--- ooo ---

CERTIFICATE OF SECRETARY

I HEREBY CERTIFY that I am the duly appointed, qualified and acting Secretary of James Irrigation District and that the foregoing Resolution was duly adopted at a meeting of the Board of Directors of this Company duly and regularly held at San Joaquin, California, on the 16th day of December, 1963, at which time a quorum of said Board of Directors was at all times present and acting; and that said Resolution has not been rescinded or amended, in whole or in part, but remains in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and the seal of said District this 18th day of December, 1963.

Donald Wright, Secretary of
James Irrigation District.

Appendix L – Exhibit 6 of the James Irrigation District Comment Letter

Contract No.
14-06-200-700-A-LTR1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

LONG-TERM RENEWAL CONTRACT BETWEEN THE UNITED STATES
AND
JAMES IRRIGATION DISTRICT
PROVIDING FOR PROJECT WATER SERVICE
FROM DELTA DIVISION

THIS CONTRACT, made this 25th day of February, 2005, in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, and JAMES IRRIGATION DISTRICT, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States has constructed and is operating the Central Valley Project (Project), California, for diversion, storage, carriage, distribution and beneficial use, for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of waters of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries; and

[2nd] WHEREAS, the United States constructed the Delta-Mendota Canal and related facilities, which will be used in part for the furnishing of water to the Contractor pursuant to the terms of this Contract; and

[3rd] WHEREAS, the rights to Project Water were acquired by the United States pursuant to California law for operation of the Project; and

[4th] WHEREAS, the Contractor and the United States entered into Contract No. 14-06-200-700-A, dated December 23, 1963, which established terms for the delivery of 9,700 acre-feet of Schedule 2 water as a permanent adjustment and settlement of the Contractor's asserted claims of rights to water in Fresno Slough, tributary to the San Joaquin River in fulfillment of such rights; and

[5th] WHEREAS, Schedule 2 water is not the subject of this Contract and will continue to be delivered and administered under the terms and conditions of Contract No. 14-06-200-700-A; and

[5.1] WHEREAS, Contract No. 14-06-200-700-A also established the terms for the delivery of 35,300 acre-feet of supplemental water, hereinafter referred to as Project Water, to the Contractor from Delta Division facilities from December 23, 1963, through December 23, 2003; and

[5.2] WHEREAS, the Contractor and the United States have pursuant to subsection 3404(c)(1) of the Central Valley Project Improvement Act (CVPIA), subsequently entered into interim renewal contract(s) identified as Contract No(s). 14-06-200-700-A-IR1 and 14-06-200-700-A-IR2, the current of which is hereinafter referred to as the Existing Contract, which provided for the delivery of Project Water to the Contractor from March 1, 2004, through February 28, 2006; and

[6th] WHEREAS, Section 3404(c) of the CVPIA provides for long-term renewal of the Existing Contract following completion of appropriate environmental documentation, including a programmatic environmental impact statement (PEIS) pursuant to the National Environmental Policy Act (NEPA) analyzing the direct and indirect impacts and benefits of implementing the CVPIA and the potential renewal of all existing contracts for Project Water; and

[7th] WHEREAS, the United States has completed the PEIS and all other appropriate environmental review necessary to provide for long-term renewal of the terms and conditions for Project Water service under the Existing Contract; and

[8th] WHEREAS, the Contractor has requested a long-term renewal contract for Project Water service, pursuant to the terms of the Existing Contract, Federal Reclamation law, and the laws of the State of California; and

[9th] WHEREAS, the United States has determined that the Contractor has fulfilled all of its obligations under the Existing Contract; and

[10th] WHEREAS, the Contractor has demonstrated to the satisfaction of the Contracting Officer that the Contractor has utilized the Project Water supplies available to it for reasonable and beneficial use and/or has demonstrated projected future demand for water use such that the Contractor has the capability and expects to utilize fully for reasonable and beneficial use the quantity of Project Water to be made available to it pursuant to this Contract; and

[11th] WHEREAS, water obtained from the Project has been relied upon by urban and agricultural areas within California for more than 50 years, and is considered by the Contractor as an essential portion of its water supply; and

[12th] WHEREAS, the economies of regions within the Project, including the Contractor's, depend upon the continued availability of water, including water service from the Project; and

[13th] WHEREAS, the Secretary intends through coordination, cooperation, and partnerships to pursue measures to improve water supply, water quality, and reliability of the Project for all Project purposes; and

[14th] WHEREAS, the mutual goals of the United States and the Contractor include: to provide for reliable Project Water supplies; to control costs of those supplies; to achieve repayment of the Project as required by law; to guard reasonably against Project Water shortages; to achieve a reasonable balance among competing demands for use of Project Water; and to comply with all applicable environmental statutes, all consistent with the legal obligations of the United States relative to the Project; and

[15th] WHEREAS, the parties intend by this Contract to develop a more cooperative relationship in order to achieve their mutual goals; and

[15.1] WHEREAS, the Contractor has utilized or may utilize transfers, contract assignments, rescheduling and conveyance of Project Water and non-Project water under this Contract as tools to minimize the impacts of Conditions of Shortage and to maximize the beneficial use of water; and

[15.2] WHEREAS, the parties desire and intend that this Contract not provide a disincentive to the Contractor in continuing to carry out the beneficial activities set out in the Explanatory Recital immediately above; and

[16th] WHEREAS, the United States and the Contractor are willing to enter into this Contract pursuant to Federal Reclamation law on the terms and conditions set forth below;

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby mutually agreed by the parties hereto as follows:

DEFINITIONS

1. When used herein unless otherwise distinctly expressed, or manifestly incompatible with the intent of the parties as expressed in this Contract, the term:

(a) "Calendar Year" shall mean the period January 1 through December 31, both dates inclusive;

(b) "Charges" shall mean the payments required by Federal Reclamation law in addition to the Rates and Tiered Pricing Component specified in this Contract as determined annually by the Contracting Officer pursuant to this Contract;

(c) "Condition of Shortage" shall mean a condition respecting the Project during any Year such that the Contracting Officer is unable to deliver sufficient water to meet the Contract Total;

(d) "Contracting Officer" shall mean the Secretary of the Interior's duly authorized representative acting pursuant to this Contract or applicable Federal Reclamation law or regulation;

(e) "Contract Total" shall mean the maximum amount of water to which the Contractor is entitled under subdivision (a) of Article 3 of this Contract;

(f) "Contractor's Service Area" shall mean the area to which the Contractor is permitted to provide Project Water under this Contract as described in Exhibit "A" attached hereto, which may be modified from time to time in accordance with Article 35 of this Contract without amendment of this Contract;

(g) "CVPIA" shall mean the Central Valley Project Improvement Act, Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

(g.1) "Delta Division Facilities" shall mean those existing and future Project facilities in and south of the Sacramento-San Joaquin Rivers Delta, including, but not limited to, the Tracy Pumping Plant, the O'Neill Forebay, the O'Neill Pumping/Generating Plant, and the San Luis Reservoir, used to divert, store, and convey water to those Project Contractors entitled to receive water conveyed through the Delta-Mendota Canal.

(h) "Eligible Lands" shall mean all lands to which Irrigation Water may be delivered in accordance with Section 204 of the Reclamation Reform Act of October 12, 1982 (96 Stat. 1263), as amended, hereinafter referred to as RRA;

(i) "Excess Lands" shall mean all lands in excess of the limitations contained in Section 204 of the RRA, other than those lands exempt from acreage limitation under Federal Reclamation law;

(j) "Full Cost Rate" shall mean an annual rate, as determined by the Contracting Officer that shall amortize the expenditures for construction properly allocable to the Project irrigation or M&I functions, as appropriate, of facilities in service including all O&M deficits funded, less payments, over such periods as may be required under Federal Reclamation law, or applicable contract provisions. Interest will accrue on both the construction expenditures and funded O&M deficits from October 12, 1982, on costs outstanding at that date, or from the date incurred in the case of costs arising subsequent to October 12, 1982, and shall be calculated in accordance with subsections 202(3)(B) and (3)(C) of the RRA. The Full Cost Rate includes actual operation, maintenance, and replacement costs consistent with Section 426.2 of the Rules and Regulations for the RRA;

(k) "Ineligible Lands" shall mean all lands to which Irrigation Water may not be delivered in accordance with Section 204 of the RRA;

(l) "Irrigation Full Cost Water Rate" shall mean the Full Cost Rate applicable to the delivery of Irrigation Water;

(m) "Irrigation Water" shall mean Project Water that is used primarily in the production of agricultural crops or livestock, including domestic use incidental thereto, and watering of livestock;

(n) "Landholder" shall mean a party that directly or indirectly owns or leases nonexempt land, as provided in 43 CFR 426.2;

(o) "Municipal and Industrial (M&I) Water" shall mean Project Water, other than Irrigation Water, made available to the Contractor. M&I Water shall include water used for human use and purposes such as the watering of landscaping or pasture for animals (e.g., horses) which are kept for personal enjoyment or water delivered to landholdings operated in units of less than five acres unless the Contractor establishes to the satisfaction of the Contracting Officer that the use of water delivered to any such landholding is a use described in subdivision (m) of this Article;

(p) "M&I Full Cost Water Rate" shall mean the Full Cost Rate applicable to the delivery of M&I Water;

(q) "Operation and Maintenance" or "O&M" shall mean normal and reasonable care, control, operation, repair, replacement (other than capital replacement), and maintenance of Project facilities;

(r) "Operating Non-Federal Entity" shall mean the entity(ies), its (their) successors or assigns, which has (have) the obligation to operate and maintain all or a portion of the Delta Division Facilities pursuant to a written agreement(s) with the United States. When this Contract was entered into, the Operating Non-Federal Entity(ies) was (were) the San Luis & Delta-Mendota Water Authority;

(s) "Project" shall mean the Central Valley Project owned by the United States and managed by the Department of the Interior, Bureau of Reclamation;

(t) "Project Contractors" shall mean all parties who have water service contracts for Project Water from the Project with the United States pursuant to Federal Reclamation law;

(u) "Project Water" shall mean all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Project and in accordance with the terms and conditions of water rights acquired pursuant to California law; however, Schedule 2 Water shall not be considered Project Water for purposes of this Contract;

(v) "Rates" shall mean the payments determined annually by the Contracting Officer in accordance with the then current applicable water ratesetting policies for the Project, as described in subdivision (a) of Article 7 of this Contract;

(w) "Recent Historic Average" shall mean the most recent five-year average of the final forecast of Water Made Available to the Contractor pursuant to this Contract or its preceding contract(s);

(w.1) "Schedule 2 Water" shall mean that water as so defined under Contract No. 14-06-200-700-A with the United States, which will continue to be delivered and administered under said contract;

(x) "Secretary" shall mean the Secretary of the Interior, a duly appointed successor, or an authorized representative acting pursuant to any authority of the Secretary and through any agency of the Department of the Interior;

(y) "Tiered Pricing Component" shall be the incremental amount to be paid for each acre-foot of Water Delivered as described in subdivision (j) of Article 7 of this Contract;

(z) "Water Delivered" or "Delivered Water" shall mean Project Water diverted for use by the Contractor at the point(s) of delivery approved by the Contracting Officer;

(aa) "Water Made Available" shall mean the estimated amount of Project Water that can be delivered to the Contractor for the upcoming Year as declared by the Contracting Officer, pursuant to subdivision (a) of Article 4 of this Contract;

(bb) "Water Scheduled" shall mean Project Water made available to the Contractor for which times and quantities for delivery have been established by the Contractor and Contracting Officer, pursuant to subdivision (b) of Article 4 of this Contract; and

(cc) "Year" shall mean the period from and including March 1 of each Calendar Year through the last day of February of the following Calendar Year.

TERM OF CONTRACT

2. (a) This Contract shall be effective March 1, 2005, through February 28, 2030, and supersedes Contract No. 14-06-200-700-A-IR2. In the event the Contractor wishes to renew this Contract beyond February 28, 2030, the Contractor shall submit a request for renewal in writing to the Contracting Officer no later than two years prior to the date this Contract expires. The renewal of this Contract insofar as it pertains to the furnishing of Irrigation Water to the Contractor shall be governed by subdivision (b) of this Article, and the renewal of this Contract insofar as it pertains to the furnishing of M&I Water to the Contractor shall be governed by subdivision (c) of this Article.

(b) (1) Under terms and conditions of a renewal contract that are mutually agreeable to the parties hereto, and upon a determination by the Contracting Officer that at the time of contract renewal the conditions set forth in subdivision (b)(2) of this Article are met, and subject to

Federal and State law, this Contract, insofar as it pertains to the furnishing of Irrigation Water to the Contractor, shall be renewed for a period of 25 years.

(2) The conditions which must be met for this Contract to be renewed are: (i) the Contractor has prepared a water conservation plan that has been determined by the Contracting Officer in accordance with Article 26 of this Contract to meet the conservation and efficiency criteria for evaluating such plans established under Federal law; (ii) the Contractor is implementing an effective water conservation and efficiency program based on the Contractor's water conservation plan as required by Article 26 of this Contract; (iii) the Contractor is operating and maintaining all water measuring devices and implementing all water measurement methods as approved by the Contracting Officer pursuant to Article 6 of this Contract; (iv) the Contractor has reasonably and beneficially used the Project Water supplies made available to it and, based on projected demands, is reasonably anticipated and expects to fully utilize for reasonable and beneficial use the quantity of Project Water to be made available to it pursuant to such renewal; (v) the Contractor is complying with all terms and conditions of this Contract; and (vi) the Contractor has the physical and legal ability to deliver Project Water.

(3) The terms and conditions of the renewal contract described in subdivision (b)(1) of this Article and any subsequent renewal contracts shall be developed consistent with the parties' respective legal rights and obligations, and in consideration of all relevant facts and circumstances, as those circumstances exist at the time of renewal, including, without limitation, the Contractor's need for continued delivery of Project Water; environmental conditions affected by implementation of the Contract to be renewed, and specifically changes in those conditions that

occurred during the life of the Contract to be renewed; the Secretary's progress toward achieving the purposes of the CVPIA as set out in Section 3402 and in implementing the specific provisions of the CVPIA; and current and anticipated economic circumstances of the region served by the Contractor.

(c) This Contract, insofar as it pertains to the furnishing of M&I Water to the Contractor, shall be renewed for successive periods of up to 40 years each, which periods shall be consistent with the then-existing Reclamation-wide policy, under terms and conditions mutually agreeable to the parties and consistent with Federal and State law. The Contractor shall be afforded the opportunity to comment to the Contracting Officer on the proposed adoption and application of any revised policy applicable to the delivery of M&I Water that would limit the term of any subsequent renewal contract with the Contractor for the furnishing of M&I Water to less than 40 years.

(d) The Contracting Officer shall make a determination ten years after the date of execution of this Contract, and every five years thereafter during the term of this Contract, of whether a conversion of the relevant portion of this Contract to a contract under subsection 9(d) of the Reclamation Project Act of 1939 can be accomplished pursuant to the Act of July 2, 1956 (70 Stat 483). The Contracting Officer shall also make a determination ten years after the date of execution of this Contract and every five years thereafter during the term of this Contract of whether a conversion of the relevant portion of this Contract to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939 can be accomplished. Notwithstanding any provision of this Contract, the Contractor reserves and shall have all rights and benefits under the Act of July 2, 1956 (70 Stat. 483). The Contracting Officer anticipates that during the term of this Contract, all authorized Project

construction expected to occur will have occurred, and on that basis the Contracting Officer agrees upon such completion to allocate all costs that are properly assignable to the Contractor, and agrees further that, at any time after such allocation is made, and subject to satisfaction of the condition set out in this subdivision, this Contract shall, at the request of the Contractor, be converted to a contract under subsection 9(d) or 9(c)(1), whichever is applicable, of the Reclamation Project Act of 1939, subject to applicable Federal law and under stated terms and conditions mutually agreeable to the Contractor and the Contracting Officer. A condition for such conversion to occur shall be a determination by the Contracting Officer that, account being taken of the amount credited to return by the Contractor as provided for under Federal Reclamation law, the remaining amount of construction costs assignable for ultimate return by the Contractor can probably be repaid to the United States within the term of a contract under subsection 9(d) or 9(c)(1), whichever is applicable. If the remaining amount of costs that are properly assignable to the Contractor cannot be determined during the term of this Contract, the Contracting Officer shall notify the Contractor, and provide the reason(s) why such a determination could not be made. Further, the Contracting Officer shall make such a determination as soon thereafter as possible so as to permit, upon request of the Contractor and satisfaction of the conditions set out above, conversion to a contract under subsection 9(d) or 9(c)(1), whichever is applicable. In the event such determination of costs has not been made at a time which allows conversion of this Contract during the term of this Contract or the Contractor has not requested conversion of this Contract within such term, the parties shall incorporate in any subsequent renewal contract as described in subdivision (b) of this Article a provision that carries forth in substantially identical terms the provisions of this subdivision.

WATER TO BE MADE AVAILABLE AND DELIVERED TO THE CONTRACTOR

3. (a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 35,300 acre-feet of Project Water for irrigation and M&I purposes. Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract. Schedule 2 water shall continue to be delivered to the Contractor at no cost pursuant to Contract No. 14-06-200-700-A, dated December 23, 1963, and shall not be subject to the provisions of this Contract, and said Contract No. 14-06-200-700-A shall be in full force and effect insofar as it pertains to the furnishing of Schedule 2 water.

(b) Because the capacity of the Project to deliver Project Water has been constrained in recent years and may be constrained in the future due to many factors including hydrologic conditions and implementation of Federal and State laws, the likelihood of the Contractor actually receiving the amount of Project Water set out in subdivision (a) of this Article in any given Year is uncertain. The Contracting Officer's modeling referenced in the PEIS projected that the Contract Total set forth in this Contract will not be available to the Contractor in many years. During the most recent five years, the Recent Historic Average of Water Made Available to the Contractor was 23,227 acre-feet. Nothing in subdivision (b) of this Article shall affect the rights and obligations of the parties under any provision of this Contract.

(c) The Contractor shall utilize the Project Water in accordance with all applicable legal requirements.

(c.1) In the event any Project Contractor (other than a Cross Valley Contractor) that receives Project Water through the Delta Division Facilities obtains a contractual agreement that the Contracting Officer shall make Project Water available at a point or points of delivery in or north of the Delta, at the request of the Contractor and upon completion of any required environmental documentation, this Contract shall be amended to provide for deliveries in or north of the Delta on mutually agreeable terms. Such amendments to the Contract shall be limited solely to those changes made necessary by the addition of such alternate points of delivery in or north of the Delta; Provided, That the Contracting Officer's use of the Harvey O. Banks Pumping Plant to deliver Project Water does not trigger this right of amendment.

(d) The Contractor shall make reasonable and beneficial use of all water furnished pursuant to this Contract. Groundwater recharge programs (direct, indirect, or in lieu), groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted within the Contractor's Service Area which are consistent with applicable State law and result in use consistent with Federal Reclamation law will be allowed; Provided, That any direct recharge program(s) is (are) described in the Contractor's water conservation plan submitted pursuant to Article 26 of this Contract; Provided further, That such water conservation plan demonstrates sufficient lawful uses exist in the Contractor's Service Area so that using a long-term average, the quantity of Delivered Water is demonstrated to be reasonable for such uses and in compliance with Federal Reclamation law. Groundwater recharge programs, groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted outside the

Contractor's Service Area may be permitted upon written approval of the Contracting Officer, which approval will be based upon environmental documentation, Project Water rights, and Project operational concerns. The Contracting Officer will address such concerns in regulations, policies, or guidelines.

(e) The Contractor shall comply with requirements applicable to the Contractor in biological opinion(s) prepared as a result of a consultation regarding the execution of this Contract undertaken pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, that are within the Contractor's legal authority to implement. The Contract No(s). 14-06-200-700-A, 14-06-200-700-A-IR1, and 14-06-200-700-A-IR2, which evidence in excess of 41 years of diversions for irrigation and/or M&I purposes of the quantities of water provided in subdivision (a) of Article 3 of this Contract, will be considered in developing an appropriate baseline for biological assessment(s) prepared pursuant to the ESA, and any other needed environmental review. Nothing herein shall be construed to prevent the Contractor from challenging or seeking judicial relief in a court of competent jurisdiction with respect to any biological opinion or other environmental documentation referred to in this Article.

(f) Following the declaration of Water Made Available under Article 4 of this Contract, the Contracting Officer will make a determination whether Project Water, or other water available to the Project, can be made available to the Contractor in addition to the Contract Total under this Article during the Year without adversely impacting other Project Contractors. At the request of the Contractor, the Contracting Officer will consult with the Contractor prior to making such a determination. If the Contracting Officer determines that Project Water, or other water available to the

Project, can be made available to the Contractor, the Contracting Officer will announce the availability of such water and shall so notify the Contractor as soon as practical. The Contracting Officer will thereafter meet with the Contractor and other Project Contractors capable of taking such water to determine the most equitable and efficient allocation of such water. If the Contractor requests the delivery of any quantity of such water, the Contracting Officer shall make such water available to the Contractor in accordance with applicable statutes, regulations, guidelines, and policies. Subject to existing long-term contractual commitments, water rights and operational constraints, long-term Project Contractors shall have a first right to acquire such water, including Project Water made available pursuant to Section 215 of the RRA.

(g) The Contractor may request permission to reschedule for use during the subsequent Year some or all of the Water Made Available to the Contractor during the current Year, referred to as "rescheduled water." The Contractor may request permission to use during the current Year a quantity of Project Water which may be made available by the United States to the Contractor during the subsequent Year referred to as "preuse." The Contracting Officer's written approval may permit such uses in accordance with applicable statutes, regulations, guidelines, and policies.

(h) The Contractor's right pursuant to Federal Reclamation law and applicable State law to the reasonable and beneficial use of Water Delivered pursuant to this Contract during the term thereof and any subsequent renewal contracts, as described in Article 2 of this Contract, during the terms thereof shall not be disturbed so long as the Contractor shall fulfill all of its obligations under this Contract and any renewals thereof. Nothing in the preceding sentence shall affect the

Contracting Officer's ability to impose shortages under Article 11 or subdivision (b) of Article 12 of this Contract or applicable provisions of any subsequent renewal contracts.

(i) Project Water furnished to the Contractor pursuant to this Contract may be delivered for purposes other than those described in subdivisions (m) and (o) of Article 1 of this Contract upon written approval by the Contracting Officer in accordance with the terms and conditions of such approval.

(j) The Contracting Officer shall make reasonable efforts to protect the water rights necessary for the Project and to provide the water available under this Contract. The Contracting Officer shall not object to participation by the Contractor, in the capacity and to the extent permitted by law, in administrative proceedings related to the Project Water rights; Provided, That the Contracting Officer retains the right to object to the substance of the Contractor's position in such a proceeding; Provided, further, That in such proceedings the Contracting Officer shall recognize the Contractor has a legal right under the terms of this Contract to use Project Water.

TIME FOR DELIVERY OF WATER

4. (a) On or about February 20 of each Calendar Year, the Contracting Officer shall announce the Contracting Officer's expected declaration of the Water Made Available. Such declaration will be expressed in terms of both Water Made Available and the Recent Historic Average and will be updated monthly, and more frequently if necessary, based on then-current operational and hydrologic conditions and a new declaration with changes, if any, to the Water Made Available will be made. The Contracting Officer shall provide forecasts of Project operations and the basis of the estimate, with relevant supporting information, upon the written request of the

Contractor. Concurrently with the declaration of the Water Made Available, the Contracting Officer shall provide the Contractor with the updated Recent Historic Average.

(b) On or before each March 1 and at such other times as necessary, the Contractor shall submit to the Contracting Officer a written schedule, satisfactory to the Contracting Officer, showing the monthly quantities of Project Water to be delivered by the United States to the Contractor pursuant to this Contract for the Year commencing on such March 1. The Contracting Officer shall use all reasonable means to deliver Project Water according to the approved schedule for the Year commencing on such March 1.

(c) The Contractor shall not schedule Project Water in excess of the quantity of Project Water the Contractor intends to put to reasonable and beneficial use within the Contractor's Service Area or to sell, transfer, or exchange pursuant to Article 9 of this Contract during any Year.

(d) Subject to the conditions set forth in subdivision (a) of Article 3 of this Contract, the United States shall deliver Project Water to the Contractor in accordance with the initial schedule submitted by the Contractor pursuant to subdivision (b) of this Article, or any written revision(s) thereto, satisfactory to the Contracting Officer, submitted within a reasonable time prior to the date(s) on which the requested change(s) is/are to be implemented.

POINT OF DIVERSION AND RESPONSIBILITY FOR DISTRIBUTION OF WATER

5. (a) Project Water scheduled pursuant to subdivision (b) of Article 4 of this Contract shall be delivered to the Contractor from the Mendota Pool and any additional point or points of delivery either on Project facilities or another location or locations mutually agreed to in writing by the Contracting Officer and the Contractor.

(b) The Contracting Officer, either directly or indirectly through its written agreement(s) with the Operating Non-Federal Entity(ies), shall make all reasonable efforts to maintain sufficient flows and levels of water in Project facilities to deliver Project Water to the Contractor at the point or points of delivery established pursuant to subdivision (a) of this Article.

(c) The Contractor shall deliver Irrigation Water in accordance with any applicable land classification provisions of Federal Reclamation law and the associated regulations. The Contractor shall not deliver Project Water to land outside the Contractor's Service Area unless approved in advance by the Contracting Officer.

(d) All Water Delivered to the Contractor pursuant to this Contract shall be measured and recorded with equipment furnished, installed, operated, and maintained by the Contracting Officer either directly or indirectly through its written agreement(s) with the Operating Non-Federal Entity(ies), unless undertaken by the Contractor with the consent of the Contracting Officer, at the point or points of delivery established pursuant to subdivision (a) of this Article. Upon the request of either party to this Contract, the Contracting Officer shall investigate, or cause to be investigated by the appropriate Operating Non-Federal Entity(ies), the accuracy of such measurements and shall take any necessary steps to adjust any errors appearing therein. For any period of time when accurate measurements have not been made, the Contracting Officer shall consult with the Contractor and the appropriate Operating Non-Federal Entity(ies), if any, prior to making a final determination of the quantity delivered for that period of time.

(e) Absent a separate contrary written agreement with the Contractor, neither the Contracting Officer nor any Operating Non-Federal Entity(ies) shall be responsible for the control,

carriage, handling, use, disposal, or distribution of Water Delivered to the Contractor pursuant to this Contract beyond the point or points of delivery established pursuant to subdivision (a) of this Article. The Contractor shall indemnify the United States, its officers, employees, agents, and assigns on account of damage or claim of damage of any nature whatsoever for which there is legal responsibility, including property damage, personal injury, or death arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such Water Delivered beyond such point or points of delivery except for any damage or claim arising out of: (i) acts or omissions of the Contracting Officer or any of its officers, employees, agents, and assigns, including the Operating Non-Federal Entity(ies), with the intent of creating the situation resulting in any damage or claim; (ii) willful misconduct of the Contracting Officer or any of its officers, employees, agents, and assigns, including the Operating Non-Federal Entity(ies); (iii) negligence of the Contracting Officer or any of its officers, employees, agents, and assigns including the Operating Non-Federal Entity(ies); or (iv) a malfunction of facilities owned and/or operated by the United States or the Operating Non-Federal Entity(ies).

MEASUREMENT OF WATER WITHIN THE CONTRACTOR'S SERVICE AREA

6. (a) The Contractor has established a measuring program satisfactory to the Contracting Officer. The Contractor shall ensure that all surface water delivered for irrigation purposes within the Contractor's Service Area is measured at each agricultural turnout and such water delivered for M&I purposes is measured at each M&I service connection. The water measuring devices or water measuring methods of comparable effectiveness must be acceptable to the Contracting Officer. The Contractor shall be responsible for installing, operating, and maintaining

and repairing all such measuring devices and implementing all such water measuring methods at no cost to the United States. The Contractor shall use the information obtained from such water measuring devices or water measuring methods to ensure its proper management of the water, to bill water users for water delivered by the Contractor; and, if applicable, to record water delivered for M&I purposes by customer class as defined in the Contractor's water conservation plan provided for in Article 26 of this Contract. Nothing herein contained, however, shall preclude the Contractor from establishing and collecting any charges, assessments, or other revenues authorized by California law. The Contractor shall include a summary of all its annual surface water deliveries in the annual report described in subdivision (c) of Article 26.

(b) To the extent the information has not otherwise been provided, upon execution of this Contract, the Contractor shall provide to the Contracting Officer a written report describing the measurement devices or water measuring methods being used or to be used to implement subdivision (a) of this Article and identifying the agricultural turnouts and the M&I service connections or alternative measurement programs approved by the Contracting Officer, at which such measurement devices or water measuring methods are being used, and, if applicable, identifying the locations at which such devices and/or methods are not yet being used including a time schedule for implementation at such locations. The Contracting Officer shall advise the Contractor in writing within 60 days as to the adequacy, and necessary modifications, if any, of the measuring devices or water measuring methods identified in the Contractor's report and if the Contracting Officer does not respond in such time, they shall be deemed adequate. If the Contracting Officer notifies the Contractor that the measuring devices or methods are inadequate, the parties shall within 60 days

following the Contracting Officer's response, negotiate in good faith the earliest practicable date by which the Contractor shall modify said measuring devices and/or measuring methods as required by the Contracting Officer to ensure compliance with subdivision (a) of this Article.

(c) All new surface water delivery systems installed within the Contractor's Service Area after the effective date of this Contract shall also comply with the measurement provisions described in subdivision (a) of this Article.

(d) The Contractor shall inform the Contracting Officer and the State of California in writing by April 30 of each Year of the monthly volume of surface water delivered within the Contractor's Service Area during the previous Year.

(e) The Contractor shall inform the Contracting Officer and the Operating Non-Federal Entity on or before the 20th calendar day of each month of the quantity of Irrigation Water and M&I Water taken during the preceding month.

RATES AND METHOD OF PAYMENT FOR WATER

7. (a) The Contractor shall pay the United States as provided in this Article for all Delivered Water at Rates, Charges, and the Tiered Pricing Component established in accordance with: (i) the Secretary's ratesetting policy for Irrigation Water adopted in 1988 and the Secretary's then-existing ratesetting policy for M&I Water, which ratesetting policies shall be amended, modified, or superseded only through a public notice and comment procedure; (ii) applicable Federal Reclamation law and associated rules and regulations, or policies; and (iii) other applicable provisions of this Contract. Payments shall be made by cash transaction, electronic funds transfer, or any other mechanism as may be agreed to in writing by the Contractor and the Contracting Officer.

The Rates, Charges, and Tiered Pricing Component applicable to the Contractor upon execution of this Contract are set forth in Exhibit "B," as may be revised annually.

(b) The Contracting Officer shall notify the Contractor of the Rates, Charges, and Tiered Pricing Component as follows:

(1) Prior to July 1 of each Calendar Year, the Contracting Officer shall provide the Contractor an estimate of the Charges for Project Water that will be applied to the period October 1, of the current Calendar Year, through September 30, of the following Calendar Year, and the basis for such estimate. The Contractor shall be allowed not less than two months to review and comment on such estimates. On or before September 15 of each Calendar Year, the Contracting Officer shall notify the Contractor in writing of the Charges to be in effect during the period October 1 of the current Calendar Year, through September 30, of the following Calendar Year, and such notification shall revise Exhibit "B."

(2) Prior to October 1 of each Calendar Year, the Contracting Officer shall make available to the Contractor an estimate of the Rates and Tiered Pricing Component for Project Water for the following Year and the computations and cost allocations upon which those Rates are based. The Contractor shall be allowed not less than two months to review and comment on such computations and cost allocations. By December 31 of each Calendar Year, the Contracting Officer shall provide the Contractor with the final Rates and Tiered Pricing Component to be in effect for the upcoming Year, and such notification shall revise Exhibit "B."

(c) At the time the Contractor submits the initial schedule for the delivery of Project Water for each Year pursuant to subdivision (b) of Article 4 of this Contract, the Contractor

shall make an advance payment to the United States equal to the total amount payable pursuant to the applicable Rate(s) set under subdivision (a) of this Article, for the Project Water scheduled to be delivered pursuant to this Contract during the first two calendar months of the Year. Before the end of the first month and before the end of each calendar month thereafter, the Contractor shall make an advance payment to the United States, at the Rate(s) set under subdivision (a) of this Article, for the Water Scheduled to be delivered pursuant to this Contract during the second month immediately following. Adjustments between advance payments for Water Scheduled and payments at Rates due for Water Delivered shall be made before the end of the following month; Provided, That any revised schedule submitted by the Contractor pursuant to Article 4 of this Contract which increases the amount of Water Delivered pursuant to this Contract during any month shall be accompanied with appropriate advance payment, at the Rates then in effect, to assure that Project Water is not delivered to the Contractor in advance of such payment. In any month in which the quantity of Water Delivered to the Contractor pursuant to this Contract equals the quantity of Water Scheduled and paid for by the Contractor, no additional Project Water shall be delivered to the Contractor unless and until an advance payment at the Rates then in effect for such additional Project Water is made. Final adjustment between the advance payments for the Water Scheduled and payments for the quantities of Water Delivered during each Year pursuant to this Contract shall be made as soon as practicable but no later than April 30th of the following Year, or 60 days after the delivery of Project Water rescheduled under subdivision (g) of Article 3 of this Contract if such water is not delivered by the last day of February.

(d) The Contractor shall also make a payment in addition to the Rate(s) in subdivision (c) of this Article to the United States for Water Delivered, at the Charges and the appropriate Tiered Pricing Component then in effect, before the end of the month following the month of delivery; Provided, That the Contractor may be granted an exception from the Tiered Pricing Component pursuant to subdivision (j)(2) of this Article. The payments shall be consistent with the quantities of Irrigation Water and M&I Water Delivered as shown in the water delivery report for the subject month prepared by the Operating Non-Federal Entity(ies) or, if there is no Operating Non-Federal Entity, by the Contracting Officer. The water delivery report shall be deemed a bill for the payment of Charges and the applicable Tiered Pricing Component for Water Delivered. Adjustment for overpayment or underpayment of Charges shall be made through the adjustment of payments due to the United States for Charges for the next month. Any amount to be paid for past due payment of Charges and the Tiered Pricing Component shall be computed pursuant to Article 20 of this Contract.

(e) The Contractor shall pay for any Water Delivered under subdivision (a), (f), or (g) of Article 3 of this Contract as determined by the Contracting Officer pursuant to applicable statutes, associated regulations, any applicable provisions of guidelines or ratesetting policies; Provided, That the Rate for Water Delivered under subdivision (f) of Article 3 of this Contract shall be no more than the otherwise applicable Rate for Irrigation Water or M&I Water under subdivision (a) of this Article.

(f) Payments to be made by the Contractor to the United States under this Contract may be paid from any revenues available to the Contractor.

(g) All revenues received by the United States from the Contractor relating to the delivery of Project Water or the delivery of non-Project water through Project facilities shall be allocated and applied in accordance with Federal Reclamation law and the associated rules or regulations, and the then-current Project ratesetting policies for M&I Water or Irrigation Water.

(h) The Contracting Officer shall keep its accounts pertaining to the administration of the financial terms and conditions of its long-term contracts, in accordance with applicable Federal standards, so as to reflect the application of Project costs and revenues. The Contracting Officer shall, each Year upon request of the Contractor, provide to the Contractor a detailed accounting of all Project and Contractor expense allocations, the disposition of all Project and Contractor revenues, and a summary of all water delivery information. The Contracting Officer and the Contractor shall enter into good faith negotiations to resolve any discrepancies or disputes relating to accountings, reports, or information.

(i) The parties acknowledge and agree that the efficient administration of this Contract is their mutual goal. Recognizing that experience has demonstrated that mechanisms, policies, and procedures used for establishing Rates, Charges, and Tiered Pricing Component, and/or for making and allocating payments, other than those set forth in this Article may be in the mutual best interest of the parties, it is expressly agreed that the parties may enter into agreements to modify the mechanisms, policies, and procedures for any of those purposes while this Contract is in effect without amending this Contract.

(j) (1) Beginning at such time as deliveries of Project Water in a Year exceed 80 percent of the Contract Total, then before the end of the month following the month of delivery the

Contractor shall make an additional payment to the United States equal to the applicable Tiered Pricing Component. The Tiered Pricing Component for the amount of Water Delivered in excess of 80 percent of the Contract Total, but less than or equal to 90 percent of the Contract Total, shall equal one-half of the difference between the Rate established under subdivision (a) of this Article and the Irrigation Full Cost Water Rate or M&I Full Cost Water Rate, whichever is applicable. The Tiered Pricing Component for the amount of Water Delivered which exceeds 90 percent of the Contract Total shall equal the difference between (i) the Rate established under subdivision (a) of this Article and (ii) the Irrigation Full Cost Water Rate or M&I Full Cost Water Rate, whichever is applicable. For all Water Delivered pursuant to subdivision (a) of Article 3 of this Contract which is in excess of 80 percent of the Contract Total, this increment shall be deemed to be divided between Irrigation Water and M&I Water in the same proportion as actual deliveries of each bear to the cumulative total Water Delivered.

(2) Subject to the Contracting Officer's written approval, the Contractor may request and receive an exemption from such Tiered Pricing Component for Project Water delivered to produce a crop which the Contracting Officer determines will provide significant and quantifiable habitat values for waterfowl in fields where the water is used and the crops are produced; Provided, That the exemption from the Tiered Pricing Component for Irrigation Water shall apply only if such habitat values can be assured consistent with the purposes of the CVPIA through binding agreements executed with or approved by the Contracting Officer prior to use of such water.

(3) For purposes of determining the applicability of the Tiered Pricing Component pursuant to this Article, Water Delivered shall include Project Water that the Contractor

transfers to others but shall not include Project Water transferred to the Contractor, nor shall it include the additional water provided to the Contractor under the provisions of subdivision (f) of Article 3 of this Contract.

(k) For the term of this Contract, Rates applied under the respective ratesetting policies will be established to recover only reimbursable O&M (including any deficits) and capital costs of the Project, as those terms are used in the then-current Project ratesetting policies, and interest, where appropriate, except in instances where a minimum Rate is applicable in accordance with the relevant Project ratesetting policy. Changes of significance in practices which implement the Contracting Officer's ratesetting policies will not be implemented until the Contracting Officer has provided the Contractor an opportunity to discuss the nature, need, and impact of the proposed change.

(l) Except as provided in subsections 3405(a)(1)(B) and 3405(f) of the CVPIA, the Rates for Project Water transferred by the Contractor shall be the Contractor's Rates, in accordance with the applicable Project ratesetting policy, adjusted upward or downward to reflect the changed costs, if any, incurred by the Contracting Officer in the delivery of the transferred Project Water to the transferee's point of delivery in accordance with the then applicable Project ratesetting policy. If the Contractor is receiving lower Rates and Charges because of inability to pay and is transferring Project Water to another entity whose Rates and Charges are not adjusted due to inability to pay, the Rates and Charges for transferred Project Water shall not be adjusted to reflect the Contractor's inability to pay.

(m) Pursuant to the Act of October 27, 1986 (100 Stat. 3050), the Contracting Officer is authorized to adjust determinations of ability to pay every five years.

(n) Omitted.

NON-INTEREST BEARING OPERATION AND MAINTENANCE DEFICITS

8. The Contractor and the Contracting Officer concur that, as of the effective date of this Contract, the Contractor has no non-interest bearing O&M deficits and shall have no further liability therefor.

SALES, TRANSFERS, OR EXCHANGES OF WATER

9. (a) The right to receive Project Water provided for in this Contract may be sold, transferred, or exchanged to others for reasonable and beneficial uses within the State of California if such sale, transfer, or exchange is authorized by applicable Federal and State laws, and applicable guidelines or regulations then in effect. No sale, transfer, or exchange of Project Water under this Contract may take place without the prior written approval of the Contracting Officer, except as provided for in subdivision (b) of this Article, and no such sales, transfers, or exchanges shall be approved absent all appropriate environmental documentation, including but not limited to, documents prepared pursuant to the NEPA and ESA. Such environmental documentation should include, as appropriate, an analysis of groundwater impacts and economic and social effects, including environmental justice, of the proposed water transfers on both the transferor and transferee.

(b) In order to facilitate efficient water management by means of water transfers of the type historically carried out among Project Contractors located within the same geographical area and to allow the Contractor to participate in an accelerated water transfer program during the term of

this Contract, the Contracting Officer shall prepare, as appropriate, all necessary environmental documentation, including but not limited to documents prepared pursuant to NEPA and ESA, analyzing annual transfers within such geographical areas and the Contracting Officer shall determine whether such transfers comply with applicable law. Following the completion of the environmental documentation, such transfers addressed in such documentation shall be conducted with advance notice to the Contracting Officer, but shall not require prior written approval by the Contracting Officer. Such environmental documentation and the Contracting Officer's compliance determination shall be reviewed every five years and updated, as necessary, prior to the expiration of the then existing five-year period. All subsequent environmental documentation shall include an alternative to evaluate not less than the quantity of Project Water historically transferred within the same geographical area.

(c) For a water transfer to qualify under subdivision (b) of this Article, such water transfer must: (i) be for irrigation purposes for lands irrigated within the previous three years, for M&I use, groundwater recharge, groundwater banking, or similar groundwater activities, surface water storage, or fish and wildlife resources; not lead to land conversion; and be delivered to established cropland, wildlife refuges, groundwater basins or M&I use; (ii) occur within a single Year; (iii) occur between a willing seller and a willing buyer; (iv) convey water through existing facilities with no new construction or modifications to facilities and be between existing Project Contractors and/or the Contractor and the United States, Department of the Interior; and (v) comply with all applicable Federal, State, and local or tribal laws and requirements imposed for protection of the environment and Indian Trust Assets, as defined under Federal law.

APPLICATION OF PAYMENTS AND ADJUSTMENTS

10. (a) The amount of any overpayment by the Contractor of the Contractor's O&M, capital, and deficit (if any) obligations for the Year shall be applied first to any current liabilities of the Contractor arising out of this Contract then due and payable. Overpayments of more than $1,000 shall be refunded at the Contractor's request. In lieu of a refund, any amount of such overpayment at the option of the Contractor, may be credited against amounts to become due to the United States by the Contractor. With respect to overpayment, such refund or adjustment shall constitute the sole remedy of the Contractor or anyone having or claiming to have the right to the use of any of the Project Water supply provided for herein. All credits and refunds of overpayments shall be made within 30 days of the Contracting Officer obtaining direction as to how to credit or refund such overpayment in response to the notice to the Contractor that it has finalized the accounts for the Year in which the overpayment was made.

(b) All advances for miscellaneous costs incurred for work requested by the Contractor pursuant to Article 25 of this Contract shall be adjusted to reflect the actual costs when the work has been completed. If the advances exceed the actual costs incurred, the difference will be refunded to the Contractor. If the actual costs exceed the Contractor's advances, the Contractor will be billed for the additional costs pursuant to Article 25.

TEMPORARY REDUCTIONS--RETURN FLOWS

11. (a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make

all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract.

(b) The Contracting Officer or Operating Non-Federal Entity(ies) may temporarily discontinue or reduce the quantity of Water Delivered to the Contractor as herein provided for the purposes of investigation, inspection, maintenance, repair, or replacement of any of the Project facilities or any part thereof necessary for the delivery of Project Water to the Contractor, but so far as feasible the Contracting Officer or Operating Non-Federal Entity(ies) will give the Contractor due notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which case no notice need be given; Provided, That the United States shall use its best efforts to avoid any discontinuance or reduction in such service. Upon resumption of service after such reduction or discontinuance, and if requested by the Contractor, the United States will, if possible, deliver the quantity of Project Water which would have been delivered hereunder in the absence of such discontinuance or reduction.

(c) The United States reserves the right to all seepage and return flow water derived from Water Delivered to the Contractor hereunder which escapes or is discharged beyond the Contractor's Service Area; Provided, That this shall not be construed as claiming for the United States any right to seepage or return flow being put to reasonable and beneficial use pursuant to this Contract within the Contractor's Service Area by the Contractor or those claiming by, through, or under the Contractor.

CONSTRAINTS ON THE AVAILABILITY OF WATER

12. (a) In its operation of the Project, the Contracting Officer will use all reasonable means to guard against a Condition of Shortage in the quantity of water to be made available to the Contractor pursuant to this Contract. In the event the Contracting Officer determines that a Condition of Shortage appears probable, the Contracting Officer will notify the Contractor of said determination as soon as practicable.

(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer or actions taken by the Contracting Officer to meet legal obligations then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom.

(c) In any Year in which there may occur a Condition of Shortage for any of the reasons specified in subdivision (b) of this Article, and subject to subdivision (d) of this Article, the Contracting Officer will first allocate the available Project Water consistent with the draft CVP M&I Water Shortage Policy on the effective date of this Contract as finally adopted after environmental review for determining the amount of Project Water available for delivery to the Project Contractors. Subject to the foregoing allocation, in any year in which there may occur a Condition of Shortage, the Contracting Officer shall then apportion Project Water among the Contractor and others entitled to Project Water from Delta Division Facilities under long-term water service or repayment contracts (or renewals thereof or binding commitments therefor) in force on February 28, 2005, as follows:

(1) The Contracting Officer shall make an initial and subsequent determination as necessary of the total quantity of Project Water estimated to be scheduled or actually scheduled under subdivision (b) of Article 4 of this Contract and under all other long-term water service or repayment contracts then in force for the delivery of Project Water by the United States from Delta Division Facilities during the relevant Year, the quantity so determined being hereinafter referred to as the scheduled total;

(2) A determination shall be made of the total quantity of Project Water that is available for meeting the scheduled total, the quantity so determined being hereinafter referred to as the available supply;

(3) The total quantity of Project Water estimated to be scheduled or actually scheduled by the Contractor during the relevant Year, under subdivision (b) of Article 4 hereof, shall be divided by the scheduled total, the quotient thus obtained being hereinafter referred to as the Contractor's proportionate share; and

(4) The available supply shall be multiplied by the Contractor's proportionate share and the result shall be the quantity of Project Water made available by the United States to the Contractor for the relevant Year in accordance with the schedule developed by the Contracting Officer under subdivision (c)(1) of this Article, but in no event shall such amount exceed the Contract Total. In the event the Contracting Officer subsequently determines that the Contracting Officer can increase or needs to decrease the available supply for delivery from Delta Division Facilities to long-term water service and repayment Contractors during the relevant Year, such

additions or reductions to the available supply shall be apportioned consistent with subparagraphs (1) through (4), inclusive.

(d) By entering into this Contract, the Contractor does not waive any legal rights or remedies it may have to file or participate in any administrative or judicial proceeding contesting (i) the sufficiency of the Central Valley Project M&I Water Shortage Policy; (ii) the substance of such a policy; (iii) the applicability of such a policy; or (iv) the manner in which such policy is implemented in order to allocate Project Water between municipal and industrial and irrigation purposes; Provided, That the Contractor has commenced any such judicial challenge or any administrative procedures necessary to institute any judicial challenge within six months of the policy becoming final. By agreeing to the foregoing, the Contracting Officer does not waive any legal defenses or remedies that it may have to assert in such a proceeding. Nothing contained herein shall be interpreted to validate or invalidate the Central Valley Project M&I Water Shortage Policy.

UNAVOIDABLE GROUNDWATER PERCOLATION

13. To the extent applicable, the Contractor shall not be deemed to have delivered Irrigation Water to Excess Lands or Ineligible Lands within the meaning of this Contract if such lands are irrigated with groundwater that reaches the underground strata as an unavoidable result of the delivery of Irrigation Water by the Contractor to Eligible Lands.

RULES AND REGULATIONS

14. The parties agree that the delivery of Irrigation Water or use of Federal facilities pursuant to this Contract is subject to Federal Reclamation law, including but not limited to the Reclamation Reform Act of 1982 (43 U.S.C.390aa et seq.), as amended and supplemented, and the rules and regulations promulgated by the Secretary of the Interior under Federal Reclamation law.

EXHIBIT B
JAMES IRRIGATION DISTRICT
Water Rates and Charges

CONTRACT NO. 14-06-200-700-A-LTR1	2005 Rates Per Acre-Foot	
	Irrigation Water	M&I Water
COST-OF-SERVICE (COS) RATES:	**DMC**	
Capital Rates:	$11.40	
O&M Rates:		
Water Marketing	$6.61	
Storage	$5.93	
Conveyance	*	
Direct Pumping (Project Use Energy)		
Tracy Pumping		
San Luis Drain		
Deficit Rates:		
Non-Interest Bearing		
Interest Bearing	$0.07	
CFO/PFR Adjustment Rate	$1.05	
TOTAL COST-OF-SERVICE RATES (COS):	$25.06	
M&I FULL-COST RATE:		
Tiered Pricing Component >80% <=90% of Contract Total [Full Cost Rate - COS Rate /2]:	$6.32	
Tiered Pricing Component >90% of Contract Total [Full Cost Rate - COS Rate]:	$12.63	
FULL-COST RATES:		
Section 202(3) Rate is applicable to a Qualified Recipient or to a Limited Recipient receiving irrigation water on or before October 1, 1981.	$37.69	
205 FULL-COST RATES:		
Section 205(a)(3) Rate is applicable to a Qualified Recipient or to a Limited Recipient that did not receive irrigation water on or before October 1, 1981.	$44.78	
SURCHARGES UNDER P.L. 102-575 TO RESTORATION FUND**	$7.93	

* Conveyance and Conveyance Pumping Operation and maintenance costs were removed for ratesetting purposes and are to be billed directly to the water authorities.

** The surcharges are payments in addition to the water rates and were determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund surcharges under P.L. 102-575 are on a fiscal year basis (10/1-9/30).

Recent Historic Use as defined in the CVP M&I Water Storage Policy is 23,227 acre-feet.

WATER AND AIR POLLUTION CONTROL

15. The Contractor, in carrying out this Contract, shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California, and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities.

QUALITY OF WATER

16. (a) Project facilities used to deliver Project Water to the Contractor pursuant to this Contract shall be operated and maintained to enable the United States to deliver Project Water to the Contractor in accordance with the water quality standards specified in subsection 2(b) of the Act of August 26, 1937 (50 Stat. 865), as added by Section 101 of the Act of October 27, 1986 (100 Stat. 3050) or other existing Federal laws. The United States is under no obligation to construct or furnish water treatment facilities to maintain or to improve the quality of Water Delivered to the Contractor pursuant to this Contract. The United States does not warrant the quality of Water Delivered to the Contractor pursuant to this Contract. None of the foregoing affects or modifies the obligations of the United States under Contract No. 14-06-200-700-A, dated December 23, 1963, with respect to Schedule 2 water, including but not limited to, Article 10 of said contract.

(b) The O&M of Project facilities shall be performed in such manner as is practicable to maintain the quality of raw water made available through such facilities at the highest level reasonably attainable as determined by the Contracting Officer. The Contractor shall be responsible for compliance with all State and Federal water quality standards applicable to surface and subsurface agricultural drainage discharges generated through the use of Federal or Contractor facilities or Project Water provided by the Contractor within the Contractor's Service Area.

WATER ACQUIRED BY THE CONTRACTOR OTHER THAN FROM THE UNITED STATES

17. (a) Water or water rights now owned or hereafter acquired by the Contractor other than from the United States and Irrigation Water furnished pursuant to the terms of this Contract may be simultaneously transported through the same distribution facilities of the Contractor subject to the following: (i) if the facilities utilized for commingling Irrigation Water and non-Project water were constructed without funds made available pursuant to Federal Reclamation law, the provisions of Federal Reclamation law will be applicable only to the Landholders of lands which receive Irrigation Water; (ii) the eligibility of land to receive Irrigation Water must be established through the certification requirements as specified in the Acreage Limitation Rules and Regulations (43 CFR Part 426); (iii) the water requirements of Eligible Lands within the Contractor's Service Area can be established and the quantity of Irrigation Water to be utilized is less than or equal to the quantity necessary to irrigate such Eligible Lands. The Contractor and the Contracting Officer concur that, as of the effective date of this Contract, the Contractor has a distribution system that was constructed without the use of Federally financed funds.

(b) Water or water rights now owned or hereafter acquired by the Contractor, other than from the United States may be stored, conveyed and/or diverted through Project facilities, subject to the completion of appropriate environmental documentation, with the approval of the Contracting Officer and the execution of any contract determined by the Contracting Officer to be necessary, consistent with the following provisions:

(1) The Contractor may introduce non-Project water into Project facilities and deliver said water to lands within the Contractor's Service Area, including Ineligible Lands, subject to payment to the United States and/or to any applicable Operating Non-Federal Entity of an appropriate rate as determined by the applicable Project ratesetting policy, the RRA, and the Project use power policy, if such Project use power policy is applicable, each as amended, modified, or superseded from time to time.

(2) Delivery of such non-Project water in and through Project facilities shall only be allowed to the extent such deliveries do not: (i) interfere with other Project purposes as determined by the Contracting Officer; (ii) reduce the quantity or quality of water available to other Project Contractors; (iii) interfere with the delivery of contractual water entitlements to any other Project Contractors; or (iv) interfere with the physical maintenance of the Project facilities.

(3) Neither the United States nor the Operating Non-Federal Entity(ies) shall be responsible for control, care or distribution of the non-Project water before it is introduced into or after it is delivered from the Project facilities. The Contractor hereby releases and agrees to defend and indemnify the United States and the Operating Non-Federal Entity(ies), and their respective officers, agents, and employees, from any claim for damage to persons or property, direct or indirect, resulting from the act(s) of the Contractor, its officers, employees, agents, or assigns, in (i) extracting or diverting non-Project water from any source, or (ii) diverting such non-Project water into Project facilities.

(4) Diversion of such non-Project water into Project facilities shall be consistent with all applicable laws, and if involving groundwater, consistent with any applicable groundwater management plan for the area from which it was extracted.

(5) After Project purposes are met, as determined by the Contracting Officer, the United States and Project Contractors entitled to Project Water from Delta Division Facilities shall share priority to utilize the remaining capacity of the facilities declared to be available by the Contracting Officer for conveyance and transportation of non-Project water prior to any such remaining capacity being made available to non-Project contractors. Other Project Contractors shall have a second priority to any remaining capacity of facilities declared to be available by the Contracting Officer for conveyance and transportation of non-Project water prior to any such remaining capacity being made available to non-Project contractors.

OPINIONS AND DETERMINATIONS

18. (a) Where the terms of this Contract provide for actions to be based upon the opinion or determination of either party to this Contract, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations. Both parties, notwithstanding any other provisions of this Contract, expressly reserve the right to seek relief from and appropriate adjustment for any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion or determination by either party shall be provided in a timely manner. Nothing in this subdivision (a) of this Article is intended to or shall affect or alter the standard of judicial review applicable under Federal law to any opinion or determination implementing a specific provision of Federal law embodied in statute or regulation.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the provisions of this Contract, the laws of the United States and of the State of California, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor to the extent reasonably practicable.

COORDINATION AND COOPERATION

19. (a) In order to further their mutual goals and objectives, the Contracting Officer and the Contractor shall communicate, coordinate, and cooperate with each other, and with other affected Project Contractors, in order to improve the operation and management of the Project. The communication, coordination, and cooperation regarding operations and management shall include, but not be limited to, any action which will or may materially affect the quantity or quality of Project Water supply, the allocation of Project Water supply, and Project financial matters including, but not limited to, budget issues. The communication, coordination, and cooperation provided for hereunder shall extend to all provisions of this Contract. Each party shall retain exclusive decision making authority for all actions, opinions, and determinations to be made by the respective party.

(b) Within 120 days following the effective date of this Contract, the Contractor, other affected Project Contractors, and the Contracting Officer shall arrange to meet with interested Project Contractors to develop a mutually agreeable, written Project-wide process, which may be amended as necessary separate and apart from this Contract. The goal of this process shall be to provide, to the extent practicable, the means of mutual communication and interaction regarding significant decisions concerning Project operation and management on a real-time basis.

(c) In light of the factors referred to in subdivision (b) of Article 3 of this Contract, it is the intent of the Secretary to improve water supply reliability. To carry out this intent:

(1) The Contracting Officer will, at the request of the Contractor, assist in the development of integrated resource management plans for the Contractor. Further, the Contracting Officer will, as appropriate, seek authorizations for implementation of partnerships to improve water supply, water quality, and reliability.

(2) The Secretary will, as appropriate, pursue program and project implementation and authorization in coordination with Project Contractors to improve the water supply, water quality, and reliability of the Project for all Project purposes.

(3) The Secretary will coordinate with Project Contractors and the State of California to seek improved water resource management.

(4) The Secretary will coordinate actions of agencies within the Department of the Interior that may impact the availability of water for Project purposes.

(5) The Contracting Officer shall periodically, but not less than annually, hold division level meetings to discuss Project operations, division level water management activities, and other issues as appropriate.

(d) Without limiting the contractual obligations of the Contracting Officer under the other Articles of this Contract, nothing in this Article shall be construed to limit or constrain the Contracting Officer's ability to communicate, coordinate, and cooperate with the Contractor or other interested stakeholders or to make decisions in a timely fashion as needed to protect health, safety, or the physical integrity of structures or facilities.

CHARGES FOR DELINQUENT PAYMENTS

20. (a) The Contractor shall be subject to interest, administrative and penalty charges on delinquent installments or payments. When a payment is not received by the due date, the Contractor shall pay an interest charge for each day the payment is delinquent beyond the due date. When a payment becomes sixty (60) days delinquent, the Contractor shall pay an administrative charge to cover additional costs of billing and processing the delinquent payment. When a payment is delinquent ninety (90) days or more, the Contractor shall pay an additional penalty charge of six (6%) percent per year for each day the payment is delinquent beyond the due date. Further, the Contractor shall pay any fees incurred for debt collection services associated with a delinquent payment.

(b) The interest charge rate shall be the greater of the rate prescribed quarterly in the Federal Register by the Department of the Treasury for application to overdue payments, or the interest rate of one-half of one (0.5%) percent per month prescribed by Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest charge rate shall be determined as of the due date and remain fixed for the duration of the delinquent period.

(c) When a partial payment on a delinquent account is received, the amount received shall be applied, first to the penalty, second to the administrative charges, third to the accrued interest, and finally to the overdue payment.

EQUAL OPPORTUNITY

21. During the performance of this Contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of payment or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without discrimination because of race, color, religion, sex, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Contracting Officer, advising the said labor union or workers' representative of the

Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by said amended Executive Order and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Contracting Officer and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in said amended Executive Order, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of said amended Executive Order, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

22. (a) The obligation of the Contractor to pay the United States as provided in this Contract is a general obligation of the Contractor notwithstanding the manner in which the obligation may be distributed among the Contractor's water users and notwithstanding the default of individual water users in their obligations to the Contractor.

(b) The payment of charges becoming due hereunder is a condition precedent to receiving benefits under this Contract. The United States shall not make water available to the Contractor through Project facilities during any period in which the Contractor may be in arrears in

the advance payment of water rates due the United States. The Contractor shall not furnish water made available pursuant to this Contract for lands or parties which are in arrears in the advance payment of water rates levied or established by the Contractor.

(c) With respect to subdivision (b) of this Article, the Contractor shall have no obligation to require advance payment for water rates which it levies.

COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS

23. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other applicable civil rights laws, as well as with their respective implementing regulations and guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

(b) These statutes require that no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the Bureau of Reclamation. By executing this Contract, the Contractor agrees to immediately take any measures necessary to implement this obligation, including permitting officials of the United States to inspect premises, programs, and documents.

(c) The Contractor makes this agreement in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or other Federal financial assistance extended after the date hereof to the Contractor by the Bureau of Reclamation, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Contractor recognizes and agrees that such Federal assistance will be extended in reliance on the representations and agreements made in this Article, and that the United States reserves the right to seek judicial enforcement thereof.

PRIVACY ACT COMPLIANCE

24. (a) The Contractor shall comply with the Privacy Act of 1974 (5 U.S.C. 552a) (the Act) and the Department of the Interior rules and regulations under the Act (43 CFR 2.45 et seq.) in maintaining Landholder acreage certification and reporting records, required to be submitted to the Contractor for compliance with Sections 206 and 228 of the Reclamation Reform Act of 1982 (96 Stat. 1266), and pursuant to 43 CFR 426.18.

(b) With respect to the application and administration of the criminal penalty provisions of the Act (5 U.S.C. 552a(i)), the Contractor and the Contractor's employees responsible

for maintaining the certification and reporting records referenced in (a) above are considered to be employees of the Department of the Interior. See 5 U.S.C. 552a(m).

(c) The Contracting Officer or a designated representative shall provide the Contractor with current copies of the Interior Department Privacy Act regulations and the Bureau of Reclamation Federal Register Privacy Act System of Records Notice (Acreage Limitation--Interior, Reclamation-31) which govern the maintenance, safeguarding, and disclosure of information contained in the Landholder's certification and reporting records.

(d) The Contracting Officer shall designate a full-time employee of the Bureau of Reclamation to be the System Manager who shall be responsible for making decisions on denials pursuant to 43 CFR 2.61 and 2.64 amendment requests pursuant to 43 CFR 2.72. The Contractor is authorized to grant requests by individuals for access to their own records.

(e) The Contractor shall forward promptly to the System Manager each proposed denial of access under 43 CFR 2.64; and each request for amendment of records filed under 43 CFR 2.71; notify the requester accordingly of such referral; and provide the System Manager with information and records necessary to prepare an appropriate response to the requester. These requirements do not apply to individuals seeking access to their own certification and reporting forms filed with the Contractor pursuant to 43 CFR 426.18, unless the requester elects to cite the Privacy Act as a basis for the request.

CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

25. In addition to all other payments to be made by the Contractor pursuant to this Contract, the Contractor shall pay to the United States, within 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer to the Contractor for such specific items of direct cost incurred by the United States for work requested by the Contractor associated with this Contract plus indirect costs in accordance with applicable Bureau of Reclamation policies and procedures. All such amounts referred to in this Article shall not exceed the amount agreed to in writing in advance by the Contractor. This Article shall not apply to costs for routine contract administration.

WATER CONSERVATION

26. (a) Prior to the delivery of water provided from or conveyed through Federally constructed or Federally financed facilities pursuant to this Contract, the Contractor shall be implementing an effective water conservation and efficiency program based on the Contractor's water conservation plan that has been determined by the Contracting Officer to meet the conservation and efficiency criteria for evaluating water conservation plans established under Federal law. The water conservation and efficiency program shall contain definite water conservation objectives, appropriate economically feasible water conservation measures, and time schedules for meeting those objectives. Continued Project Water delivery pursuant to this Contract shall be contingent upon the Contractor's continued implementation of such water conservation program. In the event the Contractor's water conservation plan or any revised water conservation plan completed pursuant to subdivision (d) of Article 26 of this Contract have not yet been determined by the Contracting Officer to meet such criteria, due to circumstances which the Contracting Officer determines are beyond the control of the Contractor, water deliveries shall be made under this Contract so long as the Contractor diligently works with the Contracting Officer to obtain such determination at the earliest practicable date, and thereafter the Contractor immediately begins implementing its water conservation and efficiency program in accordance with the time schedules therein.

(b) Should the amount of M&I Water delivered pursuant to subdivision (a) of Article 3 of this Contract equal or exceed 2,000 acre-feet per Year, the Contractor shall implement the Best Management Practices identified by the time frames issued by the California Urban Water

Conservation Council for such M&I Water unless any such practice is determined by the Contracting Officer to be inappropriate for the Contractor.

(c) The Contractor shall submit to the Contracting Officer a report on the status of its implementation of the water conservation plan on the reporting dates specified in the then-existing conservation and efficiency criteria established under Federal law.

(d) At five-year intervals, the Contractor shall revise its water conservation plan to reflect the then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law and submit such revised water management plan to the Contracting Officer for review and evaluation. The Contracting Officer will then determine if the water conservation plan meets Reclamation's then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law.

(e) If the Contractor is engaged in direct groundwater recharge, such activity shall be described in the Contractor's water conservation plan.

EXISTING OR ACQUIRED WATER OR WATER RIGHTS

27. Except as specifically provided in Article 17 of this Contract, the provisions of this Contract shall not be applicable to or affect non-Project water or water rights now owned or hereafter acquired by the Contractor or any user of such water within the Contractor's Service Area. Any such water shall not be considered Project Water under this Contract. In addition, this Contract shall not be construed as limiting or curtailing any rights which the Contractor or any water user within the Contractor's Service Area acquires or has available under any other contract pursuant to Federal Reclamation law.

OPERATION AND MAINTENANCE BY
SAN LUIS & DELTA-MENDOTA WATER AUTHORITY

28. (a) The O&M of a portion of the Project facilities which serve the Contractor, and responsibility for funding a portion of the costs of such O&M, have been transferred to the San Luis & Delta-Mendota Water Authority, an Operating Non-Federal Entity by separate agreement (8-07-20-X0354) between the United States and the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority. That separate agreement shall not interfere with or affect the rights or obligations of the Contractor or the United States hereunder.

(b) The Contracting Officer has previously notified the Contractor in writing that the Operation and Maintenance of a portion of the Project facilities which serve the Contractor has been transferred to the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority, and therefore, the Contractor shall pay directly to the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority, or to any successor approved by the Contracting Officer under the terms and conditions of the separate agreement between the United States and the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority described in subdivision (a) of this Article, all rates, charges, or assessments of any kind, including any assessment for reserve funds, which the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority or such successor determines, sets, or establishes for the O&M of the portion of the Project facilities operated and maintained by the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority or such successor. Such direct payments to the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority or such successor shall not relieve the Contractor of its obligation to pay directly to

the United States the Contractor's share of the Project Rates, Charges, and Tiered Pricing Component except to the extent the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority collects payments on behalf of the United States in accordance with the separate agreement identified in subdivision (a) of this Article.

(c) For so long as the O&M of any portion of the Project facilities serving the Contractor is performed by the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority, or any successor thereto, the Contracting Officer shall adjust those components of the Rates for Water Delivered under this Contract representing the cost associated with the activity being performed by the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority or its successor.

(d) In the event the O&M of the Project facilities operated and maintained by the Operating Non-Federal Entity San Luis & Delta-Mendota Water Authority is re-assumed by the United States during the term of this Contract, the Contracting Officer shall so notify the Contractor, in writing, and present to the Contractor a revised Exhibit "B" which shall include the portion of the Rates to be paid by the Contractor for Project Water under this Contract representing the O&M costs of the portion of such Project facilities which have been re-assumed. The Contractor shall, thereafter, in the absence of written notification from the Contracting Officer to the contrary, pay the Rates, Charges, and Tiered Pricing Component specified in the revised Exhibit "B" directly to the United States in compliance with Article 7 of this Contract.

CONTINGENT ON APPROPRIATION OR ALLOTMENT OF FUNDS

29. The expenditure or advance of any money or the performance of any obligation of the United States under this Contract shall be contingent upon appropriation or allotment of funds.

Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

BOOKS, RECORDS, AND REPORTS

30. (a) The Contractor shall establish and maintain accounts and other books and records pertaining to administration of the terms and conditions of this Contract, including: the Contractor's financial transactions, water supply data, and Project land and right-of-way agreements; the water users' land-use (crop census), land ownership, land-leasing and water use data; and other matters that the Contracting Officer may require. Reports thereon shall be furnished to the Contracting Officer in such form and on such date or dates as the Contracting Officer may require. Subject to applicable Federal laws and regulations, each party to this Contract shall have the right during office hours to examine and make copies of the other party's books and records relating to matters covered by this Contract.

(b) Notwithstanding the provisions of subdivision (a) of this Article, no books, records, or other information shall be requested from the Contractor by the Contracting Officer unless such books, records, or information are reasonably related to the administration or performance of this Contract. Any such request shall allow the Contractor a reasonable period of time within which to provide the requested books, records, or information.

(c) At such time as the Contractor provides information to the Contracting Officer pursuant to subdivision (a) of this Article, a copy of such information shall be provided to the Operating Non-Federal Entity.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

31. (a) The provisions of this Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Contract or any right or interest therein shall be valid until approved in writing by the Contracting Officer.

(b) The assignment of any right or interest in this Contract by either party shall not interfere with the rights or obligations of the other party to this Contract absent the written concurrence of said other party.

(c) The Contracting Officer shall not unreasonably condition or withhold approval of any proposed assignment.

SEVERABILITY

32. In the event that a person or entity who is neither (i) a party to a Project contract, nor (ii) a person or entity that receives Project Water from a party to a Project contract, nor (iii) an association or other form of organization whose primary function is to represent parties to Project contracts, brings an action in a court of competent jurisdiction challenging the legality or enforceability of a provision included in this Contract and said person, entity, association, or organization obtains a final court decision holding that such provision is legally invalid or unenforceable and the Contractor has not intervened in that lawsuit in support of the plaintiff(s), the parties to this Contract shall use their best efforts to (i) within 30 days of the date of such final court decision identify by mutual agreement the provisions in this Contract which must be revised and (ii) within three months thereafter promptly agree on the appropriate revision(s). The time periods specified above may be extended by mutual agreement of the parties. Pending the completion of the actions designated above, to the extent it can do so without violating any applicable provisions of law, the United States shall continue to make the quantities of Project Water specified in this Contract available to the Contractor pursuant to the provisions of this Contract which were not found to be legally invalid or unenforceable in the final court decision.

RESOLUTION OF DISPUTES

33. Should any dispute arise concerning any provisions of this Contract, or the parties' rights and obligations thereunder, the parties shall meet and confer in an attempt to resolve the dispute. Prior to the Contractor commencing any legal action, or the Contracting Officer referring any matter to the Department of Justice, the party shall provide to the other party 30 days' written notice of the intent to take such action; Provided, That such notice shall not be required where a delay in commencing an action would prejudice the interests of the party that intends to file suit. During the 30-day notice period, the Contractor and the Contracting Officer shall meet and confer in an attempt to resolve the dispute. Except as specifically provided, nothing herein is intended to waive or abridge any right or remedy that the Contractor or the United States may have.

OFFICIALS NOT TO BENEFIT

34. No Member of or Delegate to Congress, Resident Commissioner, or official of the Contractor shall benefit from this Contract other than as a water user or landowner in the same manner as other water users or landowners.

CHANGES IN CONTRACTOR'S SERVICE AREA

35. (a) While this Contract is in effect, no change may be made in the Contractor's Service Area, by inclusion or exclusion of lands, dissolution, consolidation, merger, or otherwise, except upon the Contracting Officer's written consent.

(b) Within 30 days of receipt of a request for such a change, the Contracting Officer will notify the Contractor of any additional information required by the Contracting Officer for processing said request, and both parties will meet to establish a mutually agreeable schedule for timely completion of the process. Such process will analyze whether the proposed change is likely to: (i) result in the use of Project Water contrary to the terms of this Contract; (ii) impair the ability of the

Contractor to pay for Project Water furnished under this Contract or to pay for any Federally-constructed facilities for which the Contractor is responsible; and (iii) have an impact on any Project Water rights applications, permits, or licenses. In addition, the Contracting Officer shall comply with the NEPA and the ESA. The Contractor will be responsible for all costs incurred by the Contracting Officer in this process, and such costs will be paid in accordance with Article 25 of this Contract.

FEDERAL LAWS

36. By entering into this Contract, the Contractor does not waive its rights to contest the validity or application in connection with the performance of the terms and conditions of this Contract of any Federal law or regulation; Provided, That the Contractor agrees to comply with the terms and conditions of this Contract unless and until relief from application of such Federal law or regulation to the implementing provision of the Contract is granted by a court of competent jurisdiction.

NOTICES

37. Any notice, demand, or request authorized or required by this Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, South-Central California Area Office, 1243 N Street, Fresno, California 93721, and on behalf of the United States, when mailed, postage prepaid, or delivered to the Board of Directors of the James Irrigation District, P.O. Box 757, San Joaquin, California 93660. The designation of the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

CONFIRMATION OF CONTRACT

38. The Contractor, after the execution of this Contract, shall promptly seek to secure a decree of a court of competent jurisdiction of the State of California, confirming the execution of this Contract. The Contractor shall furnish the United States a certified copy of the final decree, the

validation proceedings, and all pertinent supporting records of the court approving and confirming this Contract, and decreeing and adjudging it to be lawful, valid, and binding on the Contractor.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E. Turner
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

(SEAL)

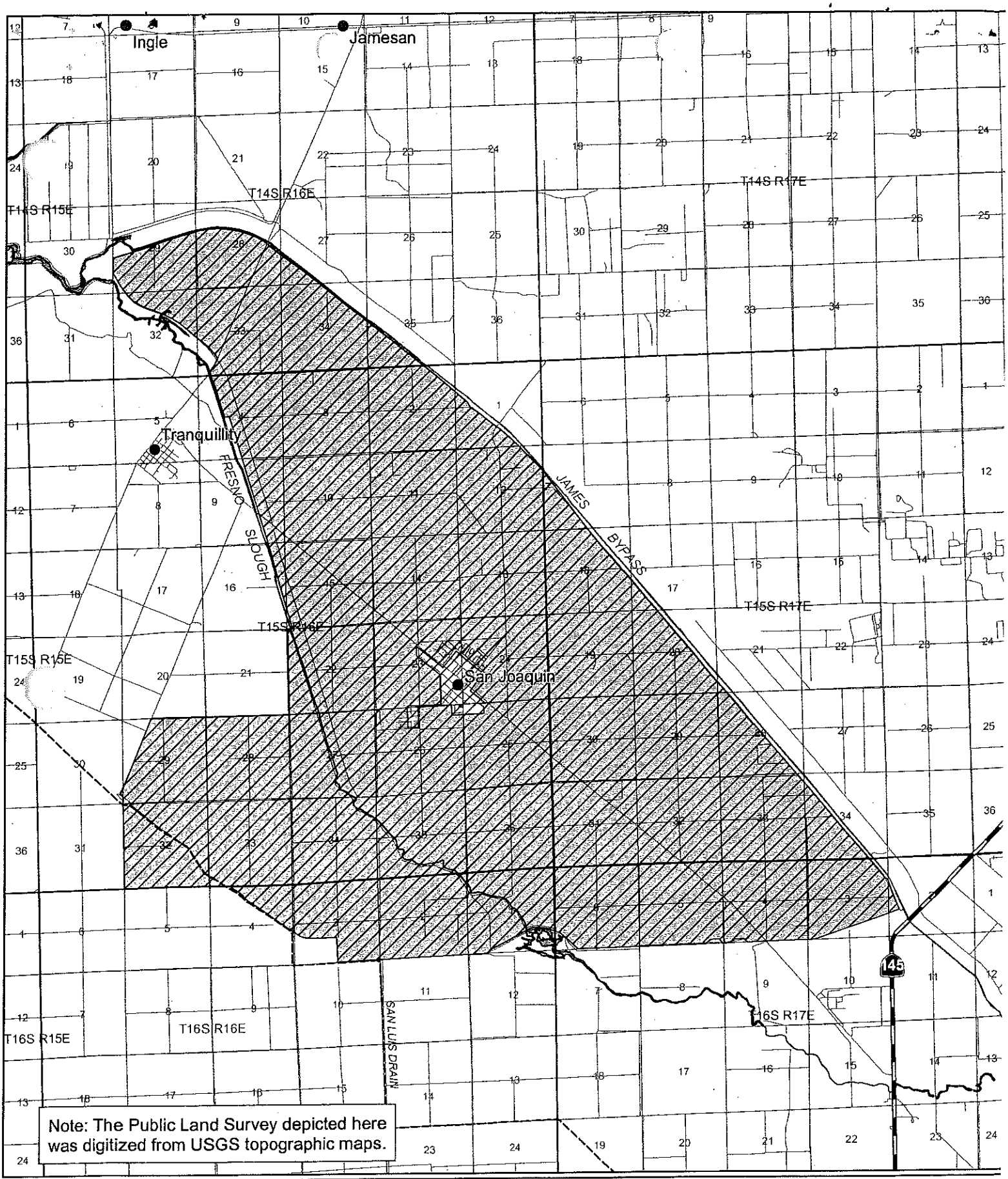
JAMES IRRIGATION DISTRICT

By: _____
President of the Board of Directors

Attest:

By: _____
Secretary of the Board of Directors

(H:\pub 440\LTRC\Final Draft LTRC's – Fresno, Tracy\09-23-04 James ID Final Draft LTRC with exhib*-its.doc)



James Irrigation District

Contractor's Service Area

District Boundary

Contract No. 14-06-200-700A-LTR1

Exhibit A

Miles

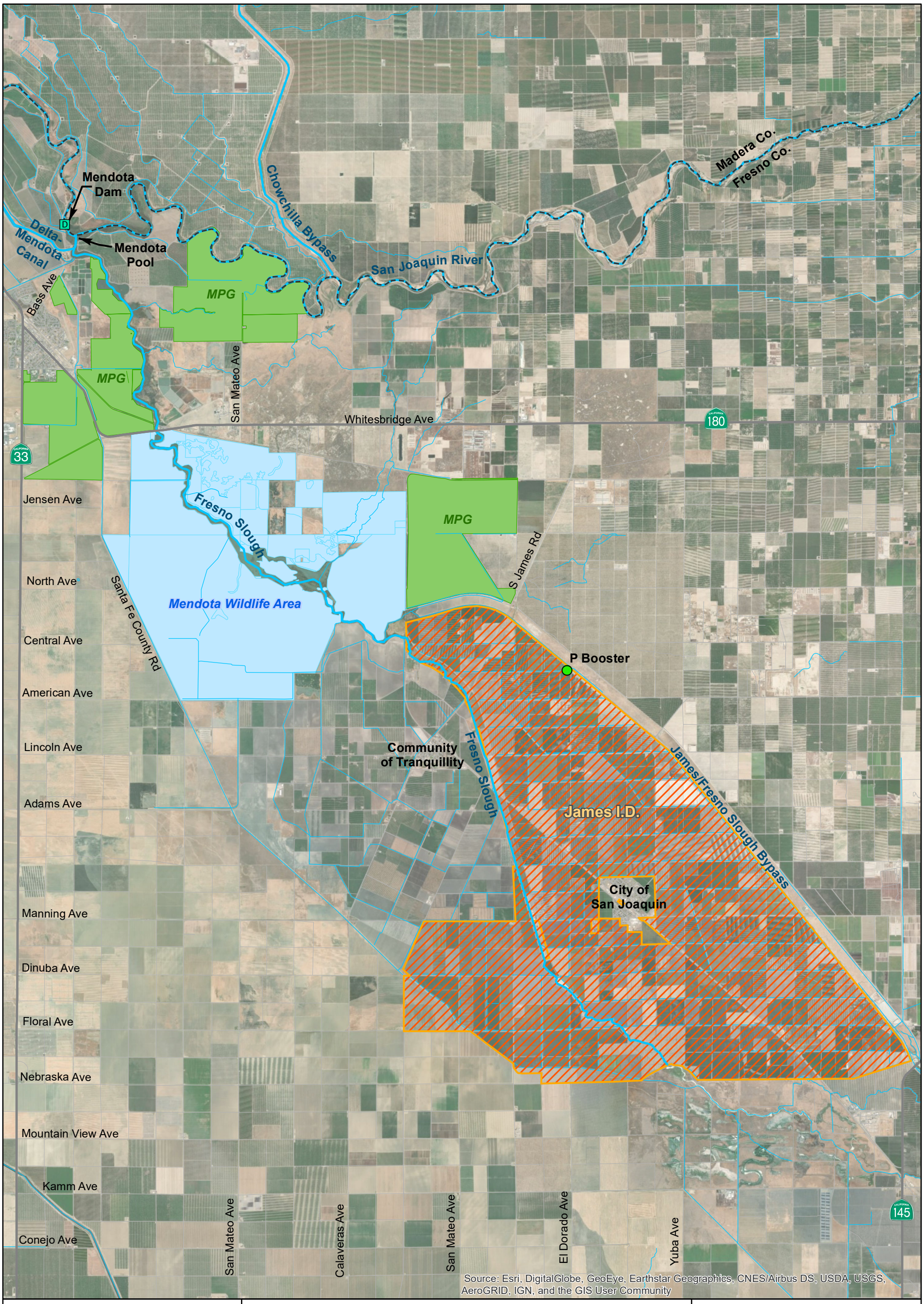
0 0.5 1 2 3

Date: October 13, 2004

File Name: N:\districts\contracts\james\james.mxd

214-202-19

Appendix L – Exhibit 7 of the James Irrigation District Comment Letter



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Miles

- Waterway
- Mendota Pool Group Lands
- Mendota Wildlife Area (Ca Dept. Fish & Wildlife)
- James ID
- County

James Irrigation District

Mendota Pool Group Lands

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Appendix L – Exhibit 8 of the James Irrigation District Comment Letter

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

2015

prepared for:

United States Bureau of Reclamation
Mid-Pacific Region

August 2016

Prepared by:

Date Signed: 8-18-2016

Provost & Pritchard Consulting Group
2505 Alluvial Ave.
Clovis, CA 93611-9166
(559) 326-1100

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Section 1: Description of the District

District Name: **James Irrigation District**

Contact Name: Steve Stadler

Title: Assistant General Manager

Telephone: (559) 693-4356

E-mail: sstadler@jamesid.org

Web Address: none

A. History

Lands within the James Irrigation District (JID or District) were originally part of a 72,000-acre patent received by the pioneer Jefferson G. James in 1858. Much of the lands within today's District were periodically flooded by Kings River flood flows, and consisted of grassland and swampland, traversed by a series of slough channels. Mr. James grazed cattle on the overflowed lands and excavated channels to control the spreading of Kings River water. In 1885, he constructed a 15 mile long canal from the Murphy Slough to skirt the eastern edge of the submersible lands. This canal was known as the Eastside Canal. In 1889 and 1892 he constructed two parallel eight-mile long canals that skirted the western edge of the submersible lands. These canals were used to irrigate cropland he leased to tenants as well as his own grasslands. The westernmost canal eventually came to be known as the Beta Main Canal. A canal was also built from the San Joaquin River to the area, but its use was blocked by Miller and Lux, and it was subsequently abandoned.

The supply of the Kings River was not reliable, however, since the diversions for James' canals were the last ones on the river, and were thus the last to receive water. In dry years, little or no water was available.

In the early 1900's James' lands were purchased by the San Joaquin Valley Farm Lands Company. The San Joaquin Valley Farm Lands Company took major steps to improve the irrigation of the land with the view of selling off cropland in blocks to settlers.

In 1914, Reclamation District 1606 constructed two channels through the District to make a continuous connection from the Kings River to the San Joaquin River and pass flood water through the area. The western channel is known as the Fresno Slough; the eastern channel is known as the Fresno Slough Bypass (or James Bypass).

In 1918 the present Main Canal was constructed just southwest of and parallel to the eastern flood channel known as the Fresno Slough Bypass. The previously mentioned Eastside Canal was subsequently abandoned. Lateral canals running east-west were also constructed to

distribute water from the Main Canal and Beta Main Canal to the blocks of land being developed. Kings River water was diverted from the Fresno Slough Bypass to irrigate the lands between the two channels. Meanwhile, the west side canals were still used to irrigate lands west of the Fresno Slough.

San Joaquin River water was also pumped from the pool in the Fresno Slough Bypass (created by impoundment of water behind Mendota Dam) at the north end of today's District when San Joaquin River flows exceeded the needs of Miller and Lux. The supply of San Joaquin River water was also not very reliable.

Numerous deep wells (700 to 1,200 feet deep) were drilled within the District boundaries by the San Joaquin Valley Farm Lands Company in the late 1910's and early 1920's to tap the confined aquifer below the Corcoran Clay. These wells were called 'artesian wells', and some originally flowed to the surface without pumping. Eventually, pumps were placed in each of the wells as the groundwater surface dropped.

In 1921, following the formation of the JID, numerous shallower wells (200 to 600 feet deep) were drilled on land then owned by the San Joaquin Valley Farm Lands Company east of the Fresno Slough Bypass. The McMullin Grade Canal and the Lassen Avenue Canal were simultaneously built to transport that water to lands west of the Bypass in James ID.

The San Joaquin Valley Farmlands Company sold James Irrigation District the perpetual right to pump groundwater from beneath those lands east of the Bypass, up to 200 cfs in capacity, and sold them existing irrigation facilities within the district. More and more pasture lands were converted to crop land within the District as the water supply and distribution system was improved. Gradually, blocks of the San Joaquin Valley Farm Land Company's holdings were sold to colonists.

Friant Dam was constructed by the United States Bureau of Reclamation (USBR) on the San Joaquin River and put into operation in 1944. From 1944 to 1950 the JID pumped San Joaquin River water from the Mendota Pool on an annual basis until August 1st of each year, with no limit placed on quantity. In 1951, the USBR completed the Delta Mendota Canal to bring water from the San Joaquin-Sacramento River Delta to the Mendota Pool. From 1949 to 1963, the JID received temporary annual contracts for pumping a limited amount of water from the Mendota Pool.

Pine Flat Dam was completed in 1954 on the Kings River by the United States Army Corps of Engineers. Wishon and Courtright reservoirs were constructed on tributaries of the Kings River by Pacific Gas and Electric Company in the late 1950's.

The reservoirs on the Kings and San Joaquin Rivers, and the Delta Mendota Canal dramatically altered the natural flow of the rivers while providing flood control, power generation, and storage of irrigation water.

The Kings River Water Association (KRWA), of which JID has been a member since 1921, modified its operating agreements to incorporate the effects of the Kings River reservoirs with the original schedule used to determine storage rights.

In 1963, the District entered into agreements with the USBR and KRWA to establish the District's entitlements to surface water from both the San Joaquin River and the Kings River. As a result of those agreements, the JID received an allocation of supplemental San Joaquin River water (called Schedule 2 water or riparian water) from the USBR, and has a separate contract for Kings River Water. JID has been selling its Kings River water, through temporary agreements, to the lower river units of the Kings River Water Association. This agreement was modified or renewed in 1987, 1989 and 2003.

The 1963 USBR agreement was revised in 1989 to incorporate the effects of the Reclamation Reform Act of 1982. The amount of the JID's water entitlements were not changed in the new agreements.

Since the 1963 agreements, the District only receives Kings River water when there are high flow releases at the James Weir in the Fresno Slough Bypass. When it does receive water from the Kings River, the District diverts its water from the Fresno Slough Bypass upstream of the James Weir and at its pump station on the Bypass.

The District has phased out the use of the deep 'artesian' wells. Water quality degradation, loss of "artesian" nature and poor well yields led to this change. However, the District continues to use deep wells to pump water for irrigation, primarily from above the Corcoran Clay.

1. Date district formed

Formed: 2/16/1920
Date of first Reclamation contract*: 1963*
Original size (acres)*: 25,980*
Current year (last complete calendar year)*: 2014*

2. Current size, population, and irrigated acres

Description	(Year 2014)
Size (acres)	25,287
Population served	0*
Irrigated acres	23,874

*The District only serves agricultural water supply; no municipal or industrial water supply is provided.

3. Water supplies received in current year

Water Source	AF
Federal urban water (Tbl 1)	0
Federal agricultural water (Tbl 1)	0
State water (Tbl 1)	0
Other Wholesaler (FID Spillwater) (Tbl 1)	288
Local surface water (Tbl 1)	6,200
Upslope drain water (Tbl 1)	0
District ground water (Tbl 2)	65,509
Banked water (Tbl 1)	0
Transferred water (Tbl 6)	0
Recycled water (Tbl 3)	0
Other (Fresno Irrigation District Floodwater) (Tbl 1)	0
Total	71,997

4. Annual entitlement under each right and/or contract

Description	AF	Source	Contract #	Availability period(s)
USBR Urban AF/Y	N/A			
USBR Agriculture AF/Y	35,300	USBR	14-06-200-700A-LTR1	CVPIA reductions, long-term average 60% deliveries
Other AF/Y	9,700	USBR-Schedule 2	14-06-200-700A	Schedule of Availability

5. Anticipated land-use changes

Over the past five years the City of San Joaquin has seen slow, gradual growth. As the City expands into JID the land is de-annexed from JID. JID has also seen a slow gradual shift towards higher value permanent crops. These land-use changes are expected to continue over the next five years.

6. Cropping patterns (Agricultural only)

List of current crops (crops with 5% or less of total acreage) can be combined in the 'Other' category.

Original Plan (1988)		Previous Plan (2009)		Current Plan (2014)	
Crop Name	**Crop Name**	**Crop Name**	**Acres**	**Crop Name**	**Acres**
Cotton	10,827	Cotton	5,748	Cotton	4,224
Alfalfa Seed	8,207	Alfalfa seed	5,969	Alfalfa Seed	4,912
Alfalfa Hay	515	Grain: wheat	1,498	Pistachios	2,189
		Almonds	2,428	Almonds	4,175
		Tomatoes	2,938	Tomatoes	2,569
		Grapes: wine	1,115	Grapes: wine	1,763
				Onions	1,917
Other (<5%)	1,021	Other (<5%)	2,434	Other (<5%)	2,125
Total	20,570	Total	22,130	Total	23,874

There has been a trend in conversion from annual to permanent crops averaging about 1,000 Acres/year.

7. Major irrigation methods (by acreage) (Agricultural only)

Previous Plan (2002)		Previous Plan (2009)		Current Plan (2014)	
Irrigation Method	**Acres**	**Irrigation Method**	**Acres**	**Irrigation Method**	**Acres**
Drip	100	Drip	1,442	Drip	7,930
Drip Tape	0	Drip Tape	3,045	Drip Tape	2,813
Micro Spray	443	Micro Sprinkler	1,067	Micro Sprinkler	211
Flood Irrigation	21,879	Flood Irrigation	16,576	Flood Irrigation	9,768
Sprinkler	0	Sprinkler	0	Sprinkler	2,092
Other	42	Other	0	Other	0
No information available	0	No information available	0	No information available	949
Fallow	NA	Fallow	NA	Fallow	111
Total	22,464	Total	22,130	Total	23,874

B. Location and Facilities

See maps in **Appendix A** for locations of facilities in JID.

1. Incoming flow locations and measurement methods

Location Name	Physical Location	Type of Measurement Device	Accuracy
Fresno Irrigation District Spill Waters	Central Wasteway No. 33 (upstream end of McMullin grade) (lat 36.662530, long 119.970322) Dry Creek Spill (Biola alignment at McMullin Grade) (lat 36.626026, long 120.016546)	Two Weirs Ultrasonic flowmeter	+/- 5% +/- 2%
Groundwater Wells	Eastside Wellfield (outside of District) and Southern portion of District (in District) (multiple locations and various coordinates)	Propeller meters	+/- 2%
Siphon Under James Bypass (water from Eastside Canals)	Southeast corner of District, running across Fresno Slough Bypass (lat 36.575818, long 120.097596)	Ultrasonic flowmeter	+/- 2%
P Booster Pumps (from Mendota Pool)	Northwest end of James Main Canal (lat 36.669110, long 120.205641)	Propeller meter	+/- 2%
James Weir (Kings River Flood Waters)	Southeast corner of District, running across Fresno Slough Bypass (lat 36.565283, long 120.094846)	Canal gates	+/- 10%

2. Current year Agricultural Conveyance System

Miles Unlined - Canal	Miles Lined - Canal	Miles Piped	Miles - Other
91.3	14.3	6.3	0

3 Current year Urban Distribution System

Miles AC Pipe	Miles Steel Pipe	Miles Cast Iron Pipe	Miles - Other
0	0	0	0

4. Storage facilities (tanks, reservoirs, regulating reservoirs)

Name	Type	Capacity (AF)	Distribution or Spill
(E) Fresno Bypass Regulation Basin (aka Regulation Basin No. 1)	Earth embankment	95 AF	Regulation storage. Spillwater capture.
(E) C-Basin	Earth embankment	10 AF	Regulation storage. Spillwater capture.
(E) E-Basin	Earth embankment	40-45 AF	Regulation storage. Spillwater capture.
(E) K-Basin Distribution Canal and Cell #1	Earth embankment	122 AF	Regulation storage. Spillwater capture. Recharge.
(E) K-Basin Cells 2-4	Earth embankment	938 AF	Spillwater capture. Recharge.
(E) Basin No. 2	Earth embankment	620 AF	Spillwater capture. Recharge.
(E) San Luis Drain	Canal	68 AF	Regulation storage.
(E) Mendota Pool	Reservoir	Very large	Regulation storage subject to 10% losses. Water must be recovered in 30 days.

(E) = Existing

5. Description of the agricultural spill recovery system

JID's agricultural spills occur at three lateral canals (E, I and J). These spills flow directly into the neighboring Tranquillity Irrigation District, the Mendota Bypass, or into the Fresno Slough and are then later picked up by Tranquillity Irrigation District. These spills are not recovered by JID, but all of them ultimately flow to the neighboring Tranquillity Irrigation District where they are re-used.

6. Agricultural delivery system operation (check all that apply)

On-demand	Scheduled	Rotation	Other (describe)
	100%		

7. Restrictions on water source(s)

Source	Restriction	Cause of Restriction	Effect on Operations
Eastside Wellfield GW Pumping	Flow Rate	Contractual	Legal agreement limits pumping to 200 cfs on the land
Schedule 2 CVP water	Schedule	Contractual	Dictates delivery amounts each month
'P' Booster	Flow Rate	Physical	Limits pumping to 250 cfs
Siphon across Fresno Slough Bypass	Flow Rate	Physical	Capacity limit of 150 cfs
Laterals C, E, & G	Flow Rate	Physical	Formerly resorted to rotation during peak water demands, but this has been largely eliminated in recent years due to construction of several regulation reservoirs.

8. Proposed changes or additions to facilities and operations for the next 5 years

Proposed changes and additions to the District's facilities in the next 5 years (2015-2019) are listed below. Implementation of the improvements will depend on available funding.

Facility	Description	Schedule	Current Status
Fresno Slough Bypass Recharge Area	Construct four recharge cells on to Bypass uplands area (Water Augmentation Project)	2015-2016	Permitting process underway
Basin No. 3	Construct 300 AF earth basin for regulation storage, spillwater capture and recharge (Water Augmentation Project)	2015-2016	Permitting process underway
E-Check	Install Langeman Gates to replace stoplog boards and provide better flow control (Water Augmentation Project)	2016-2017	

Facility	Description	Schedule	Current Status
JID Well Field	Construct New Wells	One to two wells every year to replace aging wells	
Lateral K Basin	Increase existing Cell No. 1 by about 55 AF for regulation purposes	2015 (completed)	
E-Basin Reservoir	Enlarge footprint – small increases typically every 1 to 2 years	2015, 2017, 2019	
Grower turnouts	Modify to pressurized system to allow drip irrigation	As requested by growers, but on average has been about 10 per year in recent years	About 10-20 per year
James Weir Diversion	Install flow measurement instrumentation and telemetry	2015	
Various Facilities	Install telemetry at other key facilities	2015-2019	

C. Topography and Soils

1. Topography of the district and its impact on water operations and management

Land in the District is relatively flat. It generally slopes westward and northward at a rate of about 3 to 4 feet per mile, with local variations caused by remnants of slough channels. The land is adequately sloped for gravity irrigation in most areas. Elevations range from 160 to 180 feet above sea level.

2. District soil associations (Agric only)

Soil Association	Estimated Acres	Effect on Water Operations and Management
Merced & Tachi clays	18,600	Heavy cracking clay, low infiltration rate, slightly saline
Temple loams & clays	2,200	Saline & alkaline in places, moderately slow permeability
Rossi loams	2,200	Slow permeability and saline-alkaline sub-soil
Lillis clay	1,600	
Pond sandy loam	618	Saline-alkaline in places
Gepford clay	400	
Waukena fine sandy loam	300	Saline-alkaline, hard to reclaim
Sandy alluvial loam	200	High permeability, low water holding capacity
Piper sandy loam	150	Saline-alkaline subsoil in places, mod-high permeability
Traver fine sandy loam	100	Saline-alkaline subsoil

See Appendix A, District Soils Map

3. Agricultural limitations resulting from soil problems (Agricultural only)

Soil Problem	Estimated Acres	Effect on Water Operations and Management
Salinity	0	
High-water table*	0	
High or low infiltration rates	0	
Other (define)	0	

D. Climate

1. General climate of the district service area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg.
Avg Precip.	1.44	1.27	1.00	0.49	0.29	0.09	0.01	0.02	0.17	0.36	0.66	0.98	6.79
Avg Temp. (F)	45.8	51.4	55.5	60.9	68.0	74.9	80.9	78.9	74.6	65.2	53.8	46.4	63.4
Max. Temp. (F)	55.1	62.6	68.5	75.6	84.5	91.8	97.9	95.9	90.9	80	66.4	55.6	77.1
Min. Temp	36.3	39.7	42.0	45.7	51.4	57.4	63.1	61.5	58.0	50.1	41.5	36.4	48.6
ETo	1.27	2.00	3.95	6.11	7.74	8.46	8.69	7.96	6.18	4.51	2.35	1.17	60.39

Weather station ID ***043083*** **Data period: Year** ***1942*** **to Year** ***2014***

Average wind velocity ***5.7 mph*** **Average annual frost-free days:** ***250***

Data is taken from the Five Points weather station.
(http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3083)

2. Impact of microclimates on water management within the service area

Microclimates are not a significant factor in the JID.

E. Natural and Cultural Resources

1. Natural resource areas within the service area

Name	Estimated Acres	Description
NONE	NONE	NONE

2. Description of district management of these resources in the past or present

NONE

3. Recreational and/or cultural resources areas within the service area

Name	Estimated Acres	Description
NONE	NONE	NONE

F. Operating Rules and Regulations

1. Operating rules and regulations

See **Appendix C**, District Rules and Regulations (water related)

2. Water allocation policy (Agricultural only)

See **Appendix C**, Page 3

The District allocates water to growers based on irrigated acreage. Growers are allocated water based on the percentage of lands within the District that they are irrigating. The District has not recently needed to enforce an allocation policy because they have been able to provide 100 percent of the grower's water needs. Although surface water is limited and cannot meet all the District demands, groundwater is able to satisfy the remaining demand.

The capacity of the groundwater pumps cannot meet the normal peak demand, so the peak demand is met by combining surface and groundwater sources. In an extremely dry year when surface water is limited, the groundwater pumping capacity may limit water use. In this case, the District may find it necessary to restrict water use based on the allocation policy. However, regulation reservoirs built in recent years assist in meeting peak demands.

The District may also need to implement water allocations if there is an operational problem. The District's 2010 Rules and Regulations address this issue as follows:

> *"5.8 – Water Allocation. The District will implement water allocations when necessary for a more equitable distribution of water. The conditions for determining allocations on an individual area include, but are not limited to: power failure, equipment failure or any operational problem that would prevent the District from delivering water in a timely manner. The duration of allocations will be held to the minimum length of time required to return to normal operations and deliveries. Allocation amounts will be on a per acre basis using available water distributed per acre over the affected areas."*

The District's Groundwater Management Plan outlines a policy that allows growers to transfer water to other users within or outside of the District. The volume of water that they can transfer is determined with the allocation policy (based on their irrigated acreage).

3. Official and actual lead times necessary for water orders and shut-off (Agricultural only)

See **Appendix C**, Page 2

Water orders must be received at the District office with a minimum of 72 hours advance notice. There are no restrictions on how often a grower can request water. The user can specify the flow rate to his field, not to exceed the capacity of the turnout. Turnout capacities vary from about 48 to 60 gpm per acre. With three hours minimum notice, changes usually can

be made in the flow rate during an irrigation event. Growers may shut-off at any time, but must give six hours minimum advance notice.

4. Policies regarding return flows (surface and subsurface drainage from farms) and outflow (Agricultural only)

See **Appendix C**, Page 8

Growers are allowed to pump tailwater back into the JID canal system, as long as the practice is approved in writing by the Board, and does not create a nuisance or hazard for the District or other water users. Otherwise, it will be considered pollution and reported to the water superintendent for action.

5. Policies on water transfers by the district and its customers

See **Appendix C**, Pages 8-10

The District has been a party to and has facilitated numerous transfers between itself, other CVP contractors, and other KRWA members. The District's policy on transfers has been to aggressively utilize them to maximize the utility of its water supply, first for the benefit of the District as a whole, and secondly for its growers individually.

The District Rules and Regulations were modified in 2000 to forbid riparian or groundwater transfers out of the District. However, Central Valley Project allocations can be transferred by farmers who grow crops in more than one District, if they fallow their land in the James Irrigation District. These policy revisions will prevent unwanted water exportation out of the James Irrigation District. The CVP transfers will benefit farmers who grow crops in more than one District. These farmers can transfer water from one District where it is in surplus, to another District where it is in deficit, to prevent crop losses.

G. Water Measurement, Pricing, and Billing

1. Agricultural Customers

Number of farms ***60***
Number of delivery points (turnouts and connections) ***344***
Number of delivery points serving more than one farm ***10***
Number of measured delivery points (meters and measurement devices) ***344***
Percentage of delivered water that was measured at a delivery point ***100%***

Delivery point measurement device table (Agricultural only)

Measurement Type	Number	Accuracy (+/- %)	Reading Frequency (Days)	Calibration Frequency (Months)	Maintenance Frequency (Months)
Orifices					
Propeller meter	344	+/-2%	Daily	36	12
Weirs					
Flumes					
Venturi					
Metered gates					
Acoustic doppler					
Other (define)					
Total					

Over the past five years a number of meters have been changed due to irrigation method changing from surface to pressurized irrigation. It is expected that about 12 turnouts will be modified per year in the future.

JID also has a meter test facility, which is used to calibrate their own meters.

Appendix M includes manufacturer's information (product data sheets) on the two primary meter types used in JID, open-channel propeller and strap-on-saddle propeller meters.

2. Urban Customers NA

Total number of connections ***NONE***
Total number of metered connections ***NONE***
Total number of connections not billed by quantity ***NONE***
Percentage of water that was measured at delivery point ***NONE***
Percentage of delivered water that was billed by quantity ***NONE***
Measurement device table NA

3. Agriculture and Urban Customers

Current year agriculture and /or urban water charges - including rate structures and billing frequency

In 2014 water rates ranged from $112/AF to $163.21/AF. This is higher than the average cost of about $90/AF charged in 2009. JID has two different water billing categories: COST/SVC and FC/NON-PROJ. COST/SVS lands comply with Reclamation law and can receive CVP supplies, where the FC/NON-PROJ are excess and full cost lands. Excess lands are not eligible for CVP supplies and full cost lands are provided the District's non-project water. The rate classification is based upon the cost of surface water to the District and the costs of groundwater pumping. Different volumetric rates are used for pasture land versus crop land.

In addition, the District levies an effective assessment rate of $21.00/acre for farm land. Pasture lands are charged a special rate of $1.58/acre.

Annual effective assessment rate collected from customers (current year data)

Fixed Charges			
Charges ($ unit)	Charge units ($/acre), ($/customer)	Units billed during year (acres, customer) etc.	$ collected ($ times units)
$21.00	$/acre	24,538.25	$515,313.25
$1.58	$/acre	34.05	$53.62
		Total	

Volumetric charges				
Description	Charges ($ unit)	Charge units	Units billed during year (AF, HCF) etc.	$ collected ($ times units)
Cost of Service	$112.00	$/AF	40.957.71	$4,587,263.52
Full Cost / Non Project	$117.00	$/AF	14,865.77	$1,739,295.09
Special Agreement Rate (Full Cost / Non Project)	$163.21	$/AF	204.75	$33,417.25
			Total	$6,359,976

Water-use data accounting procedures

See **Appendix D** for a sample customer invoice, which are sent to growers monthly. The bill clearly shows how much water was used and that it is billed on a volumetric basis. JID can provide extra copies of the bills for the past several years upon grower request.

H. Water Shortage Allocation Policies

1. Current year water shortage policies or shortage response plan - specifying how reduced water supplies are allocated

If meteorological conditions indicate a water short year, the District will increase groundwater pumping at the beginning of the irrigation season to preserve surface water for later use. Because of its supplemental groundwater supply, the District has been able to provide a full water supply to all of its customers in every year, except 1977. Growers are entitled to all of the water that their crops need, unless there is an overall shortage. In the event of shortage, the water is apportioned upon the basis of the acreage irrigated, with preference given first to garden crops, then secondly to first year alfalfa, young trees, cotton, vines, and cuttings, so far as water is needed to keep them alive.

Occasionally, capacity limitations in the District's water supply and/or canal system force ditch tenders to delay deliveries to those who have ordered water. When that occurs, growers are served on a first come, first served basis, until the demands are met. In recent years this practice has become uncommon due the construction of several new regulation reservoirs, and the transition to permanent crops.

To address water shortages JID is currently designing the JID Water Augmentation Project. This project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on contracted surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. It is estimated that the project will allow JID to capture and recharge an average of 2,100 AF/year of Kings River high flows. Five recovery wells will have the capacity to extract 30 AF/day. The project will also include regulation reservoirs that will help to meet peak demands. The project is currently being designed and construction is expected to be completed by over the next several years after final regulatory approvals are obtained.

The District's Drought Preparedness Plan is not formally documented and may be inadequate in severe drought conditions. The District sought funding for preparing a Drought Preparedness Plan from the Local Groundwater Assistance Act (hereafter called AB303) in a DWR application submitted in November 2004. AB 303 authorizes grants for local public agencies to conduct groundwater studies or to implement groundwater monitoring and management activities. The grant was not funded. However, when district funds permit, or JID successfully secures a grant, the District still has a goal of preparing a Drought Preparedness Plan that will include the following:

1. Triggers for implementing the program (i.e. hydrologic conditions)
2. Schedule for groundwater pumping based on anticipated hydrologic conditions

3. Procedures for reporting potential water shortages to growers
4. Discussions on conservation methods (planting less thirsty crops, fallowing land, etc.)
5. Recommendations for capacity improvements to improve groundwater supply
6. Procedures to follow during a power outage or water outage
7. Discussion on alternatives for water purchases and water exchanges

2. Current year policies that address wasteful use of water and enforcement methods

The District's water waste policy is documented in their 2010 Rules and Regulations (**Appendix C**, Page 7 – Water User Responsibilities)

The policy states the following:

"Water Users who waste water delivered by the District, either willfully, carelessly or on account of defective or inadequate privately owned ditches, conduits, or structures, or because of inadequate preparation of the land for irrigation, may be refused further services until such conditions are remedied. Any waste or other improper use of water shall be reported to the Superintendent who will take appropriate action."

In addition, the District makes customers liable to pay for any water wasted or property damage resulting from un-notified shutoffs.

Evaluate Policies of Regulatory Agencies Affecting the Contractor and Identify Policies that Inhibit Good Water Management

It is difficult to evaluate the policies of regulatory agencies affecting the contractor given the multitude of agencies and policies that affect the contractor. Policies that impede Reclamation from delivering on contracted quantities of water, reduce the reliability of deliveries, eliminate flexibility of delivery systems, and create uncertainty about deliveries adversely impact good water management practices. Consideration of these points during policy development and implementation will facilitate good water management.

Section 2: Inventory of Water Resources

A. Surface Water Supply

1. Acre-foot amounts of surface water delivered to the water purveyor by each of the purveyor's sources

See Water Inventory Tables, Table 1, **Appendix E**.

Schedule 2 CVP Water

Schedule 2 CVP Water (aka Riparian Water) is delivered without charge as a settlement of the District's water rights claims to San Joaquin River water in Fresno Slough. During normal and wet years 9,700 AF is normally available. During dry years 7,600 AF is normally available. The contract requires that the District take delivery of this water according to the schedule shown in the following table. In practice, the USBR has allowed some flexibility on when this water is taken.

USBR Scheduled Water Deliveries to JID (AF)

Hydrologic Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	0	600	800	1,300	1,900	2,500	2,000	400	200	0	0	0
Dry	0	600	800	1,000	1,500	1,900	1,400	300	100	0	0	0

Central Valley Project Water

In addition, the James Irrigation District has a Central Valley Project contract (no. 14-06-200-700A-LTR1) for up to 35,300 acre-feet of water each year. The water is generally delivered in the spring and summer months and varies each year based on demand, availability, and schedules set by the USBR. These water deliveries averaged 13,706 AF/year between 2005 and 2014, or only 39% of their contract amount

2. Amount of water delivered to the district by each of the district sources for the last 10 years

See Water Inventory Tables, Table 8 (**Appendix E**)

B. Ground Water Supply

1. Acre-foot amounts of ground water pumped and delivered by the district

See Water Inventory Tables, Table 2

2. Ground water basin(s) that underlies the service area

Name	Size (Square Miles)	Usable Capacity (AF)	Safe Yield (AF/Y)
Kings sub-basin (part of San Joaquin Basin)	1,530	93,000,000*	Unknown

*This value represents usable groundwater in 1961 to a depth of 1,000 feet.

The District has about 64 production wells. The well locations are shown on the Facilities map in Appendix A. About twenty-nine of these are within the District boundary and thirty-five are east of the District boundary. The estimated capacity of all the wells is about 200 cfs. Most of JID's wells are between 500 and 600 feet deep, and extend to the top of the Corcoran Clay. A few of JID's older wells are 700 to 900 feet deep and penetrate the confined aquifer beneath the Corcoran Clay. Two privately owned agricultural wells, and multiple private domestic wells for homesteads and animal/cattle operations, are inside JID's boundary.

3. Map of district-operated wells and managed groundwater recharge areas

See **Appendix A**, District Map

4. Description of conjunctive use of surface and ground water

Conjunctive use of groundwater and surface water has long been, and will continue to be, an integral part of the District's practices. Much effort goes into planning the use of JID's surface water and groundwater supplies to maximize the benefit of both.

The District will generally use any and all surface water that is available and within the District's capacity to receive first, then pump whatever groundwater is needed to make up any shortfall.

The District has made several efforts to optimize conjunctive use of surface and groundwater resources, particularly through groundwater recharge projects. These include the Lateral K Groundwater Recharge Project (described below) and the Water Augmentation Project (described in Section 2.B.6). Benefits from these recharge projects can include higher water levels, reduced overdraft, lower pumping costs, higher well capacities, and groundwater stored for use in droughts.

<u>Lateral K Groundwater Recharge Project</u>

The Lateral K Recharge Basin is a 226-acre basin in JID used for groundwater recharge and banking. The location of the Lateral K Recharge Basin is shown on the facilities map in

Appendix A. In 2004, seepage tests measured infiltration rates varying from 0.12 to 0.26 feet/day.

The primary water supply delivered to the Basin is Kings River high flows, although CVP water and San Joaquin River high flows could also feasibly be delivered. These water supplies are available in wet years, typically from about March to July, but can flow almost all year in very wet years. Kings River water typically has a TDS of less than 50 mg/L. Groundwater in wells near the Lateral K Basin has TDS ranging from about 800 to 1,100 mg/l.

The available groundwater storage capacity for the project has not been calculated. However, the area is considered overdrafted, and groundwater levels are about 100 feet below ground surface, so there is considerable storage capacity in JID.

Between 2005 and 2009 the District drilled and equipped 6 recovery wells, and 1 additional monitoring well at the 226-acre Lateral K Basin site. In 2007, the District completed the design and construction on a modification to the turnout to the Lateral K recharge basin site, so that the delivery canal and smallest cell could be used as regulation reservoirs, and spill protection for the Main Canal, for a combined storage increase of about 90 AF. In 2009, the banks of Lateral K were raised between the Main Canal and Placer Ave., to allow Lateral K to float with the Main Canal, and take well water from the site back to the Main Canal for use throughout the District. Also in 2009, data loggers were added to 6 wells to monitor groundwater levels.

Water Augmentation Project

To address water shortages JID is currently designing the JID Water Augmentation Project. This project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on contracted surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project consists of roughly 115 acres of new recharge basins, 1,150 AF of regulation storage (Basin 2 and 3), and up to 5 new groundwater wells. It is estimated that the project will allow JID to capture and recharge an average of 2,100 AF/year of Kings River high flows. The project is currently being designed and construction is expected to be completed by in 2 to 3 years, except the wells which are not currently scheduled. Project costs are estimated at $5 to $10 million.

5. Ground Water Management Plan

The District's Groundwater Management Plan (GMP), originally drafted in 1996, was updated in 2010. The GMP was prepared in coordination with the City of San Joaquin. **Appendix F** is a final copy of the GMP.

6. Ground Water Banking Plan

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project (see **Appendix G**). JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

C. Other Water Supplies

1. "Other" water used as part of the water supply

See the Water Inventory Tables, Table 1

Other water used by the District includes spillwater from the Fresno Irrigation District and groundwater recovery from the Lateral K Groundwater Bank (see Table 1-Ag in **Appendix E**).

Source	2014 Amount (AF/Y)	Length of contract	Use
Fresno ID spill	100	None	Agriculture
Lateral K Basin Recovery Wells	4,355	None	Agriculture
TOTAL	4,455		

JID receives operational spills from the Fresno Irrigation District into its east side canals. FID's spill water enters at two places. FID's Central Wasteway spills directly through a pipeline into the northern end of the McMullin Grade Canal. FID's Dry Creek Canal spills into the Dry Creek Canal Extension, which ends at the McMullin Grade Canal. Several farmers adjacent to the Dry Creek Extension impound and divert much of the water spilled from the Dry Creek Canal before it reaches the JID McMullin Grade Canal.

The District also diverts Kings River high flows from the Fresno Slough Bypass when it is available. In some years, the District also pumps Kings River high flows at it's P- Booster station in the Mendota Pool/Fresno Slough.

The District only receives Kings River water in about 45 percent of the years, and it has not been delivered to JID since 2011. Kings River water that is diverted is usually received in high quantity, short duration flows. Often the District is not able to fully utilize the diverted high flows and an unmeasured portion of it may spill back to the Fresno Slough.

In the past, during wet years, the USBR has made surplus water available to JID, which is above its normal contract deliveries. The source of this water may be either imports from the Delta via the Delta Mendota Canal, or San Joaquin River high flow releases (called Section 215 water by the USBR).

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only)
JID does not provide an urban water supply

2. Agricultural water quality concerns
Yes ***X*** **No** _____
(If yes, describe)

The District has identified specific areas that merit more thorough groundwater quality testing. These areas include lands surrounding the Raisin City Oilfield (located northeast of the District) and areas with possible shallow groundwater and drainage problems on the west side of the District. The lands surrounding Raisin City Oilfield have increased salinity as a result of past disposal of oil well waste water into unlined pits. The migration of this plume will be monitored.

The USBR claims that a small portion of western JID is in a drainage impacted area with shallow groundwater and water quality problems; however, JID has never seen either of these problems. These areas were investigated through a grant funded by the California Department of Water Resources Local Groundwater Assistance Fund. The study included a review of historical groundwater quality, groundwater quality testing, and construction of several monitoring wells. The study was completed in 2011. Groundwater in this area do not have high levels of selenium, which can indicate drainage impacted lands, and groundwater levels range from about 70 to 90 feet deep. Therefore, the investigation shows that the area is clearly not drainage impacted. More details, including a map of the alleged drainage impacted lands, and locations of recent groundwater quality testing and groundwater level records, are provided in **Appendix B**.

3. Description of the agricultural water quality testing program and the role of each participant, including the district, in the program

JID does not have its own surface-water-quality monitoring-program, other than daily readings of temperature and continuous electrical conductivity readings at its P-Booster Pump at Mendota Pool. Otherwise, it relies on data developed by monitoring programs of other agencies. These consist of programs operated by the USBR, San Luis & Delta Mendota Water Authority, and Kings River Conservation District. Since JID does not have any drainage water, it does not participate in a drainage water-quality monitoring-program.

4. Current water quality monitoring programs for surface water by source (Agricultural only)

Analyses Performed	Frequency	Concentration Range	Average
Electrical Conductivity (P-Booster Pump at Mendota Pool)	Continuous data approximately 60% of time from 2010 to 2014	16-1,124 ppm TDS	~484 ppm TDS

Current water quality monitoring programs for groundwater by source (Agricultural only)

Analyses Performed	Frequency	Concentration Range (2010, 2012,2013)	Average (2010,2012,2013)
Electrical Conductivity	Yearly	200 – 3,050	750, 768,767 ppm

Typically each year JID staff tests every District well with a portable Electrical Conductivity (EC) meter to estimate Total Dissolved Solids (TDS) content in the water. In addition, water from every new well (typically two each year) is taken to a lab and tested for general mineral analysis. Other wells that show high EC readings are sometimes sampled for general mineral laboratory analysis as well. The District skipped water quality testing in 2011 due to budget and staffing limitations. The District's historical groundwater quality test results (1977 – 2013) are included as **Appendix H**.

In 2013, the District also collected a water sample from every well owned by the District and conducted an agricultural suitability analysis of the groundwater. The following constituents were analyzed: pH, EC, Chloride, Total Carbonates, Sulfate, Nitrate, Sodium Adsorption Ratio, Calcium, Magnesium, Boron, Sodium, Iron and Manganese.

E. Water Uses within the District

1. Agricultural

See Water Inventory Tables, Table 5 - Crop Water Needs

2. Types of irrigation systems used for each crop in current year

Crop name	Drip Irrigation	Drip Tape	Micro-Sprinkler	Sprinkler	Flood Irrigation	Idle	No Info. Available	Total
Corn					X			
Cotton					X			
Grain: Wheat					X			
Hay: Alfalfa					X			
Hay: Oats					X			
Nuts: Almond Bearing	X	X	X		X			
Pasture (Permanent)					X			
Seed: Alfalfa					X			
Seed: Lettuce					X			
Pistachios	X	X	X		X			
Onions: Dehydrated				X	X			
Tomatoes: Canning		X			X			
Grapes	X	X			X			
Pomegranetes	X	X			X			
All other crops		X			X			
Total	7,930	2,813	211	2,092	9,768	111	949	23,874

Note: Quantitative data on irrigation systems used on specific crops is not available, but it is generally known which irrigation methods are used for which crop.

3. Urban use by customer type in current year

Customer Type	Number of Connections	AF
Single-family	NONE	
Multi-family	NONE	
Commercial	NONE	
Industrial	NONE	
Institutional	NONE	
Landscape irrigation	NONE	
Wholesale	NONE	
Recycled	NONE	
Other (specify)	NONE	
Other (specify)	NONE	

Customer Type	Number of Connections	AF
Other (specify)	NONE	
Unaccounted for	NONE	
Total	NONE	

4. Urban Wastewater Collection/Treatment Systems serving the service area – current year

Treatment Plant	Treatment Lvl (1, 2, 3)	AF	Disposal to / uses
NONE			
NONE			
NONE	Total		
Total discharged to ocean and/or saline sink			

5. Ground water recharge/management in current year (Table 6)

Recharge Area	Method of Recharge	AF	Method of Retrieval
Lateral K Basin	Percolation	0	
Basin No. 2	Percolation	0	
	Total	0	

No water was recharged in 2014, but 4,355 AF was recovered at Lateral K Basin from water recharged in previous years.

6. Transfers and exchanges into or out of the service area in current year (Table 6)

From Whom	To Whom	AF	Use
None	None	-	-

7. Trades, wheeling, wet/dry year exchanges, banking or other transactions in current year (Table 6)

From Whom	To Whom	AF*	Use
James Irrigation District	Mendota Pool	10,737 / 10,199	Banking

*JID stores water in Mendota Pool and recovers it later in the year when demands are at their peak. The volume banked, 10,737 AF, was subject to 5% losses during storage, resulting in a recovery of 10,199 AF.

8. Other uses of water in current year

Other Uses	AF
NONE	

F. Outflow from the District (Agricultural only)

Districts included in the drainage problem area, as identified in "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990)," should also complete Water Inventory Table 7 and Appendix B

1. Surface and subsurface drain/outflow in current year

Outflow point	Location description	AF	Type of measurement	Accuracy (%)	% of total outflow	Acres drained
	End of Lateral Canal E	0	Propeller meter	+/- 2%	~0%	NA
	End of Lateral Canal I	80	Propeller meter	+/- 2%	~66%	NA
	End of Lateral Canal J	42	Propeller meter	+/- 2%	~34%	NA
	Total	122				

Outflow point	Where the outflow goes (drain, river or other location)	Type Reuse (if known)
Various	Neighboring Tranquillity Irrigation District	Crop irrigation

2. Description of the Outflow (surface and subsurface) water quality testing program and the role of each participant in the program

The District does not test the quality of outflow water.

3. Outflow (surface drainage & spill) Quality Testing Program

Analyses Performed	Frequency	Concentration Range	Average	Reuse limitation
None	None	None	None	None

Deep percolation from irrigation, canal seepage and ditch seepage rejoin the groundwater underlying the District, which is of good quality. There are no on-farm or District subsurface drainage systems within or leaving the JID.

Tailwater from on-farm irrigation is generally either reused on farm, or delivered back into JID's canal system by gravity. Almost no tailwater leaves the District.

The District receives stormwater runoff into its canal system in two places from the City of San Joaquin. When there is no room in JID's system for these flows, the flow is spilled into the Fresno Slough. The spills are not part of JIDs contracted water supply, and are neither measured nor tested.

A small part of western James Irrigation District has been identified as a drainage problem area in *"A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley" (September 1990).* However, JID has never observed drainage problems on their lands. Refer to **Appendix B** for recent testing and evaluation of groundwater conditions in this area.

Outflow (subsurface drainage) Quality Testing Program

Analyses Performed	Frequency	Concentration Range	Average	Reuse limitation
None	None	None	None	None

4. *Provide a brief discussion of the District's involvement in Central Valley Regional Water Quality Control Board programs or requirements for remediating or monitoring any contaminants that would significantly degrade water quality in the receiving surface waters.*

The District is not responsible for groundwater remediation or contaminant plume management, and therefore they are not involved directly in any Central Valley Regional Water Quality Control Board programs. Those responsibilities are assigned to other agencies such as cities, counties, the USEPA or California Department of Toxic Substances Control. JID tries to stay informed of contaminant plumes and their management and remediation within District boundaries. JID also monitors groundwater quality and takes practical measures to prevent groundwater quality degradation.

In 2014, the District obtained a *Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States* from the State Water Resources Control Board. This allowed them to apply herbicides to their irrigation canals.

G. Water Accounting (Inventory)

The tables listed below can be found in **Appendix E – Water Inventory Tables.** The leaching requirements and effective precipitation were obtained from values calculated in the *Water Conservation and Management Handbook – Westlands Water District* (January 1985). Westlands Water District is located just west of JID and the leaching/effective precipitation values are considered representative of JID also.

1. Water Supplies Quantified

a. Surface water supplies, imported and originating within the service area, by month (Table 1)
b. Ground water extracted by the district, by month (Table 2)
c. Effective precipitation by crop (Table 5)
d. Estimated annual ground water extracted by non-district parties (Table 2)
e. Recycled urban wastewater, by month (Table 3)
f. Other supplies, by month (Table 1)

2. Water Used Quantified

a. Agricultural conveyance losses, including seepage, evaporation, and operational spills in canal systems (Table 4) or
Urban leaks, breaks and flushing/fire uses in piped systems (Table 4)
b. Consumptive use by riparian vegetation or environmental use (Table 6)
c. Applied irrigation water - crop ET, water used for leaching/cultural practices (e.g., frost protection, soil reclamation, etc.) (Table 5)
d. Urban water use (Table 6)
e. Ground water recharge (Table 6)
f. Water exchanges and transfers and out-of-district banking (Table 6)
g. Estimated deep percolation within the service area (Table 6)
h. Flows to perched water table or saline sink (Table 7)
i. Outflow water leaving the district (Table 6)
j. Other

3. Overall Water Inventory
a. Table 6

Section 3: Best Management Practices (BMPs) for Agricultural Contractors

A. Critical Agricultural BMPs

1. Water Measurement

Measure the volume of water delivered by the district to each turnout with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6%

a) Number of delivery points (turnouts and connections): 344
b) Number of delivery points serving more than one farm: 10
c) Number of measured delivery points (meters and measurement devices): 344
d) Percentage of water delivered to the contractor that was measured at a delivery point: 100%
e) Total number of delivery points not billed by quantity: 0
f) Delivery point measurement table:

Measurement Type	Number	Accuracy	Reading Frequency (Days)	Calibration Frequency (Months)	Maintenance Frequency (Months)
Orifices					
Propeller meter	344	+/-2%	Daily	36	12
Weirs					
Flumes					
Venturi					
Metered gates					
Acoustic doppler					
Other:					
Total					

Manufacturer's information on the District's two types of water meters (open-channel propeller and saddle propeller) can be found in **Appendix M**.

The James Irrigation District installed a Flow Meter Test Facility in 2009, with assistance from a USBR Field Services Grant. The facility is used to compare propeller meter flowrates to the flowrate measured in a high-accuracy magnetic meter, and thus measure their accuracy. The facility is able to test 18-inch, 21-inch and 24-inch open-channel flow meters.

2. Water Conservation Coordinator

Designate a water conservation coordinator to develop and implement the Plan and develop progress reports

Name: Steve Stadler *Title:* Assistant District Manager

Address: PO Box 757, San Joaquin, CA 93660

Telephone: (559) 693-4356 *E-mail:* sstadler@jamesid.org

Steve Stadler, the Assistant District Manager, is the designated Conservation Coordinator. He will be responsible for coordinating all District activities and goals discussed in the Water Management Plan and communicating with the USBR. Specifically, the Conservation Coordinator will assist with planning new facilities, attending regular Board meetings, and preparing annual Water Management Plan updates. All these tasks further the goals and objectives in the USBR Best Management Practices Guidelines.

3. Water Management Services

Provide or support the availability of water management services to water users

a. On-Farm Evaluations

1) On farm irrigation and drainage system evaluations using a mobile lab type assessment

Description	Total in district	# surveyed last year	# surveyed in current year	# projected for next year	# projected 2nd yr in future
Irrigated acres	23,874	7,515	9,185	10,500	11,800
Number of farms	60	20	24	27	31

The District does not perform on-farm irrigation system evaluations since many farmers proactively use independent irrigation consultants for the evaluations. It is assumed that all growers with permanent plantings hire an irrigation consultant. These represent about 9,185 acres of the 23,874 irrigated acres in 2014 (40% of the irrigated acres and an increase of 1,670 acres from 2013).

The District has encouraged farmers to hire crop irrigation specialists during the Annual Growers meeting and in District newsletters. The District will continue to advise growers of the opportunity to participate in irrigation efficiency tests, and will increase our efforts to track opportunities.

2) Timely field and crop-specific water delivery information to the water user

Monthly water bills list the average acre-feet for each irrigation. A sample water bill is included as **Appendix D**. On the water bill, the turnouts and fields are tied to specific crops. The invoice also shows the volume of water used. In addition, the District maintains data on average annual water use by crop type in the District, and this information is available to the growers.

b. Real-time and normal irrigation scheduling and crop ET information

Numerous sources of real-time ET information are available to the growers. Most growers use information gathered from websites or hire private consultants or both. As a result, the District has not directly provided real-time ET information to the growers. The availability of CIMIS data is periodically mentioned in the District Newsletter and at Annual Growers meetings. Recent newsletters have not included this information but JID has set a goal of including it in 2016 and 2017 newsletters. JID will also remain aware of other sources of data that the growers can use.

c. Surface, ground, and drainage water quantity and quality data provided to water users

The District's water-quality monitoring-program includes the following:

1. Agricultural analysis on new wells constructed each year (typically two each year).
2. Annual testing of each existing well for total dissolved solids.
3. Water quality testing at the Mendota Pool including continuous electrical conductivity and periodic grab samples.
4. Water quality testing, as requested by growers, in specific portions of the canal system.

This water quality data is available to the growers and their irrigation consultants for determining suitable crop types. The data is also used by the District to characterize trends and identify changes in water quality.

The District collected a water sample from every well owned by the District and conducted an "agricultural suitability" analysis of the groundwater from each well in 2014. The following constituents were analyzed: pH, EC, Chloride, Total Carbonates, Sulfate, Nitrate, Sodium, Adsorption Ratio, Calcium, Magnesium, Boron, Sodium, Iron and Manganese.

The James Irrigation District does not have any drainage water and therefore does not participate in a drainage water-quality monitoring program.

JID attempts to modify their well pumping by recovering more groundwater from wells that have better water quality, when feasible and practical.

d. Agricultural water management educational programs and materials for farmers, staff, and the public

Program	Co-Funders (If Any)	Yearly Targets
Growers meeting		Annually
Newsletter		Semi-Annually

See **Appendices I and J** for a sample newsletter and annual growers meeting agenda, respectively.

e. other

None

4. Pricing Structure

Pricing structure - based at least in part on quantity delivered

Describe the quantity-based water pricing structure, the cost per acre-foot, and when it became effective.

Volumetric pricing involves a water pricing structure for District water users based at least in part on quantity delivered. In 1978 the District changed from a flat rate charge "per irrigation" to charging a uniform rate per acre-foot of water delivered. This billing method provides growers monetary incentive to conserve water. Water bills sent to the growers include the volume of water used each billing period.

In 2014, the cost of water ranged from $112/AF to $117/AF.

The District pricing structure also includes several incentive pricing policies that are discussed in Section 3.B.4 – Incentive Pricing.

5. Pump Efficiency

Evaluate and improve efficiencies of district pumps

Describe the program to evaluate and improve the efficiencies of the contractor's pumps.

Benefits from pump efficiency testing include identifying older, inefficient wells that need repairs or replacement, and identifying the most efficient wells to use during groundwater pumping. This can ultimately lead to energy and cost savings. Only two private irrigation wells are known to operate in the District. All other wells are owned and operated by the District.

The San Luis & Delta-Mendota Water Authority performs tests periodically on the JID P-Booster pump.

When practical, the District uses the wells/pumps with the combination of the best water quality and least energy usage per acre-foot of water recovered. The District has an estimate of energy saved from the pump testing program which was last completed in 2014 on almost all District wells. The results of testing is also used as an indicator of the health of the well and/or pumps and assists the District in conducting investigations that result in repairs of wells/pumps or the abandonment of a well.

B. Exemptible BMPs for Agricultural Contractors

(See Planner, Chapter 2, Appendix C for examples of exemptible conditions)

1. Facilitate Alternative Land Use

Drainage Characteristic	Acreage	Potential Alternate Uses
High water table (<5 ft)	0	See discussion below
Poor drainage	0	See discussion below
Ground water Selenium concentration > 50 ppb	0	See discussion below
Poor productivity	0	

A small part of western James Irrigation District has been identified as a drainage problem area in *"A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley" (September 1990).* However, JID has never observed drainage problems on their lands. **Appendix B** includes information on recent investigations in this area.

The James Irrigation District Board and the City of San Joaquin have both signed resolutions, stating that, as the City of San Joaquin grows, urban land will be separated from James Irrigation District land. As a result, new lands in the City of San Joaquin used for urban purposes will be managed by an urban water agency, who can better serve their needs.

The District has no land identified for alternative land use (dryland conversions, retirement from agriculture, or conversion to wildlife/non-irrigated or other). Inquiries from solar companies have been on-going, but no conversion of irrigated lands to solar farms is expected in 2015.

2. Recycled Water

Facilitate use of available recycled urban wastewater that otherwise would not be used beneficially, meets all health and safety criteria, and does not cause harm to crops or soils

Sources of Recycled Urban Waste Water	AF/Y Available	AF/Y Currently Used in District
None	None	None

The District does not presently use any recycled water from treatment plants for irrigation. The City of San Joaquin is the only nearby municipality, and is an urban enclave within the District. They treat their wastewater, but the water does not receive tertiary level treatment and therefore cannot be used on edible crops. Presently, the wastewater is delivered to evaporation ponds. Some of the water infiltrates and provides beneficial groundwater recharge for the City of San Joaquin and the JID.

James ID has had periodic discussion with the feasibility of using recycled water from the City of Fresno (pumped from their treatment plant spreading basins), which could be delivered to James ID through the District's canal system. This may have the potential to be a viable project in the future.

3. Finance Capital Improvements

Facilitate the financing of capital improvements for on-farm irrigation systems

Funding source Programs	How provide assistance
District	Modify turnouts to facilitate conversions to high efficiency irrigation systems at District cost
Agricultural Water Enhancement Program (through Kings River Conservation District)	Educated and encouraged growers to take advantage of this program and the funding opportunities

In 2009, the Kings River Conservation District was awarded an Agricultural Water Enhancement Program (AWEP) grant, which was offered by the NRCS. This grant made money available to individual growers within the District for on-farm improvements, with KRCD as the administering agency. The funding was available through 2013. The District encouraged growers to learn more about this program and the potential funding opportunities.

Over the past several years, the District has provided assistance to their landowners by modifying their turnouts to facilitate on-farm improvements, primarily for conversion to permanent crops with non-flood irrigation methods. The modification of District turnouts has been conducted at District expense.

4. Incentive Pricing

Structure of incentive pricing	Related goal
Volumetric pricing	Incentive to conserve water
Rates adjusted for Percent Water Year	Encourage use of floodwater and conservation in droughts
High unit water cost	Incentive to conserve water

The James Irrigation District currently uses volumetric water pricing and several incentive pricing policies. These policies will be sustained.

Current Incentive Pricing Policies

1) Volumetric Pricing. Volumetric pricing involves a water pricing structure for district water users based at least in part on quantity delivered. In 1978 the District changed from a flat rate charge "per irrigation" to charging a uniform rate per acre-foot of water delivered. This billing method provides growers a monetary incentive to conserve water. Water bills sent to the growers include the volume of water used each billing period.

2) Rates Adjusted for Percent Water Year. The District provides incentive pricing by adjusting water rates based on annual hydrological conditions. For example, in wet years when floodwaters are available at low costs, average water costs to growers are lower than in dry years when floodwaters are not available. Therefore, in dry years farmers have incentives to conserve water due to the higher average water costs.

3) High Unit Water Costs. Water costs in the District were $112-117/AF in 2014. This represents a significant cost to the growers. Furthermore, due to soil and climatic conditions, many growers plant low value crops, such as cotton and grains. Current water costs in the District are high considering the low-value crops that are commonly planted, and therefore the growers have incentives to conserve water.

5. Canal and Reservoir Lining

a) Line or pipe ditches and canals

History

JID has experimented with canal lining and piping canals since the 1920's. Seepage rates were also measured in selected canal laterals in 1991 and were extrapolated to the rest of the District. The McMullin and Lassen Canals were successfully lined, and partially funded with grants. Other canal lining experiments experienced problems with expansive clays and cracked linings. Previous analyses have also shown that canal lining with concrete is not economical (see 1998 Water Conservation Plan). Furthermore, canal lining reduces seepage and affects the District's ability to beneficially use surplus surface water from the Kings River (for canal recharge) when it is available. About 10,000 to 15,000 acre-feet of surplus Kings River water is available about every three years. No canal lining was performed from 2010 to 2014.

In the past, lining canals with clay or canal compaction were performed to improve stability or reduce adjacent waterlogging. In-place vibrator compaction could also help to reduce seepage without the need for expensive importation of clay into the canal areas.

JID has no present plans for canal compaction. The District would like to compact the JID Main Canal, but due to grower demands, it can only be dewatered 4 to 6 weeks each winter and is not able to dry sufficiently to allow for compaction.

b) Construct/line regulatory reservoirs

With the uncertainty in CVP water supplies and the trend (1,000 acres per year in recent years) to convert to permanent crops, the District continues to see the value in enlarging the regulation basin capacity within the District.

The District is continuing to work on obtaining permits for the JID Water Augmentation Project, which will include a total regulation capacity expansion of about 1,150 AF through the project. A portion of the funding is from Reclamation, but permitting issues are yet to be resolved, although they are expected to be completed in 2015 or 2016. Construction is anticipated to start in 2016.

Planned regulation reservoir work includes the following:

Facility	Description	Schedule
Fresno Slough Bypass Recharge Area	Construct recharge cells adjacent to Bypass uplands area (Water Augmentation	2015-2016

Facility	Description	Schedule
	Project)	
Basin No. 3	Construct 300 AF earth basin for regulation storage, spillwater capture and recharge	2016
Lateral K Basin	Increase existing Cell No. 1 by about 55 AF for regulation purposes	2015 (completed)
E-Basin Reservoir	Enlarge footprint – small increases typically every 1 to 2 years. Soil is excavated and used for other construction projects.	2015, 2017, 2019

The District's regulating reservoirs allow for more efficient use of water. Surplus floodwaters and off-peak flows can be stored in the reservoirs for future use. The reservoirs also reduce energy costs since they can store groundwater pumped during off-peak periods (nights and weekends).

Regulation Reservoir Work (2010-2014)

Facility	Description	Schedule	Update
Water Augmentation Project	Proposed project that will provide 1,150 AF of regulation storage	On-going	Continued work on permitting process and regulatory approval
E-Basin Reservoir	Enlarge footprint	2010	Every 1 to 2 years there are small increases to the area and/or storage. In 2014 there was a 5 AF increase
Basin A	Construct New Basin	On-hold	Currently on-hold due to right of way issues.

Operational spills in the District have only been measured in the past few years and were found to be small compared to the total District water use. It is believed that the new regulation reservoirs are a primary reason for the low spills, but the magnitude of spills that would occur if the reservoirs were not in place is unknown.

6. Water Ordering

Increase flexibility in water ordering by, and delivery to, water users

The District currently requires between 24 and 72 hours advance notice for water orders, and 6 hours notice for shutoff. Recently, water ordering and delivery has become more flexible due to the construction of regulation reservoirs, conversion of annual crops to permanent crops, and the installation of more efficient irrigation methods. JID has reached the maximum potential flexibility without major physical improvements to the delivery system. Additional detail is provided below:

Regulation Reservoirs

JID constructed several new regulation reservoirs and made improvements to existing reservoirs. Many of the reservoirs are used for regulation storage and reduce lead times for delivering water. See Section 3.B.5 for more details. The proposed Water Augmentation Project (additional 1,150 AF of storage) will provide additional water storage and help improve delivery flexibility when it is constructed, anticipated to be started in 2016.

Conversion to Permanent Crops

The District has seen a trend involving the conversion of annual crops to permanent crops. The permanent crops typically use drip irrigation systems that provide a more constant demand than flood irrigation, and therefore have lower peak demands. This provides greater flexibility in operating the system.

Installation of More Efficient Irrigation Systems

There has also been a trend in the installation of more efficient irrigation systems in the District, such as drip and micro-sprinkler systems. These irrigation systems reduce peak demands and reduce overall water usage, and, as a result provide greater flexibility in ordering and delivering water.

The District has a 10 year agreement (2007-2017) with the USBR for the use of about 4 miles of the San Luis Drain as a regulation reservoir. If needed, this can help the District in meeting peak demands, and the growers will experience less lead time when ordering water and will have greater flexibility in shutting off water.

District deliveries are all scheduled. On-demand deliveries are not currently possible due to system capacity constraints. The numerous regulation reservoirs help to make deliveries more

flexible.

A copy of a sample water bill is included as **Appendix D**, and a copy of a sample water order is included as **Appendix K**.

7. Spill and Tailwater Recovery

Construct and operate district spill and tailwater recovery systems

Distribution System Lateral	Annual Spill (AF/Y)	Quantity Recovered and reused (AF/Y)
Lateral E	0	All assumed reused in neighboring Irrigation District
Lateral I	80	
Lateral J	42	
Total	122	

Drainage System Lateral	Annual Drainage Outflow (AF/Y)	Quantity Recovered and reused (AF/Y)
NONE		
Total		

Spillwater

The measured spill quantities were 120 AF in 2014, which is small compared to total District usage of about 71,500 AF. The spillwaters could potentially be recovered, but instead the District intends to place emphasis on preventing spills. The low volume of spillwater is partially attributed to the recent construction of several regulation reservoirs.

Note that spillwater leaving the District is ultimately delivered to the Fresno Slough or the Tranquility Irrigation District and used by others for a beneficial purpose.

Tailwater

Growers are allowed to pump tailwater back into the JID canal system, as long as the practice is coordinated with the responsible ditchtender and does not create a nuisance for the District or other water users. The growers must first sign up before they can pump back their tailwater and the water must be original source water from the JID. Tailwater pumped back into the JID canal system is ultimately used internally or externally. Tailwater pumping is not currently measured. However, it is believed that almost no tailwater leaves the District.

In 2008, the District applied for and received partial funding from the USBR Field Services Program for the installation of a reuse pump in the District's Main Drain. The pump was installed and captures spill water from several laterals and delivers it to Laterals O and P. The spillwater recovery is measured with a flowmeter.

8. Outflow Measurement

Plan to measure outflow

Total # of outflow (surface) locations/points 4

Total # of outflow (subsurface) locations/points 0

Total # of measured outflow points 4

Percentage of total outflow (volume) measured during report year ~98%

Identify locations, prioritize, determine best measurement method/cost, submit funding proposal

JID does not plan to install any new outflow measurement facilities or make major modifications to existing facilities in the next five years.

9. Conjunctive Use

Optimize conjunctive use of surface and ground water

The District has made several efforts to optimize conjunctive use of surface and groundwater resources, particularly through groundwater recharge projects. These include the Lateral K Groundwater Recharge Project and Water Augmentation Project. Benefits from these projects can include higher water levels, lower overdraft, lower pumping costs, higher well capacities, and water storage for droughts. Existing and planned conjunctive use project are described below.

Lateral K Groundwater Recharge Project

The 220-acre Lateral K-Recharge Project was constructed in 2004. The location of the Lateral K Recharge Basin is shown on the District map in **Appendix A**. Between 2005 and 2009 the District drilled and equipped 6 recovery wells. The project also has six monitoring wells. In 2007, the District completed the design and construction on a modification to the turnout to the Lateral K recharge basin site, so that the delivery canal and smallest cell could be used as regulation reservoirs and spill protection and recovery for the Main Canal, for a combined storage increase of about 93 AF. In 2009, the banks of lateral K were raised between the Main Canal and Placer Ave., to allow Lateral K to float with the Main Canal. Also in 2009, data loggers were added to 6 wells to monitor groundwater levels. In 2014, JID began expanding the Lateral K Basin, with a goal of expanding the capacity by 55 AF, and all work completed in 2015.

Water Augmentation Project

The JID Water Augmentation Project was developed to sustain the District's current practices in the absences of our 35,300 AF CVP Supply. The project includes roughly 114 acres of recharge basins, 1,150 AF of new regulation storage, and up to 5 new groundwater wells. The basins will provides storage for pumped groundwater and surface supplies, and recharge facilities will be constructed to offset the effects of groundwater pumping. Project costs are estimated at $5 to $10 million. Partial construction is expected to begin in 2016 with expenditures of up to $2 million. A majority of the work will not begin until the end of the 2016 irrigation season.

10. Automate Canal Structures

The District constructed a long crested weir on the turnout from the Main Canal to the Lateral K recharge facility site. This allows automatic spill protection along that pool of the Main Canal.

As part of the Water Augmentation Project, JID plans to control water levels in the Main Canal with the use of several basins. When the water is too high in the Main Canal, it will flow by gravity into the Fresno Slough Bypass Basins. When the water level is low in the Main Canal, water would be pumped out of Basins 1, 2 and 3 of the Fresno Slough Bypass.

JID also plans to install a Langeman Control Gate at the E-Check.

If funding was available, the District would consider additional automation for the distribution system.

11. Pump Testing

Facilitate or promote water customer pump testing and evaluation

Benefits from pump efficiency testing include identifying older, inefficient wells that need repair or replacing, and identifying the most efficient wells to use first during groundwater pumping. This can ultimately lead to energy and cost savings.

The District periodically informs private well owners of any opportunities for funding or technical assistance from pump testing programs. Presently the District only knows of two active privately-owned irrigation well in the District, although there are a few domestic wells. All other wells are owned and operated by the District.

JID pump tested almost all of their wells in 2014 and plans to continue pump testing them every two years. JID also performs pump efficiency testing on all new wells when they are installed or undergo repairs.

12. Mapping

The District has GIS maps of their distribution system, drainage system, groundwater wells, soils, and groundwater quality problem areas (The District has no natural or cultural resources). The District uses NRCS data for soils maps and updates will not be needed. **Appendix A** includes copies of these maps. Future work will be limited to updating maps with new information.

GIS maps	Estimated cost (in $1,000s)				
	2015	2016	2017	2018	2019
Layer 1 – Distribution system	0.2	0.3	0.3	0.3	0.3
Layer 2 – Drainage system	-	-	-	-	-
Suggested layers:	-	-	-	-	-
Layer 3 – Ground water information	0.2	0.2	0.2	0.2	0.2
Layer 4 – Soils map	-	-	-	-	-
Layer 5 – Natural & cultural resources	-	-	-	-	-
Layer 6 – Problem areas	-	-	-	-	-

C. Provide a 3-Year Budget for Implementing BMPs

1. Amount actually spent during current year (2014).

BMP #	BMP Name	Actual Expenditure (not including staff time)	Staff Hours
A 1	Measurement	$18,000	520
2	Conservation staff	$5,000	200
3	On-farm evaluation /water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$4,000	110
	Agricultural Education Program	$3,000	50
4	Quantity pricing	$0	25
5	Contractor's pumps	$14,000	50
B 1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$18,000	500
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$0	0
6	Increase delivery flexibility	$6,000	80
7	District spill/tailwater recovery systems	$1,766	8
8	Measure outflow	$1,000	10
9	Optimize conjunctive use	$150,000	25
10	Automate canal structures	$0	0
11	Customer pump testing	$0	8
12	Mapping	$400	4
	Total	$221,166	1,590

2. Projected budget summary for the next year (2015).

BMP #	BMP Name	Actual Expenditure (not including staff time)	Staff Hours
A 1	Measurement	$20,000	750
2	Conservation staff	$5,000	200
3	On-farm evaluation /water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$1,500	50
	Agricultural Education Program	$3,000	50
4	Quantity pricing	$0	25
5	Contractor's pumps	$2,000	10
B 1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$20,000	580
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$185,000	80
6	Increase delivery flexibility	$15,000	160
7	District spill/tailwater recovery systems	$1,500	4
8	Measure outflow	$1,000	10
9	Optimize conjunctive use	$0	0
10	Automate canal structures	$0	0
11	Customer pump testing	$0	8
12	Mapping	$5000	4
	Total	$254,500	1,931

3. Projected budget summary for 3rd year (2016).

BMP #	BMP Name	Actual Expenditure (not including staff time)	Staff Hours
A 1	Measurement	$20,000	750
2	Conservation staff	$5,000	200
3	On-farm evaluation /water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$1,500	50
	Agricultural Education Program	$3,000	50
4	Quantity pricing	$0	25
5	Contractor's pumps	$2,000	10
B 1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$20,000	580
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$185,000	80
6	Increase delivery flexibility	$15,000	160
7	District spill/tailwater recovery systems	$1,500	4
8	Measure outflow	$1,000	10
9	Optimize conjunctive use	$0 - $2,000,000	500
10	Automate canal structures	$0	0
11	Customer pump testing	$0	8
12	Mapping	$500	4
	Total	$234,500 – $2,234,500	1,681

Note: The amount spent on 9 – Optimize Conjunctive use is difficult to predict and therefore a range of values is provided. It will depend on whether the District has funding, and if permits are issued to implement the Water Augmentation Project.

Section 4: Best Management Practices for Urban Contractors

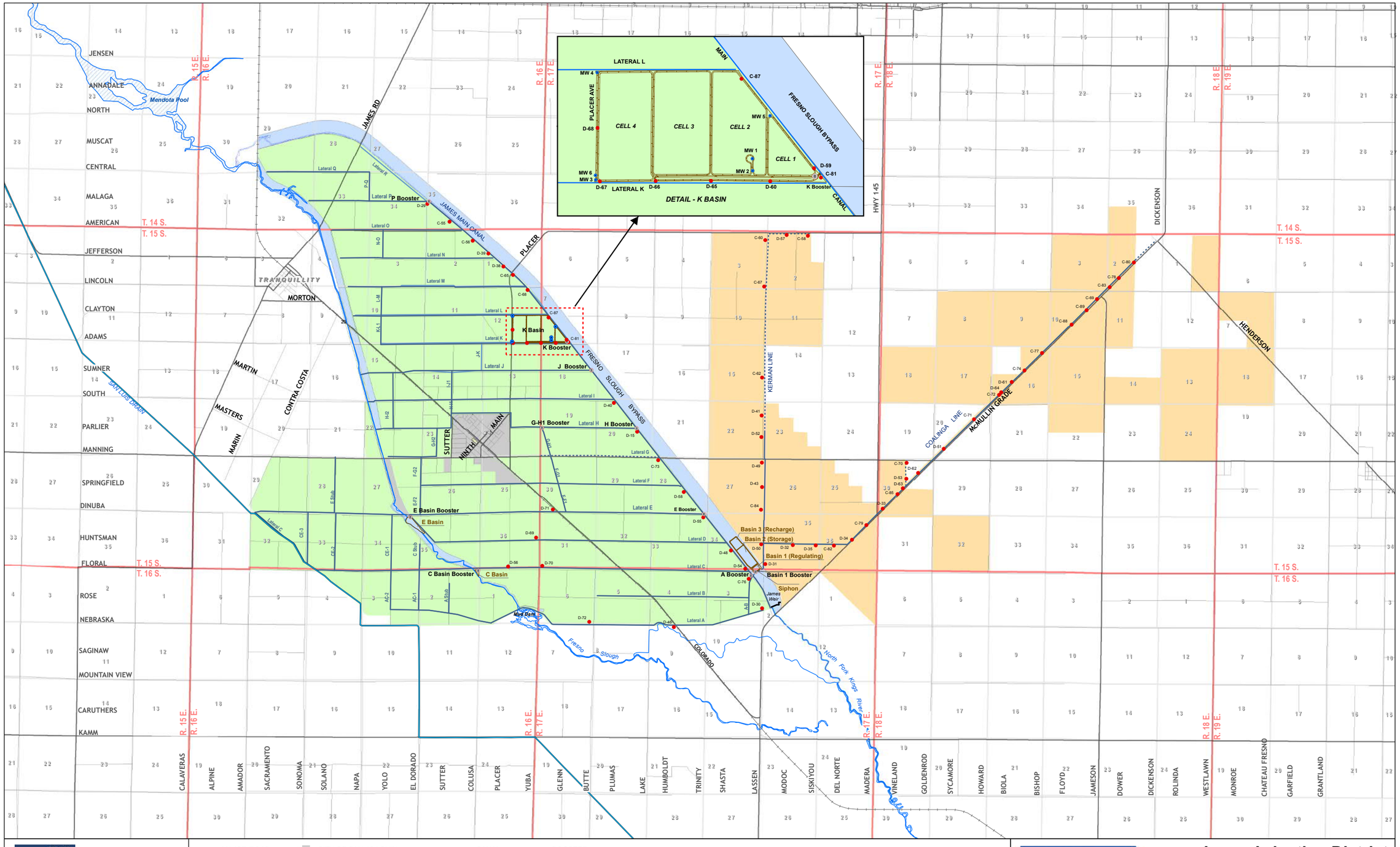
James Irrigation District does not provide an urban water supply.

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX A

DISTRICT LOCATION, FACILITIES AND SOILS MAPS



EST. 1958
PROVOST & PRITCHARD CONSULTING GROUP
An Employee Owned Company

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Fresno, CA 93711-6162
(559) 449-2700

0 2,000 4,000 6,000 Feet

- MAJOR ROAD
- STREET
- RAILROAD
- TOWNSHIP/RANGE
- SECTION
- CITY OF SAN JOAQUIN
- JAMES ID
- CITY OF SAN JOAQUIN/JID OVERLAP
- RECLAMATION DISTRICT 1606
- JAMES ID WELL FIELD
- CANAL
- PIPELINE
- BASIN
- KINGS RIVER
- BOOSTER
- MONITOR WELL
- PRODUCTION WELL

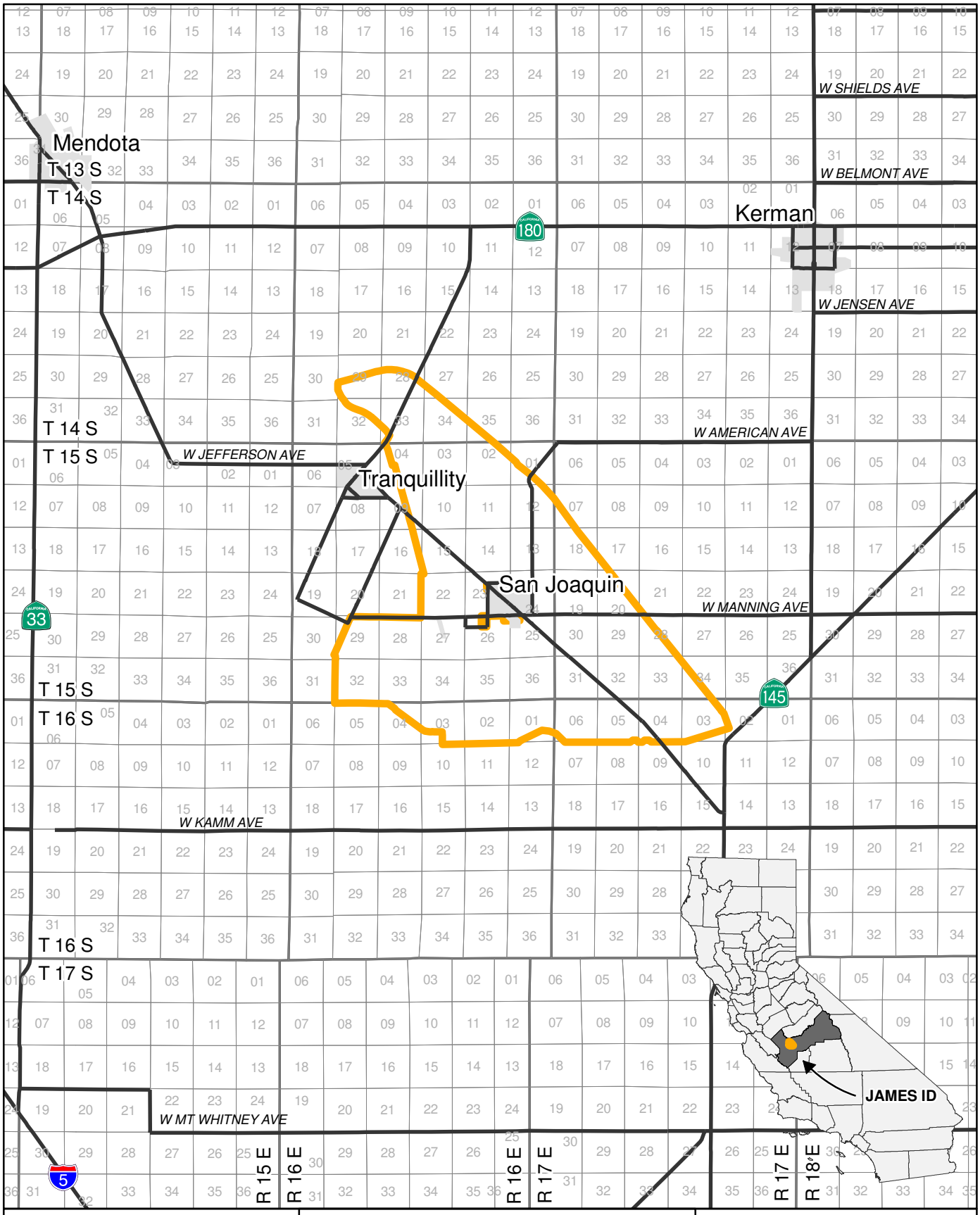
JAMES IRRIGATION DISTRICT
SAN JOAQUIN, CA

James Irrigation District

Fresno County, CA

April 2015

4/8/2015: \\evolution\clv_clients\Clients\James ID-1051\GIS\Map\JID_and_wellfield_24x36.mxd



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James Irrigation District

Location Map

FIGURE 1

NORTH
MUSCAT
CENTRAL
AMERICAN
AMERICAN
JEFFERSON
LINCOLN
CLAYTON
ADAMS
SUMNER
SOUTH
PARLIER
MANNING
SPRINGFIELD
DINUBA
HUNTSMAN
FLORAL
ROSE
NEBRASKA
SAGINAW

Tranquillity

San Joaquin

A CLAY EXTENT

A CLAY EXTENT

A
B
D
E

CALAVERAS
ALPINE
AMADOR
SACRAMENTO
SONOMA
SOLANO
NAPA
YOLO
EL DORADO
SUTTER
COLUSA
PLACER
YUBA
GLENN
BUTTE
PLUMAS
LAKE
HUNTER
TRINITY
SHASTA
LASSEN

*San Joaquin Valley Soils

Soil Texture

- Not rated or not available
- clay
- clay loam
- coarse sandy loam
- fine sandy loam
- loam
- loamy coarse sand
- loamy sand
- sandy loam
- silt loam

*Soils data is from NRCS Soils Survey, Eastern (CA654) and Western (CA653) Fresno County, reclassified by soils texture properties

0 0.5 1 1.5 Miles

N

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Legend

Geologic Layers From USGS Water Supply Paper 1999-H

- Cross Section
- A Clay Extent
- James ID Wellfield
- James Irrigation District
- Street
- Section

JAMES IRRIGATION DISTRICT
SAN JOAQUIN, CA

James Irrigation District

Top Soils and Locations of Subsurface Geologic Cross Sections and A Clay

11/17/2008 \\pineflat\dwg_dgn\Clients\James ID-1051\Projects\105108C1-AB303 Study\GIS\Map\soils_clay_crosssections.mxd

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX B

EVALUATION OF POTENTIAL DRAINAGE IMPACTED LANDS

James Irrigation District
Drainage Impacted Lands

The James Irrigation District (JID) is purported to be within a drainage problem area according to a September 1990 report entitled "*A Management Plan for Agricultural Subsurface Drainage Related Problems on the Westside San Joaquin Valley*". This report claims that the westerly tip of JID is within the Westlands drainage problem subarea (see attached Figure). The report also provides recommendations for managing the drainage problems, including:

- Source control
- Land retirement
- Drainage water treatment
- Drainage water reuse
- Shallow groundwater pumping
- Evaporation ponds

JID disputes that they are in a drainage problem area, and, as a result, has not implemented any of these recommendations. JID has also performed groundwater level and groundwater quality investigations in the area, which are described below.

Groundwater Investigations

In 2008, the District received a grant from the California Department of Water Resources Local Groundwater Assistance Act (Assembly Bill 303) to further evaluate drainage problems in the District. Funds were used for monitoring well construction, water quality sampling, geologic analyses, and a review of historical water level and groundwater quality data. This work was completed in October 2010 and no evidence of drainage impacted lands was found in the District, even though a portion of JID was previously identified as a drainage problem area. Observations continue to suggest that District lands do not have drainage problems.

The attached Figure is a map showing the purported area that is 'drainage impacted' and the location of shallow monitoring wells in the area. Monitoring wells SW-1, SW-2 and SW-3 were constructed in 2010, largely to help assess the drainage problems in the area. The wells are 2-inch in diameter and were drilled to depths of 88 to 113 feet. The wells were originally planned to be shallower, but were constructed to about 15 feet below the existing groundwater level.

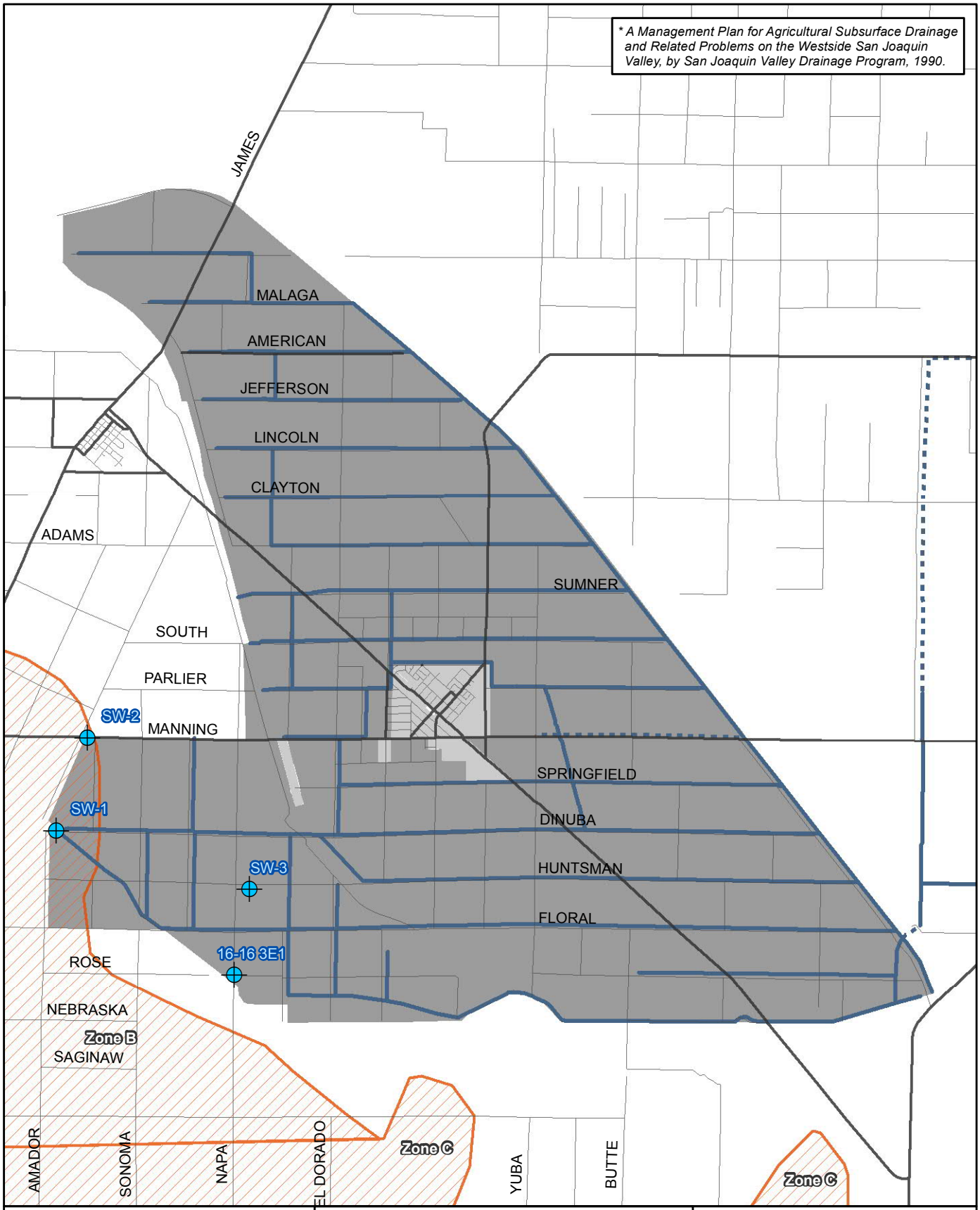
Table 1 shows groundwater levels in each of the shallow wells. Groundwater depths in the area have ranged from 70 to 95 feet since 2010, and have been dropping slightly. Drainage impacted lands typically have groundwater levels within ten feet of the ground surface. This data shows that the area is clearly not drainage impacted.

Table 1 – Shallow Groundwater Level Monitoring

Well	Date	Depth to Water (ft)
SW-1	10/15/2014	89.9
	4/28/2014	88.3
	10/17/2013	87.9
	3/5/2013	83.6
	10/15/2012	84.9
	4/23/2012	82.1
	4/10/2010	82
SW-2	10/15/2014	74.5
	4/28/2014	73.2
	10/17/2013	72.4
	3/5/2013	71.1
	10/15/2012	71.3
	4/23/2012	70.4
	4/10/2010	70
SW-3	10/15/2014	94.8
	4/28/2014	93.9
	10/21/2013	92.8
	3/14/2013	90.5
	10/15/2012	90.8
	4/23/2012	89
	4/10/2010	91

Groundwater quality was also tested in wells SW-1, SW-2, SW-3 and 16-16 3E1. The water quality in all of them was generally poor and not suitable for agriculture. Selenium was tested in SW-1, SW-2 and SW-3 but was not detected. Selenium is considered a general indicator for shallow drainage problems in the area.

Based on the data presented above, drainage is not a problem in JID and no drainage improvements have been implemented, as they do not appear to be needed. JID formally requests that they be removed from the list of Districts that have drainage impacted lands.



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JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX C

JAMES IRRIGATION DISTRICT RULES AND REGULATIONS GOVERNING WATER DISTRIBUTION AND CANAL MAINTENANCE

JAMES IRRIGATION DISTRICT

RULES & REGULATIONS GOVERNING WATER DISTRIBUTION & CANAL MAINTENANCE

Originally Adopted 1920
Revised: February 24, 2010 to become effective April 1, 2010

Board of Directors
Michael A. Carvalho, President
Robert Motte, Vice-President
George Ayerza, Sr.
Thomas W. Chaney
Kenneth R. Hale

Administration
John Mallyon, General Manager
Donna Y. Hanneman, Secretary-Treasurer / Assessor-Collector
Kenneth Mancini, Superintendent

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1 AUTHORIZATION

Section 22257 of the California Water Code states in part as follows: "Each District shall establish equitable rules for the distribution and use of water which shall be printed in convenient form for distribution in the District".

The Rules and Regulations set forth hereafter have been approved and adopted by the JAMES IRRIGATION DISTRICT Board of Directors and are intended to fulfill the requirements of Section 22257 of the California Water Code. Further, these Rules and Regulations cancel and supersede prior JAMES IRRIGATION DISTRICT Rules and Regulations. Refusal to comply with the requirements of or transgression of the stated Rules and Regulations may result in sanctions, including but not limited to denial of water service, being imposed by the District until full compliance has been made.

2 DEFINITIONS

The following definitions shall be applicable to these Rules and Regulations:

Agent	**Individual(s) granted Power of Attorney to act on behalf of the Landowner or Water User. Such individual(s) must file a copy of the Power of Attorney with the District. Forms are available at the District office.**
Board	**The Board of Directors of the James Irrigation District**
Bureau	**United States Department of the Interior, Bureau of Reclamation**
District	**James Irrigation District**
Water User	**The individual or entity who either owns or leases property within the District and makes application with the District for water service and is responsible for ordering, controlling, using and paying for water received from the District**
Year	**A calendar year, that is January 1 through December 31**

3 CONTROL OF THE SYSTEM

All matters relating to the distribution of water and the maintenance of the District's canals, ditches and conduits shall be under the general supervision of the Manager acting under the authority and direction of the Board of Directors.

4 OWNERSHIP OF CANAL SYSTEM

Certain diversion works, canals, and conduits, head gates and other structures and associated rights-of-way owned by the JAMES IRRIGATION DISTRICT were acquired by virtue of deeds from the San Joaquin Valley Farm Lands Company and others. Other facilities and rights-of-way were acquired by prescriptive use, grants, and various forms of conveyance agreements. All are dedicated to public use and are under the exclusive control of the elected Board of Directors acting through the Manager and staff of the District.

5 DELIVERY OF WATER

5.1 District Water Supply - General

The District sells water as a commodity only and not as a guaranteed service and will not be liable for defective quality of water, shortage of water, either temporary or permanent, or for failure to deliver water or delay in doing so.

The District's water supply is in a raw, untreated condition, and as a result, is considered to be unfit for human consumption without treatment. The District does not warrant the quality of water delivered and is under no obligation to construct or furnish water treatment facilities or maintain or better the quality of water.

5.2 Applications

Each year by January 1, and in any event prior to placing orders for deliveries, Landowners and/or Water Users shall file on a form provided by the District, an "Application for Water" for the forthcoming year. Said Application shall contain the following:

5.2.1 Name and address of Water User

5.2.2 Telephone number of the Water User and telephone number of the local individuals who manage or irrigate the farm or distribute water.

5.2.3 Water Users will be required to provide the following information: Turnout delivery numbers, Assessor's parcel numbers associated with each turnout and the total irrigated acreage for each turnout.

5.2.4 Landowners leasing their ground must list their tenant(s) by turnout or Assessor's parcel number and the acreage being farmed by each Lessee.

5.2.5 Acknowledgment that the Water User has read the Rules & Regulations and that water service will only be provided in accordance with the terms of said Rules & Regulations.

5.3 Bureau Forms

The "Application for Water" must also be accompanied by the proper Bureau Certification or Verification forms for the forthcoming year (unless previously submitted). Such forms must be completed by the Landowner or their Agent, and where the property is leased, by the Lessee/Water User. No water will be delivered until the forms, properly completed, are in the District office. Forms may be obtained in the District office.

District staff will review the forms for completeness but are not responsible for errors not found. The District is not responsible for deliveries made to Landowners and Water Users filing forms with incorrect information or if no forms have been filed. The Landowners or their Agent and Water Users are responsible for filing timely and correct forms.

Additionally, crop information may be required. Agricultural water service shall not be provided to any Water User who fails to provide the District with crop information at the time(s) and in the form(s) required by the District.

5.4 Orders

Water deliveries under demand schedules shall be made on the basis of continuous and steady use of water during all days and nights, including holidays and Sundays. In order to prevent waste of water and prevent breaks, it is mandatory that every Water User notify the Superintendent or Assistant Superintendent when the delivery is/will be terminated. As a general policy, it is requested that orders for water be submitted 72 hours in advance of the requested delivery date due to power order requirements. Exceptions will be made on a case-by-case basis.

5.5 Cancellation of Orders

As circumstances may develop from time to time which may cause the need to cancel orders for water, the District will make every effort to adjust to these events. However, as a general policy, six (6) hours' advance notice should be given when an order needs to be canceled or rescheduled.

5.6 Shutoff

In the event a Water User fails to notify the District in advance of a water shutoff or a rescheduling of a water delivery, the Water User will be responsible for the water that is lost to the District as well as any property damage that may result from the failure to notify the District.

5.7 Coordination with Ditch tenders

Ditch tenders shall be assigned to operational areas within the District and shall have the responsibility of enforcing District Rules and Regulations and policies. The Superintendent shall be responsible for the coordination of Water User requests and will communicate those requests to the Ditch tender as they occur. Scheduled water deliveries to Water Users will be performed by Ditch tenders under the direction of the Superintendent. The Ditch tender will make every effort to maintain an adequate flow of water in each lateral canal to meet requested demands. However, changes in water use due to temperature variation, improper coordination by upstream users during water changes, local runoff from precipitation, spill water from other lateral systems, canal breaks, and other emergencies may cause unavoidable fluctuations and interruptions in flow. It is expected that a Water User will notify the Superintendent if water is not available when requested or if the flow is interfered with during the period. It is also expected that all Water Users will cooperate with the Superintendent and/or the Ditch tender in determining the cause of the interruptions and will, to the extent practical, assist in correcting the problem.

5.8 Water Allocation

The District will implement water allocations when necessary for equitable distribution of water as follows. The District has for many years allocated water and capacity on individual canals based on the acreage that has timely applied for water service that year, consistent with Water Code Section 22252.1, herein called "irrigated acreage."

5.8.1 Area Allocations

The conditions for determining allocations on an individual canal or area include, but are not limited to: power failure, equipment failure or any operational problem that would prevent the District from delivering water in a timely manner. The duration of allocations will be held to the minimum length of time required to return to normal operations and deliveries. Allocation amounts will be on a per-acre basis based on irrigated acreage over the affected area.

5.8.2 District-wide Allocation

If at any time the District has insufficient supplies to supply the demands of all Water Users then eligible for and requesting service, available supplies shall be allocated on a per-acre basis based on all irrigated acres in the District.

5.9 Temporary Reductions-Maintenance & Repairs

The District may temporarily discontinue water service or reduce the amount of water to be furnished for investigation, inspection, maintenance, repair or replacement of any of the District's facilities. The District will give the Water User notice in advance of such temporary discontinuance or reduction, except in case of an emergency, in which event no notice need be given. No liability shall accrue against the District or any of its officers, directors or employees for damage, direct or indirect, because of the failure to provide water as a result of system malfunctions, interruptions in service necessary to properly operate and maintain the water distribution system or other similar causes which are beyond the District's reasonable control.

In order to maintain the integrity of the water delivery system, the District performs inspection and repair of head gates and other structures on an annual basis. This inspection is automatic and is usually conducted after the irrigation season has ended.

5.9.1 Distribution System Structures

Should repair of irrigation facilities/structures that are an integral part of the District's distribution system be required resulting from ordinary wear-and-tear, repairs will be automatically undertaken and costs will be borne by the District. Major items, such as gate replacement or repairs resulting from Water User negligence will be discussed with the Landowner and/or Water User for authorization to proceed and costs will be billed to the Landowner or Water User, as appropriate.

5.9.2 Field Diversion Structures

Field diversion structures, or those facilities installed for the convenience of the Water User which are NOT an integral part of the District's distribution system, will be repaired by the District at the direction and with the expressed permission of the Water User. Repair costs will be billed to the Water User.

5.10 Failure to Take Delivery

If a Water User fails, neglects, or refuses to use water when scheduled, it shall not be a valid basis for claiming the right to use water until rescheduled and confirmed by the Superintendent or Assistant Superintendent. In the event a head gate is opened without being ordered or rescheduled, the District reserves the right to close and lock the head gate until the problem is corrected.

5.11 Measurements

All water will be measured by the District with meters installed, maintained, and calibrated by it and such measurements shall be final and conclusive.

5.12 Liability

The District will not be responsible for the control, carriage, handling, use, disposal or distribution of water delivered to Water User outside the facilities then being operated and maintained by the District. Water User does hereby indemnify and shall assume the defense of and hold harmless the District and its officers, agents and employees from any and all loss, damage, liability, claims, or causes of action of every nature whatsoever, for damage to or destruction of property, including the District's property, or for injury to or death of persons, in any manner arising out of or incidental to the control, carriage, handling, use, disposal, or distribution of water outside such District facilities. Furthermore, Water User shall hold the District harmless from any inadvertent damages resulting from the District's duties to maintain and operate its facilities, including the application of weed control chemicals in and along District canals.

5.13 Determination of Safe Operating Levels in Canals

The water level in any District canal, ditch or conduit shall not be raised to an unsafe height for the purpose of providing gravity service to high elevation lands or delivery facilities. The Superintendent or his/her designated representative shall determine the safe levels to which water may be raised for the purpose of providing gravity service. Diversions which jeopardize the safe operations of District facilities or interfere with service to others shall not be permitted.

6 REQUESTS FOR NEW WATER SERVICE

Water Users within the District who are not presently receiving water from the District's distribution system, but desire to do so, shall be required to provide the necessary facilities to transport the water from the District's system to their lands. Requests for new water service must be submitted to the Manager who will verify that no delinquencies exist.

7 CHARGES AND ASSESSMENTS[1]

7.1 Charges

7.1.1 Charges for agricultural water and other services shall be established by the Board of Directors. The water charges shall include District operation and maintenance costs and any other costs determined by the Board to be payable as part of the water charges, including components established for the payment of all or a portion of the District's annual repaying obligation to the United States. The water charges shall also include the applicable charges required pursuant to the Reclamation Reform Act of 1982 and associated Regulations. Water charges shall be adjusted retroactively to the extent required by Federal or State law or regulations.

[1] Board of Directors, 02/24/2010

7.1.2 **As a condition of the District continuing to furnish water, the Water User shall make all payments for water used and other related services, by the 20th day of the month following the month of service. When any deadline established herein falls on a Saturday, Sunday, or holiday, it shall be extended to the next working day. Payments must be received at the District office in San Joaquin by the applicable due date. Charges not paid by 5:00 p.m. on the applicable due date shall be delinquent.**

7.1.3 **On the day following the payment due date, a penalty of two percent (2%) shall be added to the delinquent account balance and thereafter delinquent accounts shall accrue a late penalty of two percent (2%) each month. Penalties shall not, however, accrue after the delinquent charges, together with applicable penalties have been added to, and become a part of, the annual assessment levied on the land by the District as provided in Section 7.2.3. All payments and credits shall be applied to the earliest delinquent charges.**

7.1.4 **On the day following that in which an account becomes delinquent, all services for such lands for which payments are delinquent shall be discontinued, and services shall not be reinitiated until such delinquency is paid in full, plus applicable penalties and interest. Any outstanding orders for water for delinquent lands will be canceled; orders currently running will be allowed to finish.**

7.1.5 **If the delinquency is not cleared by the first of the following month following the date it becomes delinquent, (1) services for such delinquent lands and other lands under the same account will be placed C.O.D. (Cash On Delivery) wherein all orders must be prepaid and (2) all payments will be required to be paid by cashiers check or money order for the following twelve (12).**

7.1.6 **If the delinquency is not cleared by November 1st, the charges for such delinquent lands will be added to the landowner's assessments and will constitute a lien on that real property as provided in Section 7.2.3.**

7.1.7 **Following attachment, services to delinquent lands and other lands owned or leased by some or all of the same principals will be placed C.O.D. January 1st through December 31st of the following year. Assessments with attached charges must be paid by cashiers check or money order.**

7.1.8 **Landowners wishing to be notified when their tenant(s) account(s) are past due, must submit a letter annually to the District requesting this service. Letters will be mailed no later than the 15th of the month following the delinquency date.**

7.1.9 **As an alternative to the procedure described in Section 7.2.3, or in addition thereto, the District may elect to file and record a Certificate of Unpaid Water Charges as provided in California Water Code Section 25806 or pursue other remedies available. This Certificate creates a lien in the amount of delinquent charges on any land owned by the Water User, irrespective of where the water was used.**

7.1.10 **The District shall also require advance payment and/or payment by cashier's check or money order when a Water User's account is determined, based on the payment history or other action of the Water User, to create a financial risk or hardship for the District or its Landowners and Water Users. Circumstances which constitute the basis for such a determination include, but are not limited to, the following: (1) instances of a Water User's check being returned unpaid, except where the Water User's bank provides evidence a check was returned because of a bank error, or (2) instances where a Water User whose account is delinquent has, in violation of District regulations, taken water from the District in an unauthorized manner.**

7.2 Assessments[2]

7.2.1 The Board of Directors shall annually levy an assessment as provided by law to, among other things, collect sufficient funds to a pay costs of the District not directly related to serving water to specific users, to pay a portion of costs associated with contracting with the United States for a water supply, recognizing groundwater level improvements and other benefits associated with importation of such supplies and to pay any other costs determined by the Board to be payable as part of the assessment.

7.2.2 District assessments will be considered delinquent if not received or postmarked on or before December 20 (first installment) and June 20 (second installment). If any of the dates of delinquency fall on a Saturday, Sunday or a state holiday, the assessment installment due on that date becomes delinquent at 5:00 p.m. on the next business day. Should the assessment installment become delinquent, penalties (first installment=10%; second installment=5%) and costs of $5.00 per parcel per delinquent installment will be added thereto as provided by law from the date the assessment installment becomes delinquent.

7.2.3 As authorized by Water Code Section 25806, at the time of the filing of the District's assessment book with the Tax Collector of the District, delinquent charges, together with applicable penalties, shall be added and become a part of the assessment levied by the District on the land which received the service. The District shall give the owner of the land notice of the anticipated amount(s) prior to addition to the assessment. The amounts so added shall become a lien on the land and impart notice therefor to all persons.

7.2.4 Service shall not be provided to any parcel of land for which the assessment is delinquent.

7.3 Returned Checks[3]

7.3.1 An administrative charge of $20.00 will be charged for all returned checks in addition to any bank or institutional charges that may have been billed to the District..

8 RIGHTS OF WAY

Rights-of-way and easements for canals and ditches owned by the District include the land actually occupied by the canal or ditch, and such land on both sides thereof, as is reasonably necessary for the maintenance and operation of such canals and ditches. Rights-of-way and easements for conduits (pipelines) which have been substituted for open canals and ditches owned by the District and which have been acquired either by voluntary agreement with the Landowner or by legal process have been recorded in Official Records of Fresno County, California.

9 ENCROACHMENTS

No trees, vines, shrubs, corrals, fences, buildings, bridges, or any other type of encroachment shall be planted or placed in, on, over or across any District canal, ditch, conduit or the right-of-way therefor except pursuant to specific written authority of the District Manager. Any such encroachment of an unusual or extraordinary nature shall be approved by the Board of Directors. Any unauthorized encroachment may be removed by the District at the expense of the encroacher.

[2] Board of Directors, 02/24/2010
[3] Board of Directors, 02/24/2010

10 ACCESS TO LANDS

The authorized agents and employees of the District shall have reasonable access at all times to all lands irrigated from the District's distribution system for the purpose of maintaining, operating, or inspecting the canals, ditches, and conduits and the flow of water therein and for the purpose of ascertaining the acreage of crops of lands irrigated or to be irrigated. If the District holds a right-of-way or easement across private land for the operation and maintenance of a canal, conduit or other facilities, the District shall have the right to enter upon the property on which the right-of-way or easement is located to make repairs and do such things reasonably necessary for the full exercise of the easement rights.

11 WELL MEASUREMENTS

If requested, Landowners and Water Users shall be expected to allow District employees to enter upon their property and measure the depth of water in their private wells for the purpose of determining the conditions of the groundwater within the District. Measurements in selected observation wells are made and recorded by District personnel.

12 TAMPERING WITH FACILITIES

Landowners or Water Users who, by opening, closing or otherwise interfering with regulating gates or devices, cause any fluctuations in the flow of water in the District's distribution system or cause any overflow, breaks or damage of any kind, shall be responsible to the District for the expense and damage caused thereby and may be liable to others that may be adversely affected. Where water control devices are regulated in accordance with specific instructions from an authorized District representative or in cases of an emergency nature when immediate adjustment or other corrective action will prevent overflows, breaks, crop loss or other property damage, the person making such adjustments or taking corrective action shall not be deemed to be in violation of this rule. Any such emergency action or adjustments shall be reported forthwith to the Superintendent or Assistant Superintendent.

13 DAMAGING FACILITIES

No person shall make an opening, cut, plow or disc down or otherwise damage or weaken any canal, ditch or conduit owned by the District without written approval of the Manager or his/her designated representative. Any such approvals to open, cut, plow or disc down or otherwise disturb any District canal, ditch or conduit shall contain requirements for the restoration of such canal, ditch, or conduit to its original condition or better. The District reserves the right to seek restoration and monetary damages as provided by law for any authorized damage done to its system.

14 UNAUTHORIZED INSTALLATION

No delivery gate, pipe, siphon or any other structure or device shall be installed or placed in any canal, ditch or conduit owned by the District without express written permission and must be in strict compliance with plans and specifications approved by the Manager or his/her designated representative. Any such structure or device installed on a District canal, ditch or conduit without approval may be removed by the District at the expense of the owner.

15 WATER USER RESPONSIBILITIES

Water Users who waste water delivered by the District, either willfully, carelessly or on account of defective or inadequate privately owned ditches, conduits, or structures, or because of inadequate preparation of the land for irrigation, may be refused further services until such conditions are remedied. Any waste or other improper use of water shall be reported to the Superintendent who will take appropriate action.

16 PERSONAL LIABILITY

Any person entering upon District property or District rights-of-way, does so at his/her own risk and assumes all risks associated therewith and by such action accepts the responsibility for any damage to District or private property resulting therefrom.

17 TRASH AND DEBRIS

No tires, trash, debris, litter, garbage, prunings, brush, grass, dairy waste, dead animals, herbicides, pesticides, or any other material which is offensive to the senses or injurious to health, or which pollutes or degrades the quality of water or which obstructs the flow of water, shall be placed, emptied, discharged, thrown, or be allowed to slide, flow, wash or be flown into any canal, ditch or conduit belonging to the District. All District employees shall promptly report any violations of this rule to the District's Superintendent who will take appropriate action. The District reserves the right to take appropriate legal action and seek restitution in incidents of this nature.

18 DISCHARGES INTO CANALS

No person, firm, company, corporation or agency shall be permitted to pump, siphon, or drain surplus irrigation water (tailwater), storm water, waste water, or any other water, including but not limited to well water, into any District canal, ditch, or conduit, without the express written consent of the Board of Directors. Any such discharges which result in pollution or contamination of District facilities shall be immediately reported to the Superintendent for appropriate action.

19 IMPLEMENTATION OF AB 3030 GROUNDWATER MANAGEMENT PLAN WATER TRANSFERS

19.1 Background (Based on Findings of Resolution 2001-02, Adopted April 10, 2001

19.1.1 Pursuant to Water Code Section 22257, the District has adopted "Rules and Regulations Governing Water Distribution and Canal Maintenance," as amended, which Rules and Regulations do not provide for transfers of the District's surface water supplies outside of the District.

19.1.2 The District has adopted a Groundwater Management Plan pursuant to Water Code Section 10750, et seq. (referred to as A.B. 3030), dated March 20, 1996, amended February 13, 2001, ("Amended 3030 Plan") which, among other things, finds that groundwater overdraft within the District is approximately 1,600 acre-feet per year and an additional 2,700 acre-feet per year in the east side well field pumping area, which may not fully account for deficiencies expected to continue to occur as a result of actions by principally federal regulatory agencies affecting the ability of the District to receive supplemental water from the United States pursuant to its "Contract Between the United States of America and the James Irrigation District Providing for Water Service and for Adjustment and Settlement of Certain Claimed Water Rights" ("Water Supply Contract"). Therefore, the estimated long-term overdraft is now in excess of 3,700 acre-feet per year. Such Amended 3030 Plan further finds (p. 30):

> **"As stated earlier, any increase in groundwater pumping would exacerbate the continuing overdraft. Any transfer of surface water which is replaced by increased groundwater pumping would therefore exacerbate groundwater overdraft. Therefore, in order to prevent any further overdraft, the District will oppose transfer of surface water otherwise needed within the District except for temporary Landowner transfers of their annual allocation of CVP supplement supplies with the following mitigation measures:(I) the land in question will not be entitled to CVP supplemental surface water during the year when water is transferred. (ii) A Landowner transferring CVP water will be entitled to receive its allocation of groundwater and supplies of other than supplemental CVP supplies on the same basis as other lands within the District provided, that use of such supplies not increase as a result of such transfer. (iii) If the Landowner uses his/her own well or makes use of other private wells to substitute for the quantity of water transferred, the District will not provide the Landowner water from any source. The District may adopt rules and regulations to implement and carry out this mitigation measure."**

19.1.3 Particularly in years of low precipitation and short water supplies, the District may receive requests from Water Users wishing to transfer a portion of the District's surface water supplies which would otherwise be allocated to their lands for use on other lands outside the District. It is in the best interest to accommodate such requests, provided that the resulting action does not adversely affect other Water Users within James or its groundwater resources.

19.1.4 If Water Users were permitted to transfer surface water to lands outside of the District and then replace that supply from groundwater extractions, either from their own wells or by groundwater supplied by the District, the resulting impact would be to further aggravate groundwater overdraft within the District, to the detriment of all Water Users within the District. Similarly, if a Water User were to pump groundwater within the District and export it, the same effect would occur.

19.1.5 By this supplemental policy, the District intends to prescribe conditions under which a Water User can transfer his/her allocated share of the District's supplemental water made available under its Water Supply Contract for use on lands within other contractors of the Central Valley Project. This policy shall be supplementary to the District's Rules & Regulations referenced in Section 19.1.1 and in furtherance of its Amended 3030 Plan.

19.1.6 To allow surface water transfers without the conditions imposed through this policy would result in adverse impacts to other Water Users within the District and possibly surrounding and would cause adverse impacts to groundwater conditions and further aggravate groundwater overdraft and thereby be a significant adverse impact on the environment. This Policy was adopted after due consideration to potential impacts on business activities, including agricultural operators, by permitting such transfers in such a manner so as to minimize adverse impacts on groundwater resources.

19.2 The District will permit a Water User to transfer his/her Allocated Share of Supplemental Water under the conditions prescribed following:

> "Allocated Share of Supplemental Water" is defined as: 35,300 acre-feet times the percentage allocation as determined by the Bureau of Reclamation times the number of acres for which the Water User has requested water service from the District divided by total number of acres in the District for which water service has been requested for such year.

19.2.1 The Water User shall fallow and not utilize any surface or groundwater to irrigate during such year on acreage which is equivalent to the quantity of water to be transferred, up to the Water User's Allocated Share of Supplemental Water times 2.58 (the average estimated consumptive use of water within the District), all to the satisfaction of the General Manager.

19.2.2 The Water User shall pay to the District a rate per acre-foot for each acre-foot transferred, that being the estimated fixed cost which otherwise will be incurred during such year based on the total acre-feet available for delivery by the District.

19.2.3 The Water User shall pay to the District the cost which the District pays to the Bureau for the supplemental water (one-half of which otherwise would be paid by other Kings River/Lower River interests).

19.2.4 The Water User obtains the consent of the District to which the water would be transferred, and the Bureau of Reclamation and otherwise complies with all rules and policies of the Bureau of Reclamation with respect to such transfer and pays any costs imposed by the Bureau of Reclamation to facilitate the transfer.

19.3 For any Water User within the District which attempts to pump groundwater and divert it directly into the Mendota Pool or into other facilities such that it can be transferred to lands outside the District, the District will only cooperate and consent to such transfer if, similar to condition 19.2.1 above, the Water User fallows to the satisfaction of the Manager acreage equivalent to the quantity of water pumped and exported divided by 2.58 feet per acre. Additionally, the Water User must comply with all applicable requirements of the San Luis & Delta-Mendota Water Authority, Bureau of Reclamation and the State Water Control Board, particularly related to pumping water into the Mendota Pool. Absent such Water User meeting

these requirements, the District will object to and not approve any such attempted transfer and if the transfer is nonetheless implemented, the District shall reduce the quantity of water otherwise allocated to the Water User from any source by the amount of the objected to transfer in order to insure that such transfer does not cause adverse consequences upon the District's groundwater resources and its Water Users.

19.4 The Manager is authorized and directed to develop an application/agreement incorporating the above policy under which any Water User wishing to facilitate a transfer pursuant to this policy would agree to comply with its provisions. The Manager is authorized and directed to do all other things necessary and appropriate to carry out this policy in consultation with the District's consultants and to prevent any attempted transfers which are not consistent with this policy.

20 GROUNDWATER GENERALLY

As noted in Section 19, the District has for many decades carried out its conjunctive use project generally as provided in the AB 3030 Groundwater Management Plan. The following is noted:

20.1 Consistent with and as otherwise provided by Water Code Section 1005.4, a Landowner's use of water supplied by the District from a non-tributary source, is declared to be a reasonable beneficial use of groundwater and shall not result in any lapse, reduction or loss of groundwater rights.

20.2 In operating its Project, the District in part relies upon pumping groundwater through, (i) exercise of Landowners overlying groundwater rights, for the benefit of the District's overlying Landowners and (ii) exercising its right to pump groundwater provided for and recognized under a Deed granted to the District by the San Joaquin Valley Farm Lands Company, a corporation, dated April 22, 1920, recorded September 1, 1920, at Book 6, Page 1, et seq. of the Official Records of Fresno County, and the following additional recorded documents:

- **Grant Deed from Santa Ana and Fresno Land Company, dated September 16, 1991, recorded as Instrument No. 91122531;**
- **Grant Deed from Hubert Beene and Sons, dated November 8, 1991, recorded as Instrument No. 91139173;**
- **Grant Deed from Roy Rabb Ranches, Inc., and Georgia Rabb Ranches, Inc., dated October 4, 1991, recorded as Instrument No. 91155101; and**
- **Stipulation and Order dated October 13, 1993, executed on behalf of John Semper, Marlita M. Ferriera and Martin N. Semper, recorded December 30, 1993;**

All of said recordings being with the Fresno County Recorder's office.

20.3 Without obligating District to assume any responsibility therefore and without limiting or detracting from the obligations assumed by Water Users in this regard, District shall have the right to use of all seepage and return flow resulting from water which escapes, percolates, or is discharged beyond Water User's facilities, if any, and nothing contained herein shall be construed as an abandonment or relinquishment by District of the right to the recapture, use, and benefit of all such water.

20.4 In carrying out its conjunctive use project, the District may from time to time recharge, store and later recover imported water supplies on behalf of third parties.

21 DISPUTES

When Landowners/Water Users cannot resolve any dispute or controversies with any Ditch tender, the Superintendent or Assistant Superintendent, or any dispute concerning implementation of District policy with any employee of the District, or any other dispute concerning the District, the matter must be discussed with the Manager prior to asking the Board of Directors for final determination. Unresolved disputes must be presented in writing to the Board of Directors. The Board of Directors will take no action until a written complaint is received. The Board of Directors reserves the authority to act as the final level of appeal on any such dispute and controversy between Water Users and District employees.

STATE OF CALIFORNIA)
} ss.
COUNTY OF FRESNO)

I hereby certify that the foregoing Rules and Regulations were revised by the Board of Directors of the JAMES IRRIGATION DISTRICT at a Regular Meeting held February 24, 2010.

{SEAL}

Donna Y. Hanneman, Secretary
Board of Directors
JAMES IRRIGATION DISTRICT

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX D

DISTRICT SAMPLE CUSTOMER INVOICE

IRRIGATION INVOICE

JAMES IRRIGATION DISTRICT
P O BOX 757
SAN JOAQUIN CA 93660-0757
(559) 693-4356

Invoice Date: 4/30/2015

Customer Number:

Invoice Number:

SAMPLE INVOICE

Reference	Previous Balance	Payments	Balance Forward	2% Penalty	Usage	Rate	IRR Charges	Adjust. Qty	Adjust. Amount	Service ID Balance
A07E-131007	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A07W-131008	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A08-131009	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A08N-131010	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
B05E-131615	5,650.40	5,650.40	0.00	0.00	40.33	112.000	4,516.96	0.00	0.00	4,516.96
B05W-131001	92,371.50	92,371.50	0.00	0.00	25.18	117.000	2,946.06	0.00	0.00	2,946.06
B12-131011	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
B14-131012	0.00	0.00	0.00	0.00	0.95	117.000	111.15	0.00	0.00	111.15
C02A-131632	3,442.88	3,442.88	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C03-131633	5,547.36	5,547.36	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C04-131634	4,365.76	4,365.76	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C10-131613	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C11-131612	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C12-131611	0.00	0.00	0.00	0.00	30.48	117.000	3,566.16	0.00	0.00	3,566.16
C13-131610	6,435.52	6,435.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C15-131609	4,905.60	4,905.60	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D00-131608	5,475.68	5,475.68	0.00	0.00	45.98	112.000	5,149.76	0.00	0.00	5,149.76
D000-131641	6,938.29	6,938.29	0.00	0.00	64.67	112.000	7,243.04	0.00	0.00	7,243.04
D01-131631	5,035.52	5,035.52	0.00	0.00	29.60	112.000	3,315.20	0.00	0.00	3,315.20
D02-131003	2,860.77	2,860.77	0.00	0.00	18.81	117.000	2,200.77	0.00	0.00	2,200.77
D02A-131632	3,047.52	3,047.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D03-131004	0.00	0.00	0.00	0.00	0.00	114.480	0.00	0.00	0.00	0.00
D04-131604	5,289.66	5,289.66	0.00	0.00	21.14	114.480	2,420.11	0.00	0.00	2,420.11
D07-131006	702.00	702.00	0.00	0.00	37.31	117.000	4,365.27	0.00	0.00	4,365.27
D10-131622	2,784.60	2,784.60	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
D12-131002	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D13-131603	3,232.32	3,232.32	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D14-131614	3,334.50	3,334.50	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
D15-131603	2,235.52	2,235.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
E09-131005	162.63	162.63	0.00	0.00	5.40	117.000	631.80	0.00	0.00	631.80
F05A-131639	194.22	194.22	0.00	0.00	4.18	117.000	489.06	0.00	0.00	489.06
MC04-131608	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
Account Totals:	164,012.25	164,012.25	0.00	0.00	324.03		36,955.34	0.00	0.00	**36,955.34**

Total Irrigation Charges ↑

2%/MO OR 24%/YR WILL BE APPLIED TO BALANCES UNPAID
AS OF 5 PM 20TH/MONTH - C.O.D. 1ST FOLLOWING MONTH

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX E

DISTRICT WATER INVENTORY TABLES

Year of Data	2014	**Enter data year here**

Table 1

Surface Water Supply

2014 Month	**Federal Ag Water** (acre-feet)	**Federal non-Ag Water.** (acre-feet)	**State Water** (acre-feet)	**Local Water (Riparian)** (acre-feet)	**Other Water** (acre-feet)	**Transfers into District** (acre-feet)	**Upslope Drain Water** (acre-feet)	**Total** (acre-feet)
Method								
January	0	0	0	0	0	0	0	0
February	0	0	0	0	29	0	0	29
March	0	0	0	0	23	0	0	23
April	0	0	0	0	27	0	0	27
May	0	0	0	739	108	0	0	847
June	0	0	0	3,799	63	0	0	3,862
July	0	0	0	1,278	1	0	0	1,279
August	0	0	0	256	9	0	0	265
September	0	0	0	128	13	0	0	141
October	0	0	0	0	8	0	0	8
November	0	0	0	0	7	0	0	7
December	0	0	0	0	0	0	0	0
TOTAL	0	0	0	6,200	288	0	0	6,488

Table 2

Ground Water Supply

2014 Month Method	District Groundwate (acre-feet)	Private Agric *(acre-feet)
January	3,079	0
February	6,209	0
March	6,283	0
April	6,752	0
May	10,078	0
June	10,118	0
July	8,561	0
August	6,584	0
September	4,564	0
October	1,913	0
November	1,368	0
December	0	0
TOTAL	65,509	0

*normally estimated

Table 3

Total Water Supply

2014 Month / Method	Surface Water Total (acre-feet)	District Groundwate (acre-feet)	Recycled M&I (acre-feet)	Total District (acre-feet)
January	0	3,079	0	3,079
February	29	6,209	0	6,238
March	23	6,283	0	6,306
April	27	6,752	0	6,779
May	847	10,078	0	10,925
June	3,862	10,118	0	13,980
July	1,279	8,561	0	9,840
August	265	6,584	0	6,849
September	141	4,564	0	4,705
October	8	1,913	0	1,921
November	7	1,368	0	1,375
December	0	0	0	0
TOTAL	6,488	65,509	0	71,997

*Recycled M&I Wastewater is treated urban wastewater that is used for agriculture.

2014 Precipitation Worksheet				
	inches precip	ft precip	acres	AF/Year
Jan	0.15	0.01		
Feb	0.89	0.07		
Mar	0.81	0.07		
Apr	0.30	0.03		
May	0.00	0.00		
Jun	0.00	0.00	See attached backup tables	
Jul	0.00	0.00		
Aug	0.00	0.00		
Sept	0.00	0.00		
Oct	1.00	0.08		
Nov	0.11	0.01		
Dec	2.63	0.22		
TOTAL	5.89	**0.49**		

2014 Evaporation Worksheet			
	inches evap	ft evap	acres
Jan	2.26	0.19	
Feb	2.54	0.21	
Mar	4.70	0.39	
Apr	6.82	0.57	
May	9.60	0.80	
Jun	10.42	0.87	See attached backup files
Jul	9.90	0.83	
Aug	9.01	0.75	
Sept	6.83	0.57	
Oct	5.18	0.43	
Nov	2.20	0.18	
Dec	1.30	0.11	
TOTAL	70.76	**5.90**	

Table 4

Agricultural Distribution System

2014 Canal, Pipeline, Lateral, Reservoir	**Length** (feet)	**Width** (feet)	**Surface Area** (square feet)	**Precipitatio** (acre-feet)	**Evaporation** (acre-feet)	**Spillage** (acre-feet)	**Seepage** (acre-feet)	**Total** (acre-feet)
Eastside Canal	81,840	25	2,046,000	8.4	239	0	0	(231)
Main Canal	44,880	55	2,468,400	15.4	328	0	6,270	(6,583)
Lateral A	49,632	50	2,481,600	10.2	290	0	970	(1,250)
Lateral B	14,256	50	712,800	2.9	83	0	328	(409)
Lateral C	66,000	47	3,102,000	12.8	363	0	622	(972)
Lateral D	31,152	48.9	1,523,333	6.3	178	0	378	(550)
Lateral E	47,520	50.7	2,409,264	9.9	282	0	390	(661)
Lateral F	29,568	52.7	1,558,234	6.4	182	0	335	(511)
Lateral G	16,896	54.6	922,522	3.8	108	0	281	(385)
Lateral H	31,680	53.7	1,701,216	7.0	199	0	372	(564)
Lateral I	27,456	52.9	1,452,422	6.0	170	80	351	(595)
Lateral J	23,760	52	1,235,520	5.1	144	42	307	(489)
Lateral K	23,760	52.8	1,254,528	5.2	147	0	276	(418)
Lateral L	20,592	53.6	1,103,731	4.5	129	0	189	(313)
Lateral M	16,368	54.3	888,782	3.7	104	0	178	(278)
Lateral N	16,368	52.8	864,230	3.6	101	0	174	(271)
Lateral O	15,840	49.4	782,496	3.2	92	0	185	(274)
Lateral P	13,728	47.4	650,707	2.7	76	0	142	(215)
Lateral Q	9,504	50	475,200	2.0	56	0	67	(120)
Lateral R	8,448	50	422,400	1.7	49	0	136	(184)
Reservoir No. 1	NA	NA	435,600	2.0	52.0	0	218	(268)
Reservoir C	NA	NA	130,680	1.0	16.0	0	65	(80)
K-Basin	NA	NA	1,089,000	0.0	0.0	0	0	0
Reservoir E	NA	NA	1,041,084	5.0	129.0	0	544	(668)
Mendota Pool[1]	0	0	0	0.0	0.0	538	0	(538)
TOTAL				128.7	3,517.1	660	12,778	(16,827)

1) Losses from Mendota Pool, which is just outside of the District, is 5%, based on an agreement with the Pool Operator.

2) K Basin is a groundwater recharge basin so seepage is not reported as a loss. Net precipitation and evaporation are negligible and are not reported.

Table 5

Crop Water Needs

2014 Crop Name	Area (crop acres)	Crop ET (AF/Ac)	Leaching Requiremen (AF/Ac)	Cultural Practices (AF/Ac)	Effective Precipitatio (AF/Ac)	Appl. Crop Water Use (acre-feet)
Corn (human use)	178	2.00	0.10	0.00	0.00	374
Cotton	4,224	2.23	0.05	0.00	0.00	9,631
Grain: Wheat	134	1.53	0.05	0.00	0.30	172
Hay: Alfalfa	108	4.83	0.20	0.00	0.40	500
Hay: Oats	361	1.53	0.02	0.00	0.30	451
Nuts: Almond Bearing	4,175	3.03	0.20	0.00	0.10	13,068
Pasture (Permanent)	9	4.83	0.20	0.00	0.40	42
Seed: Alfalfa	4,912	3.53	0.20	0.00	0.20	17,339
Seed: Lettuce	155	3.10	0.05	0.00	0.20	457
Pistachios	2,189	2.73	0.20	0.00	0.10	6,195
Onions: Dehydrated	1,917	2.67	0.10	0.00	0.10	5,118
Tomatoes: Canning	2,569	2.20	0.05	0.00	0.20	5,266
Grapes	2,376	2.13	0.10	0.00	0.10	5,061
Pomegranetes	444	3.38	0.20	0.00	0.20	1,502
All other crops	123	3.00	0.20	0.00	0.10	381
Crop Acres	23,874					65,557

Total Irrig. Acres 23,874 (If this number is larger than your known total, it may be due to double cropping)

Table 6

2014 District Water Inventory

Water Supply		Table 3		71,997
Riparian ET		(Distribution and Drain)	minus	0
Groundwater recharge		(intentional - ponds, injection)	minus	0
Seepage		Table 4	minus	12,778
Evaporation - Precipitation		Table 4	minus	3,388
Spillage		Table 4	minus	660
Transfers out of District			minus	0
Water Available for sale to customers				55,170
Actual Agricultural Water Sales	2014	From District Sales Records		55,987
Private Groundwater		Table 2	plus	0
Crop Water Needs		Table 5	minus	65,557
Drainwater outflow		(tail and tile, not recycled)	minus	0
Percolation from Agricultural Land		(calculated)		(9,570)
Unaccounted for Water		(calculated)		(817)

Table 7

Influence on Groundwater and Saline Sink

2014

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence	(52,731)
Estimated actual change in ground water storage, including natural recharge)	0
Irrigated Acres (from Table 5)	23,874
Irrigated acres over a perched water table	0
Irrigated acres draining to a saline sink	0
Portion of percolation from agri seeping to a perched water table	0
Portion of percolation from agri seeping to a saline sink	0
Portion of On-Farm Drain water flowing to a perched water table/saline sink	0
Portion of Dist. Sys. seep/leaks/spills to perched water table/saline sink	0
Total (AF) flowing to a perched water table and saline sink	0

Table 8

Annual Water Quantities Delivered Under Each Right or Contract

Year	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (Riparian) (acre-feet)	Other Water (acre-feet)	Transfers into District (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2005	30,820	0	0	9,700	9,789	0	0	50,309
2006	23,866	0	0	9,700	33,840	0	0	67,406
2007	20,071	0	0	9,700	9,748	0	0	39,519
2008	6,212	0	0	9,700	5,345	0	0	21,257
2009	3,652	0	0	9,700	453	0	0	13,805
2010	16,528	0	0	9,700	1,711	0	0	27,939
2011	13,943	0	0	9,700	40,511	9,984	0	74,138
2012	19,729	0	0	9,700	1,288	4,796	0	35,513
2013	2,240	0	0	9,700	217	4,510	0	16,667
2014	0	0	0	6,200	288	0	0	6,488
Total	137,061	0	0	93,500	103,190	19,290	0	353,041
Average	13,706	0	0	9,350	10,319	1,929	0	35,304

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Canal Evaporation and Direct Precipitation
CIMIS San Joaquin Valley Westlands Station #105

				Lateral and Eastside Canal			Main Canal		
Year	Month	Effective Precip. (in)	Potential Evapotransp. (in)	Canal Use	Direct Precip. (in)	Canal Evap. (in)	Canal Use	Direct Precip. (in)	Canal Evap. (in)
2014	Jan	0.15	2.26	30%	0.05	0.68	100%	0.15	2.26
2014	Feb	0.89	2.54	100%	0.89	2.54	100%	0.89	2.54
2014	Mar	0.81	4.70	100%	0.81	4.70	100%	0.81	4.70
2014	Apr	0.30	6.82	100%	0.30	6.82	100%	0.30	6.82
2014	May	0.00	9.60	100%	0.00	9.60	100%	0.00	9.60
2014	Jun	0.00	10.42	100%	0.00	10.42	100%	0.00	10.42
2014	Jul	0.00	9.90	100%	0.00	9.90	100%	0.00	9.90
2014	Aug	0.00	9.01	100%	0.00	9.01	100%	0.00	9.01
2014	Sept	0.00	6.83	100%	0.00	6.83	100%	0.00	6.83
2014	Oct	1.00	5.18	10%	0.10	0.52	100%	1.00	5.18
2014	Nov	0.11	2.20	5%	0.01	0.11	100%	0.11	2.20
2014	Dec	2.63	1.30	0%	0.00	0.00	0%	0.00	0.00
	Total	5.89	70.76	-	2.15	61.13	-	3.26	69.46

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Canal Evaporation and Direct Precipitation Volumes

	Lats & E-side Canal	Main Canal
Year	**2014**	**2014**
Evaporation (in)	61.13	69.46
Precipitation (in)	2.15	3.26

									2014	
Canal	**Length (ft)**	**Top Width (ft)**	**Surface Area (Acres)**	**Surface Area (sf)**	**Water Depth (ft)**	**Side Slopes**	**Bottom Width (ft)**	**Volume (AF)**	**Evap. (AF)**	**Precip. (AF)**
Eastside Canal	81,840	25	46.97	2,046,000	6	2H:1V	9	237	239	8.4
Main Canal	44,880	55	56.67	2,468,400	6	2H:1V	39	315	328	15.4
Lateral A	49,632	50	56.97	2,481,600	6	2H:1V	34	314	290	10.2
Lateral B	14,256	50	16.36	712,800	6	2H:1V	34	90	83	2.9
Lateral C	66,000	47	71.21	3,102,000	6	2H:1V	31	391	363	12.8
Lateral D	31,152	48.9	34.97	1,523,333	6	2H:1V	32.9	193	178	6.3
Lateral E	47,520	50.7	55.31	2,409,264	6	2H:1V	34.7	306	282	9.9
Lateral F	29,568	52.7	35.77	1,558,234	6	2H:1V	36.7	198	182	6.4
Lateral G	16,896	54.6	21.18	922,522	6	2H:1V	38.6	118	108	3.8
Lateral H	31,680	53.7	39.05	1,701,216	6	2H:1V	37.7	217	199	7.0
Lateral I	27,456	52.9	33.34	1,452,422	6	2H:1V	36.9	185	170	6.0
Lateral J	23,760	52	28.36	1,235,520	6	2H:1V	36	157	144	5.1
Lateral K	23,760	52.8	28.80	1,254,528	6	2H:1V	36.8	160	147	5.2
Lateral L	20,592	53.6	25.34	1,103,731	6	2H:1V	37.6	141	129	4.5
Lateral M	16,368	54.3	20.40	888,782	6	2H:1V	38.3	113	104	3.7
Lateral N	16,368	52.8	19.84	864,230	6	2H:1V	36.8	110	101	3.6
Lateral O	15,840	49.4	17.96	782,496	6	2H:1V	33.4	99	92	3.2
Lateral P	13,728	47.4	14.94	650,707	6	2H:1V	31.4	82	76	2.7
Lateral Q	9,504	50	10.91	475,200	6	2H:1V	34	60	56	2.0
Lateral R	8,448	50	9.70	422,400	6	2H:1V	34	54	49	1.7
TOTAL	589,248	-	644	28,055,386	-	-	-	3,540	3,320	121

Notes: 1) Water depth and side slopes are assumed values
2) Widths for Eastside Canal, Main Canal, and Laterals A, B, Q and R are assumed values

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Regulation Reservoir Losses

Reservoir	Area (acres)
1	10
C	3
K-Basin Dist Canal and Cell No. 1	23.9
E	25

					Reservoir Use				Effective Precipitation (AF)				Evaporation (AF)				Seepage (AF)			
Year	Month	Effective Precip. (in)	Evporation (in)	Seepage (in/day)[2]	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E
2014	Jan	0.15	2.26	1.00	35%	35%	0%	35%	0.04	0.01	0.00	0.11	0.66	0.20	0.00	1.65	8.75	2.63	0.00	21.88
2014	Feb	0.89	2.54	1.00	100%	100%	0%	100%	0.74	0.22	0.00	1.85	2.12	0.64	0.00	5.29	25.00	7.50	0.00	62.50
2014	Mar	0.81	4.70	1.00	100%	100%	0%	100%	0.68	0.20	0.00	1.69	3.92	1.18	0.00	9.79	25.00	7.50	0.00	62.50
2014	Apr	0.30	6.82	1.00	100%	100%	0%	100%	0.25	0.08	0.00	0.63	5.68	1.71	0.00	14.21	25.00	7.50	0.00	62.50
2014	May	0.00	9.60	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.00	2.40	0.00	20.00	25.00	7.50	0.00	62.50
2014	Jun	0.00	10.42	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.68	2.61	0.00	21.71	25.00	7.50	0.00	62.50
2014	Jul	0.00	9.90	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.25	2.48	0.00	20.63	25.00	7.50	0.00	62.50
2014	Aug	0.00	9.01	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	7.51	2.25	0.00	18.77	25.00	7.50	0.00	62.50
2014	Sept	0.00	6.83	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	5.69	1.71	0.00	14.23	25.00	7.50	0.00	62.50
2014	Oct	1.00	5.18	1.00	25%	25%	0%	25%	0.21	0.06	0.00	0.52	1.08	0.32	0.00	2.70	6.25	1.88	0.00	15.63
2014	Nov	0.11	2.20	1.00	10%	10%	0%	10%	0.01	0.00	0.00	0.02	0.18	0.06	0.00	0.46	2.50	0.75	0.00	6.25
2014	Dec	2.63	1.30	1.00	0%	0%	0%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	-	5.89	70.76	-	-	-	-	-	1.93	0.58	0.00	4.82	51.77	15.53	0.00	129.43	217.50	65.25	0.00	543.75

Notes
Seepage in Reservoir No. 1 was measured to be about 1-inch/day and is assumed to be similar in the other reservoirs

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX F

GROUNDWATER MANAGEMENT PLAN

GROUNDWATER MANAGEMENT PLAN

JAMES IRRIGATION DISTRICT AND THE CITY OF SAN JOAQUIN

NOVEMBER 2010

DATE SIGNED: 11/1/10

PREPARED BY:

EST. 1968
PROVOST & PRITCHARD
CONSULTING GROUP
An Employee Owned Company

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2 - Summary of Production Well Attributes
3 - 2009 Water Delivery Report
4 - Sampling Instructions for Aqueous Samples
5 - Annual Groundwater Report Outline
6 - Implementation Schedule

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List of Abbreviations

AB	Assembly Bill
ACWA	Association of California Water Agencies
AF	Acre-feet
AWMC	Agricultural Water Management Council
bgs	below ground surface
BMO	Basin Management Objective
CVP	Central Valley Project
DBCP	dibromochloropropane
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	Electrical Conductivity
EPA	Environmental Protection Agency
ET	evapotranspiration
EWMP	Efficient Water Management Practices
FKC	Friant-Kern Canal
FWA	Friant Water Authority
FWUA	Friant Water Users Authority
GAC	Groundwater Advisory Committee
GMP	Groundwater Management Plan
GPS	Global Positioning System
HSA	Hydrologic Study Area
ID	Irrigation District
IRWMP	Integrated Regional Water Management Plan
JID	James Irrigation District
KRCD	Kings River Conservation District
KRWA	Kings River Water Association
MOU	Memorandum of Understanding
MVWD	Mid Valley Water District
NRCS	Natural Resources Conservation Service
RCWD	Raisin City Water District
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCIC	Stinson Canal and Irrigation Company
SCS	Soil Conservation Service
SLDMWA	San Luis and Delta-Mendota Water Authority
TDS	total dissolved solids
TID	Tranquillity Irrigation District
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WHPA	Wellhead Protection Area
WWD	Westlands Water District

1 - INTRODUCTION

This Groundwater Management Plan (GMP or Plan) is a joint effort between the City of San Joaquin (San Joaquin or City) and the James Irrigation District (JID or District). The two agencies are preparing this integrated GMP to better coordinate efforts, share data, and improve regional management of groundwater resources. Hereafter, the two agencies will be called the 'Plan Participants' and the area covered by the GMP will be called the 'Plan Area'. This Plan is the first effort by the City of San Joaquin to develop a GMP. This Plan is also an update to JID's GMP prepared in 2001, and this GMP satisfies new requirements for GMPs created by the September 2002 California State Senate Bill No. 1938, which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses recommended components for a Groundwater Management Plan described in Appendix C of Department of Water Resources Bulletin 118 (2003 Update).

1.1 - Background Information on Plan Participants

Following is general information on the Plan Area, followed by specific information on the City of San Joaquin and James Irrigation District.

Climate

The climate in the Plan Area is characterized by cool, mild winters and hot dry summers. Temperatures in the summer often exceed 100 degrees F. Fog occurs for long periods in the winter, with low temperatures typically in the mid 30's F; occasionally dropping into the 20's F. Average annual precipitation is about 7 inches, with 80 percent of the rainfall occurring from December through April. Precipitation is inadequate to meet crop water needs, except during the rainy season for some crops. Crops are sustained by irrigation during the summer. The growing season is typically 250 days per year.

Topography

Land in the Plan Area is relatively flat. It generally slopes westward and northward at a rate of about 3 to 4 feet per mile towards the topographic axis of the San Joaquin Valley, with local variations caused by remnants of slough channels. Elevations range from 160 to 180 feet above sea level.

City of San Joaquin

Below is a summary of the geography, demographics, water demands and water facilities in the City of San Joaquin.

Geography and Demographics

The City of San Joaquin was founded in 1920. The City is located in Western Fresno County about 11 miles southwest of the City of Kerman (see **Figure 1**). The City is an enclave in James Irrigation District. The City currently covers approximately 1 square mile. In 2010, the City had a population of 4,166. The population growth is expected to

be 2.6% per year for the next ten years. Most of the population is employed in the agricultural industry.

Currently, rural dwellings in JID are not commonly being built. Old houses are being torn down and people are moving to San Joaquin or other urban areas. This could lead to more growth in San Joaquin. San Joaquin plans to expand to the east with an area of about one square mile. Specifically, San Joaquin expects to see the construction of about 300 new homes in the next five years.

Water Demand

Water usage in San Joaquin from 2005 to 2009 is summarized in Table 1.1.

Table 1.1 – City of San Joaquin Water Usage

Year	Volume	
	Million gallons	Acre-feet
2005	222	681
2006	221	678
2007	242	742
2008	259	795
2009	257	789

In 2008, the City's per capita water usage was 181 gallons per capita per day (gpcpd), which is close to the national average (ConSol 2009). About 60% of the water is used for outdoor landscaping. Fluctuations in gpcpd from year to year can be explained by a variety of economic, demographic, and climate factors. The per capita water use is not expected to increase, but may reduce with the implementation of conservation measures.

Facilities

The City is serviced by three groundwater wells. Combined, these wells have a maximum capacity of 3,500 gallons per minute (gpm) and 5 million gallons per day (gpd). In 2008, 49% (1,723 gpm) of the maximum groundwater well capacity was used during peak consumption for the City. The City hopes to construct one well in the near future to replace one of the older existing wells. The City does not use or import any surface water. The City also operates three stormwater basins that provide stormwater retention and incidental groundwater recharge. The City has no recharge basins or reservoirs, but has plans to construct a reservoir tank within the next few years.

Based on current analysis, the City is not expected to outstrip its supply capacity or lose ability to meet peak demands over the next ten years, unless one of the wells ceases to operate. This is a concern for the City since some of their wells are old.

The City has about 950 service accounts. Residential accounts are not metered. About 5 percent of the accounts are commercial, and about 20% of the commercial accounts are metered.

James Irrigation District

Below is a brief description of the origin, physiography, geology, water supplies and facilities in JID.

Location

The James Irrigation District (JID or District) was organized in 1920 under the California Water Code. The District covers 26,392 acres wholly within Fresno County, California. The San Joaquin Valley Farmlands Company, successor to the James Ranch, granted to JID a perpetual right to pump and import groundwater from beneath lands east of the District, up to 200 cfs in capacity. This GMP covers the area within the JID boundaries and deeded groundwater area, but the physiography and geology of neighboring lands are also discussed. The District is situated in the central San Joaquin Valley of California and is approximately thirty miles southwest of the City of Fresno. The City of San Joaquin lies near the middle of the District, but is excluded from the District's boundary. State Highways 145, 180 and 33 are in close proximity. Adjacent agricultural water agencies include the Tranquility Irrigation District (TID), Westlands Water District (WWD), Stinson Canal and Irrigation Company (SCIC), Mid Valley Water District (MVWD), Reclamation District 1606, and the Raisin City Water District (RCWD). A location map for the District is included as **Figure 1**, and a vicinity map of the District within the Kings Groundwater Basin is included as **Figure 2**.

Land Use

When JID was formed in 1920, agricultural development of its lands was well underway. As irrigation facilities were constructed, use of the land gradually converted from grasslands to cultivated crop land. District lands are now essentially fully developed for agriculture. Cropping data for 1993 to 2007 is included on **Attachment 1**. Typically, about 23,000 acres are irrigated and prevalent crops include cotton, wine grapes, corn, almonds and seed alfalfa. Other significant crops include tomatoes, sugar beets, wheat, and onions. Currently, the principal irrigation method is furrow irrigation, with smaller amounts of drip, level basin, and micro-sprinkler irrigation. There is a trend towards planting permanent crops and converting to modern irrigation methods.

Facilities

Figure 3 is a map illustrating the major facilities in the District. JID's conveyance system consists of three major components: Eastside Canals, the Main Canal, and the Lateral Canals. The Eastside Canals consist of two canals, the Kerman Line Pump Canal (a.k.a. Lassen Canal) and the Coalinga Line Pump Canal (a.k.a. McMullin Grade Canal). These canals collect and convey groundwater pumped from about 35 JID wells, which lie outside of the District's boundaries, into the district. The Eastside Canals merge together and connect near the south end of the Main Canal by flowing through twin 60-inch diameter reinforced concrete pipelines that cross under the Fresno Slough

Bypass (also called the James Bypass). These 60-inch pipelines are called 'the siphon'. In 1992, 3.25 miles of the Eastside Canals were piped with smooth interior corrugated polyethylene pipe, and the remaining 12.25 miles were concrete lined; the pipeline and canal lining were financed through a DWR sponsored loan and JID bonds.

The JID Main Canal operates as a lift canal for surface water that is pumped from the Mendota Pool. Groundwater and diverted Kings River flood releases feed by gravity into the Main Canal from the south and flow northwesterly. The system also includes 17 lateral canals that are mostly unlined earthen ditches.

The District also has about 63 groundwater extraction wells and about 20 monitoring wells. A summary of well attributes is provided as **Attachment 2**. In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes six wells to recover some of the recharged water.

The proposed JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 4,740 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. Other details on the project are not provided as the design continues to evolve. The project is currently being permitted and designed, and construction is expected to be completed by the end of 2011 or possibly 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

Groundwater Supplies

The District owns and operates about 63 irrigation wells. The well locations are shown on **Figure 3**. About 28 of these are within the District boundary and about 35 are east of the District boundary within their deeded groundwater easement area. The current estimated yield for each well is shown on **Attachment 2**. Well yields range from 950 to 3,400 gpm, with an average of about 1,500 gpm. The total well pumping capacity is about 210 cfs. Most of JID's wells are between 500 and 600 feet deep, and extend to the top of the Corcoran Clay (a local confined aquifer). A few of JID's older wells are 700 to 900 feet deep and penetrate the confined aquifer. Two privately owned irrigation wells are inside of JID's boundary.

An enormous aquifer system lies beneath the Kings Groundwater Sub-basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the usable aquifer in the region are a number of clay layers that can act as confining beds. The confining bed that has greatest significance to the District is known as the Corcoran Clay, or E-clay. The E-clay underlies the entire District. Two other clay layers also partially underlie the District.

JID now primarily uses the unconfined aquifer lying above the E-clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow.

Surface Water Supply

CVP Schedule 2 water (informally called 'Riparian water') is delivered without charge as a settlement of the District's water rights claims in Fresno Slough – during normal and wet years 9,700 acre-feet is available, during dry years 7,600 acre-feet is available. The contract requires that the District take delivery of this water according to a predetermined schedule. In practice, the United States Bureau of Reclamation has allowed some flexibility on when this water is taken.

In addition, JID has a Central Valley Project (CVP) contract (No. 14-06-200-700L) for up to 35,300 acre-feet of water each year. Other water used by the District includes spillwater from the Fresno Irrigation District and Kings River floodwater.

In the past during wet years the USBR has made surplus water available to JID, which is above its normal contract deliveries. The source of this water may be either imports from the Delta via the Delta Mendota Canal, or San Joaquin River flood releases (called Section 215 water by the USBR).

Water Demands

Water demand in the District slowly increased over the years as land was brought into production. Since full agricultural development has now occurred, change in demand is largely the result of changing cropping patterns. **Attachment 3** is a 2009 Water Delivery Report for JID. The table also provides general water supply data for 1994 to 2009. Between 1994 and 2009, JID pumped an average of 29,500 AF/year of groundwater (39% of total supply), and imported an average of 46,600 AF/year of surface water (61% of total

water supply). JID has a goal to reduce their overall water demands through water conservation and water management efforts.

For more general information on JID refer to the James Irrigation District Water Conservation Plan – 2009 Update.

1.2 - Goals and Objectives of Groundwater Management Plan

The overall purpose of this GMP is to develop a coordinated and comprehensive approach to the evaluation and management of groundwater resources within the City of San Joaquin, James Irrigation District, and the James Irrigation District "East Side Wellfield" which is outside the District boundaries. Specific goals of this plan include the following:

1. Develop a consensus among agency staff and stakeholders on the current groundwater conditions, need for proactive groundwater management, and problems that need to be addressed.
2. Document goals and objectives for sustaining existing efforts and improving groundwater management.
3. Develop practical solutions for addressing groundwater issues, especially groundwater overdraft.
4. Improve communication between the City of San Joaquin and JID, and increase awareness of each agencies groundwater management concerns, programs and goals.
5. Provide a realistic and feasible implementation plan for short-term and long-term groundwater management efforts.

This GMP documents the existing groundwater management efforts in the Plan Area and planned efforts to improve groundwater management. Specific groundwater management goals documented in this GMP include:

1. Preserve and enhance the existing quality of the area's groundwater.
2. Preclude surface or ground water exports that would reduce the long-term supply of groundwater.
3. Coordinate groundwater management efforts between regional water users.
4. Maintain local management of the groundwater resources.
5. Implement a groundwater-monitoring program to provide an "early warning" system to future problems.
6. Stabilize groundwater levels in order to minimize pumping costs and energy use, and provide groundwater reserves for use in droughts.
7. Maximize the use of surface water, including available flood water, for beneficial use.

In addition, the Plan Participants will take a proactive role in the legislative process, participate in developing sound legislation concerning groundwater management if it

becomes necessary, and take an active role in opposing any legislation that is detrimental to local groundwater management efforts.

1.3 - Statutory Authority for Groundwater Management

The City of San Joaquin and James Irrigation Districts are both public agencies with the authority to manage groundwater and prepare Groundwater Management Plans. California Assembly Bill 3030, as chaptered, (California Water Code, Division 6, Part 2.75, SEC. 10750-10753.9) grants specified "local agencies" authority to undertake groundwater management. AB 3030 also confers upon local agencies the powers of a water replenishment district. These authorities remained unchanged with the amendments to the law provided by California Senate Bill No. 1938, which was passed in 2002 and outlines additional requirements for GMPs. Agencies adopting a GMP are authorized to enter into agreements with other local agencies or private parties to manage mutual groundwater supplies, including those existing in overlapping areas.

1.4 - Lower Kings Basin Groundwater Management Plan

The Kings River Conservation District has developed a regional GMP that includes the area covered by James Irrigation District and the City of San Joaquin. The GMP is called the '*Lower Kings Basin Groundwater Management Plan*' (Regional GMP) and was prepared in April 2005. The GMP is compliant with Senate Bill 1938 and discusses regional geography, geology and hydrogeology, regional groundwater problems, and regional basin management objectives. The Regional GMP includes several study areas and JID and the City are included in study 'Area A'. One important goal in the Regional GMP is the development of an improvement district for all of Area A to jointly fund regional studies, projects and monitoring.

JID and the City did not participate in the development of the Regional GMP. However, JID found many of the goals and objectives in the regional GMP to be compatible with their needs and beneficial for JID and the region. As a result, JID passed a District Resolution (No. 2007-03) supporting the Regional GMP. As a result, JID will have two GMPs: this document and the Regional GMP. This document will help guide local and regional groundwater management, and the Lower Kings Basin GMP will help guide regional groundwater management.

1.5 - Groundwater Management Plan Components

This GMP includes the required and voluntary components for a GMP as identified in California Water Code Section 10753, et. seq. This Plan is also consistent with the recommended elements for a GMP as identified in DWR Bulletin 118 (2003), Appendix C. **Table 1.2** identifies the location within this document where each of the components is addressed.

Table 1.2 – Location of Groundwater Management Plan Components

Description	Plan Section(s)
California Water Code Mandatory Requirements (10750 et seq.)	
1. Documentation of public involvement	1.5, Appendix A
2. Groundwater basin management objectives	1.2, 3
3. Monitoring and management of groundwater elevations, groundwater quality, land subsidence, and surface water	5
4. Plan to involve other agencies located in the groundwater basin	4.3
5. Monitoring protocols	5.3
6. Map of groundwater basin and agencies overlying the basin	**Figure 2**
California Water Code Voluntary Components (10750 et seq.)	
7. Control of saline water intrusion	6.3
8. Identification and management of wellhead protection areas and recharge areas	6.2, 7.2
9. Regulation of the migration of contaminated groundwater	6.3, 6.4
10. Administration of well abandonment and well destruction program	6.1
11. Mitigation of overdraft conditions	7.1, 7.2
12. Replenishment of groundwater extracted by water users	7.2
13. Monitoring of groundwater levels and storage	5.1, 9.2
14. Facilitating conjunctive use operations	7.3
15. Identification of well construction policies	8.1
16. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.4, 7, 8.2
17. Development of relationships with state and federal regulatory agencies	4.2, 4.3
18. Review of land use plans and coordination with land use planning agencies	9.1
Additional Components Recommended by DWR (App. C of Bulletin 118)	
19. Advisory committee of stakeholders	4.1
20. Description of the area to be managed under the Plan	1.1, 2
21. Descriptions of actions to meet management objectives and how they will improve water reliability	4 - 9
22. Periodic groundwater reports	9.2
23. Periodic re-evaluation of Groundwater Management Plan	9.4

1.6 - Adoption of Plan

Refer to **Appendix A** for documentation on the adoption of the GMP and the public process that was followed.

Public Participation in Plan Development
The public was invited to participate in the development of the updated GMP through newspaper notices and public hearings described below.

Preparation of Integrated Plan with City and JID
JID began to update their GMP in 2009. JID contacted several local agencies to solicit their input on the GMP. The City of San Joaquin was the only agency that expressed interest in the local groundwater management, and requested that the two agencies prepare a joint integrated Groundwater Management Plan. In April 2010, the two agencies signed a Memorandum of Understanding to cooperate on local groundwater management (see **Appendix E**) and prepare a joint GMP.

Groundwater Advisory Committee
The City of San Joaquin and JID used their City Council and Board of Directors, respectively, as groundwater Advisory Committees during preparation of this GMP. The two agencies plan to form a joint GAC for implementing the GMP after it is adopted. The joint GAC will include representatives from JID and the City that can represent and speak for the local interests. Several special sessions on groundwater issues were held at JID Board of Directors and City Council meetings. The GAC were also given a draft copy of the GMP to review. The GAC provided several insightful and useful comments for managing groundwater that were incorporated into the GMP.

As required by the California Water Code Section 10753.2 (a), JID and the City published a series of public notices, held public meetings, and adopted resolutions required for preparing and adopting this GMP. No comments were received from the public other than those offered by the Groundwater Advisory Committees. These public outreach efforts are summarized in Table 1.3 below.

Table 1.3 – Public Participation in Groundwater Management Plan Adoption

Phase of Public Noticing	Description	James Irrigation District	City of San Joaquin
Intent to prepare GMP	Notice of hearing published	12-31-08/1-7-09	4-10/5-10
	Hearing held. Resolution adopted.	1-13-09	5-12-10
	Resolution published	4-8-09/4-15-09	7-7-20/7-14-09
GMP Adoption	Notice of hearing published	9-29-10/10-6-10	9-29-10/10-6-10
	Hearing held. Resolution adopted.	10-19-10	10-13-10

The hearing at JID was advertised for October 12, 2010, but JID was forced to reschedule their Board meeting to October 19, 2010. However, no one appeared at the JID office for the October 12 meeting, and no comments were received at the October 19 Board meeting.

2 - GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of the City of San Joaquin, JID, JID eastside well field, and the surrounding area. The purpose of this section is to provide general background information on the local geology, hydrogeology and water chemistry that will aid in selecting and implementing groundwater management programs. Most of the information in this section was derived from City of San Joaquin records, JID records, USGS Professional Paper 1401-C, USGS Water Supply Paper 1999-H, and a report prepared by the United States Bureau of Reclamation for Tranquillity Irrigation District.

The following sections include technical discussions on the plan area's groundwater. These are intended to provide geologists, engineers, and water managers a greater understanding of the area's stratigraphy, groundwater conditions, and hydrogeologic parameters. Less technical discussions on groundwater management programs are provided in Sections 3-9 of this document.

2.1 - Regional Geology

The San Joaquin Valley is the southern part of a large, northwest-to-southeast trending asymmetric trough of the Central Valley, which has been filled with up to six vertical miles of sediment. This sediment includes both marine and continental deposits ranging in age from Jurassic to Holocene (recent). The San Joaquin Valley lies between the Coast Ranges on the west, the Sierra Nevada on the east, and extends northwestward from the San Emigdo and Tehachapi Mountains to the Delta near the City of Stockton. The San Joaquin Valley is 250 miles long and 50 to 60 miles wide. The relatively flat alluvial floor is interrupted occasionally by low hills.

The San Joaquin Valley is divided into several geomorphic land types including dissected uplands, low alluvial fans and plains, river floodplains and channels, and overflow lands and lake bottoms. The alluvial plains cover most of the valley floor and comprise some of the most intensely developed agricultural lands in the San Joaquin Valley. In general, alluvial sediments of the western and southern parts of the San Joaquin Valley tend to have lower permeability than eastside deposits. The lower permeability in material along the western and southern portions of the valley is mainly attributed to the fine-grained nature of the parent material from which the alluvium is derived. The sediments are predominately marine in origin and consist of the thick sequences of mudstone, claystone, and siltstone that make up the Coast Ranges. Upon weathering and transport down slope along alluvial fans, these sediments readily decrepitate into fine-grained materials consisting mainly of silt and clay found along the axis of the valley trough.

Near the valley trough, fluvial deposits of the east and west sides grade into fine-grained deposits termed Flood-basin deposits by Page (1986) or Basin Sediments by USBR (1955). The San Joaquin Valley has several thick, fine-grained, lacustrine

deposits. The Corcoran Clay Member of the Tulare Formation is the most notable fine-grained deposit in the San Joaquin Valley affecting groundwater quality and creates confined groundwater conditions below. The Corcoran Clay was deposited about 600,000 years ago in the Tulare Lake. This clay bed, which is found in the western and southern portions of the valley, separates the upper semi-confined to unconfined aquifer from the lower confined aquifer. The clay bed covers approximately 5,000 square miles and is up to 160 feet thick beneath the present bed of Tulare Lake and thins with distance from the center of origin.

Regional Hydrogeologic Setting

An enormous aquifer system lies beneath the Kings Basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada Mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the useable aquifer in the region are a number of clay layers that can act as confining beds or perching layers. The confining bed that has greatest significance to the Plan Area is known as the Corcoran Clay, or 'E' Clay. The 'E' Clay underlies the entire Plan Area (**Figure 5**). **Figure 9** is a generalized cross section of the Plan Area. Two other significant clay layers also partially underlie the Plan Area. However, neither the 'C' Clay on the extreme northern edge of the District, nor the 'A' Clay have as a significant impact on the Plan Participants use of the aquifer as the Corcoran clay. However, recent studies completed by JID for the K-Basin recharge project indicates that there, the ‘C’ Clay may be present, extending the ‘C’ Clay several miles southeast as mapped by USGS (1972).

JID wells primarily tap the unconfined aquifer lying above the 'E' Clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow, reflecting the confined groundwater conditions below the Corcoran clay. The use of wells within District boundaries which tap the confined aquifer below the E-clay was slowly phased out due to its poorer water quality, generally lower yields, and more expensive well construction costs. However newer wells are constructed on a case by case basis, and built to recover the highest quality water at a given location, whether that is above or below the Corcoran clay. As a result, some wells tapping the confined aquifer are now constructed.

Groundwater in the plan area is divided into three separate non-marine, water bearing zones. These include the lower water-bearing zone, upper water-bearing zone, and the perched or shallow zone, as discussed below.

- The **lower water-bearing zone** contains fresh water in the lower section of the Tulare Formation from the base of the E-clay (Corcoran Clay) to the base of fresh water or the top of connate, saline marine water. USBR (1955) terms the base of the fresh water aquifer as the base of the effective ground-water reservoir. The depth to the base of fresh water is from about 1,000 feet to 1,400 feet beneath the Plan Area (Page, 1973).

- The **upper water-bearing zone** is from the top of the Corcoran Clay to the upper sections of the Tulare Formation, often considered the bottom of the A-clay.

- The **shallow or perched zone** underlies the portion of the Plan Area from the City of San Joaquin and northward, from the top of the A-clay, if it is present, to the perched groundwater table which is often within 10 feet or less of the ground surface. DWR Bulletin 118-03 uses 25 feet below ground surface (bgs) as a general vertical depth limit for the base of the perched zone.

Subsidence

Land subsidence in the San Joaquin Valley has been studied extensively in the past by the USGS and DWR. A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Land subsidence of up to 16 feet has been experienced in the southern portions of the San Joaquin Valley basin. Between 1926 and 1970, a maximum of 29.7 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million AF of water storage space out of valley sediments during the same period.

There are two types of land subsidence due to groundwater withdrawals; elastic and inelastic. Elastic subsidence is not permanent and is largely reversible, if water levels recover to above historic lows. Recent studies indicate that current subsidence west of the plan area is primarily elastic in nature, and will likely not be inelastic until water levels fall below historic lows. Inelastic subsidence is permanent and occurs when water is removed from a confined aquifer for the first time, and is sometimes referred to as virgin subsidence. Between the mid-1920's to about 1980, the San Joaquin Valley experienced inelastic, non-recoverable subsidence.

The most recent reports on land subsidence in the San Joaquin Valley were completed by R. L. Ireland of the USGS in 1986 and Arvey A. Swanson of DWR in 1995. Ireland (1986) states that "*Land subsidence to groundwater withdrawal in the San Joaquin Valley that began in the mid-1920's and reached a maximum of 29.7 feet in 1981 has been halted by the importation of surface water through major canals and the California Aqueduct in the 1950's through 1970's*." This was generally true at the time, because large scale regional subsidence had halted, but smaller-scale local subsidence continued in many areas.

Poland et al. (1975) estimated that cumulative non-recoverable land subsidence from 1926 to 1972 in the vicinity of the Plan Area was on the order of 4 feet. A land subsidence contour map shows lowering of the land surface due to land subsidence was exacerbated west of the Plan Area and cumulatively, for the period of record, was as much as 8 feet in this area.

As land subsidence is a function of groundwater pumpage and recharge, it is linked to drops in groundwater levels. **Appendix C** shows hydrographs for wells monitored by DWR in the Plan Area. The DWR hydrographs show periodic increases in water levels, but the overall trend is a steady decline in water levels from the 1960's to today. Other hydrographs in the area prepared for KRCD's 2005 Lower Kings Basin Groundwater Management Plan Update and JID's 2001 GMP show continued decreases in water levels. Recent drops in groundwater levels are likely a result of low precipitation years, and the increased reliance on groundwater in the area to supplement surface water supplies.

Poland et al. (1975) show a direct correlation between subsidence and pumpage. In a 1996 draft memo, DWR indicated that from 1975 to 1992 subsidence occurred primarily in drought years when groundwater supplies replaced surface water supplies. The most recent record of land subsidence in the area is from Swanson (1995), were he indicates that 2 feet of subsidence occurred along the Outside Canal near Mendota Dam between the years of 1970 and 1994. However, it is not known how much of the 2 feet of subsidence reported by Swanson was residual subsidence, continued from pre-surface water delivery pumpage west of the Plan Area. Data from 6 extensometers located west of the Plan Area indicates that subsidence there has been elastic since about 1977.

With the recent reductions in surface water supplies for CVP contractors, the demand on the regional aquifer system's groundwater will likely increase. A link between land subsidence and pumpage is well established west of the District. Therefore, studies should be conducted to determine the susceptibility of subsurface deposits to land subsidence with increasing groundwater demand, especially if newly constructed wells tap the confined aquifer.

2.2 - Groundwater Basin

The James Irrigation District and City of San Joaquin are in the Kings Groundwater subbasin (Kings Basin) in the San Joaquin Valley Groundwater basin of the Tulare Lake Hydrologic Region (DWR 2003). See **Figure 2** for a map of the regional groundwater sub-basins. The Kings subbasin has been identified by the DWR as a basin with boundaries appropriate for ground water management purposes (DWR Bulletin 118-80). These boundaries were identified on the basis of geological and hydrological conditions, as well as political boundary lines. There are 19 court adjudicated basins in California, most of them in Southern California or coastal regions of California. The Kings Groundwater Subbasin is not included in the list of adjudicated basins, however DWR Bulletin 118-03

identifies eleven basins in California as being in critical conditions of over draft and the Kings Basin is included on the list.

Geography

The Kings Basin covers 976,000 acres. The Kings Basin extends from the Sierra Nevada foothills on the east to the San Joaquin Valley trough on the west, and from the San Joaquin River on the north to roughly the Fresno County line on the south. The Kings Basin also includes small portions of Kings and Tulare counties. The Plan Participants lie in the northwest portion of the Kings Basin and is bounded to the west by the southern extension of Delta-Mendota subbasin (**Figure 2**). The Westside Groundwater Subbasin borders the southwest portion of the District. The San Joaquin and Kings Rivers are the two principal rivers within or bordering the Kings Basin. There are no hydrogeologic features that would prevent groundwater from flowing between the Kings Basin to the Delta-Mendota or Westside Sub-basins, located to the west.

Tulare Lake Hydrologic Region

The Kings Basin (DWR subbasin No. 5-22.08) lies within the Tulare Lake Hydrologic Region, which covers approximately 10.9 million acres (17,000 square miles) and includes all of the Kings and Tulare Counties and most of Fresno and Kern Counties. The region has 12 distinct groundwater basins and 7 sub-basins of the San Joaquin Valley Groundwater Basin.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the Hydrologic Region's total annual supply and 35 percent of all groundwater use in the State. The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The base of fresh groundwater in the region, at an average of about 1,200 feet below ground surface, is considered to be the maximum effective depth of the basin in terms of pumping and recharge. According to Bullettin118-2003, well yields average 500 to 1500 gpm, with a maximum of 3,000 gpm (this agrees with data for JID wells).

Groundwater Quality for the Tulare Lake Hydrologic Region

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high total dissolved solids (TDS), nitrate, gross alpha, arsenic and organic compounds. The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley, especially in water close to the surface, is the result of concentration of salts because of evaporation and poor drainage. According to DWR Bulletin 18-2003, TDS in groundwater in the Kings Basin ranges from 40 to 2,000 mg/L with an average of 200-700 mg/L. Groundwater quality specific to JID and the City of San Joaquin is discussed in detail in Section 2.6 below.

Groundwater Budget

According to the DWR Bulletin 118-03, in the Tulare Lake Hydrologic Region the San Joaquin Valley Basin only has two subbasins ranked as a Type "C" groundwater budget; Kings and Westside. A Type C budget indicates that there are not enough data to provide either an estimate of the basin's groundwater budget or groundwater extraction from the basin. This suggests a low level of knowledge exists on groundwater inflow, outflow, or storage information in the Kings basin. The C budget type is for the whole subbasin, not just the Plan Area, so it will take collaboration to get information needed to bring the subbasin to a budget type classification of A, which is based on actual groundwater budgets or models, or B which is a use-based estimate of groundwater extraction (using evapotranspiration demand). The Kings Subbasin was determined in DWR Bulletin 118-80 to be a "*critically overdrafted*" basin. This designation was not reevaluated when the bulletin was updated in 2003.

2.3 - Stratigraphy

The following discussion focuses on significant hydrogeologic units that have an impact on the groundwater resources within the Plan Area. From the surface to the base of the effective groundwater reservoir, about 1,200 feet bgs, important hydrogeologic units are topsoil, alluvial fan deposits of eastside origin, basin sediments, the A-, C-, and E-(Corcoran) clays, and alluvial deposits below the E clay, and to a lesser extent alluvial deposits of Westside origin. Depth to bedrock is too deep under the Plan Area to impact groundwater conditions and therefore will not be discussed here.

Topsoils

Soils in the District and vicinity range from coarse sands to heavy clays. In the middle and western portions of the Plan Area the soils generally have a higher clay content. These soils developed on sediments deposited in the valley trough during flood periods. The parent material of these soils is flood basin deposits and fine-grained alluvium of mixed granitic and sedimentary origin from both the Sierra Nevada and Coast Range Mountains. Soils in the eastern portion of the Plan Area and the JID eastside wellfield generally have higher sand content and are derived mostly from granitic Sierra Nevada sediments deposited on alluvial fans. The increase in sandier materials to the east extends into the subsurface and partially explains why more wells are located in the eastern side of JID than the western side. Soils throughout the vicinity of the Plan Area are stratified, with interspersed sandy and clayey streaks. **Figure 4** is a composite of United Stated Department of Agriculture soil survey maps which cover the Plan Area.

Subsurface Geology

The USBR (1955) provides the most focused and detailed descriptions of the subsurface geology in the Plan Area. While the USBR report was prepared for Tranquillity Irrigation District, it also covers the Plan Areas and east to R.17E/R.18E section line (approximately 2 miles east of the eastern JID border). The following discussion on subsurface geology is based on the descriptions found in USBR's report. Surface deposits, as mapped by the USBR, include eastside inactive alluvial fan deposits that cover the Plan Area east of James Bypass. From about the James Bypass

westward surface deposits are composed of Basin Sediments deposited in the axis of the valley during wet climatic cycles. Beneath these sediments lies the Corcoran clay, a regional lacustrine clay that causes confined groundwater conditions below it. Below the Corcoran clay, Sierran alluvial sediments dominate to depths greater than 3,000 feet bgs. These sediments are considered part of the Tulare Formation and are discussed in further detail below. Within the Tulare Formation seven lacustrine clays are mapped to varying extent in the San Joaquin Valley. In the Plan Area the A-clay, C-clay and E-clay or Corcoran clay are the most important of the mapped clay lacustrine clays. Several geologic cross sections passing through JID, the JID Eastside Wellfield, and the City of San Joaquin are included in **Appendix B**. The locations of the cross sections are shown on **Figure 4**.

Alluvial Fan Deposits of Eastside (Sierran) Origin

Surficial deposits of eastside origin are roughly found east of the James Bypass. The alluvial fan deposits above the Corcoran clay are predominately of eastside (Sierran) origin and comprise lenticular beds of sands and silts derived primarily from granitic rocks with rare clay laminae. These sediments probably represent deposits of former Kings River and San Joaquin River distributaries and are geographically higher than alluvium deposits of the active fans. They are slightly wind modified and soils that form on them tend to be saline; developed under conditions of high water table and little sedimentation. USDA-SCS soil classification for soils that formed on the inactive alluvial fans are sandy loam to fine sandy loam, with the finer grained soils dominating near James Bypass (**Figure 4**). Beneath the topsoil the sands vary from fine to medium-grained sizes and coarse sands and gravels are rare. The deposits generally become finer westward; grading into the Basin sediments discussed below. Fine-grained deposits dominate in the western portion of the area where they finger into the Basin sediments. This alluvial sequence occurs from the surface to depths of 500-550 feet bgs. Most of the wells in the JID eastside well field are completed in these deposits. These sediments, while all Sierran fluvial, represent three distinct environments of deposition. Clays and silt/clay mixtures represent deposition in lakes or marshes, well sorted sands and silts represent deposition in water with current such as streambeds or lake beaches, and poorly-sorted silt and clay fractions indicate floodplain origins.

Basin Sediments

West of the alluvial fan deposits of eastside origin (roughly James Bypass) surface deposits are comprised of Basin sediments. The Basin sediments are along the trough of the valley and consist of material of mixed Sierran and Coast Range origin. The Basin sediments are fine sands, silts, and clays. Soils that formed on the Basin Sediments are classified by the USDA-SCS as clay loam and clay. Under natural conditions these deposits are poorly drained, frequently flooded, and ponded or marshy. These sediments grade westward into inactive alluvial fan deposits of Westside (Coast Range) origin.

The A-clay is one of seven recognized lacustrine clay beds in the San Joaquin Valley (**Figure 6**). It was deposited in a widespread lake and is found almost continually beneath the topographic axis of the valley. While not comprised of alluvium of eastside origin or Basin Sediments, stratigraphically it is located within these units, and thus is discussed here. The top of it is often the base of the perched or shallow ground water zone. The A-clay, as mapped by Croft (1972), extends under the Plan Area from the City of San Joaquin northwestward (**Figures 6**). The base is about 60 to 75 feet beneath the land surface and generally it is between 5 to 70 feet thick. Structure contours drawn on the base of the A-clay indicate that it is relatively flat beneath the northern portions of JID. The A clay is an aquitard, not yielding significant water to wells, and in fact is a perching layer stopping the downward migration of water from the surface.

The C-clay is another of one of the seven recognized lacustrine clay beds in the San Joaquin Valley. In the JID area its extent is similar to the A-clay, but it was not mapped with the same level of certitude by Croft (1972) as the overlying A clay or the underlying E-clay. Recent subsurface investigations by JID for the K-Basin recharge project indicate that the C-clay is likely present there at a depth of 235 to 253 feet bgs. These depths correspond to Croft's mapping of the C clay where, in the northern portions of the District, it is roughly 240 to 260 feet bgs. The Report of Findings for Potential Banking Facilities (Provost and Pritchard, 2005) indicates that, based on the results of pump tests at the Lateral K Basin, there is only a small hydraulic connection between groundwater in strata above and below the C-clay.

Alluvial Deposits Beneath The Corcoran Clay

Beneath the Corcoran clay a series of granitic sands, silts, and occasional clays extends to depths greater than 1,200 feet. These sediments were deposited by alluvial fans debauching from the Sierra Nevada Mountains and resemble beds of similar origin above the Corcoran clay, but are texturally coarser grained. While most of the recently built wells, as of 2003, are completed in the alluvial deposits above the Corcoran, two wells built around 1950 were completed to depths below the Corcoran clay. Of these two wells one is abandoned and records indicate that the other is no longer in use. This unit contains the base of the effective groundwater reservoir, as described below. Water quality in this zone is discussed below but generally is of much better quality than water above the Corcoran clay. Currently the District designs and constructs wells based on site specific conditions and wells may be perforated above or below the Corcoran clay.

Corcoran Clay

The Corcoran Clay, also known as the E-clay, is a lacustrine clay bed of lake or swamp origin that effectively underlies the entire Plan Area. The Corcoran clay has long been recognized as the most significant subsurface deposit in the San Joaquin Valley confining water beneath it. It is the upper most boundary of the confined aquifer and the lower most boundary of the unconfined aquifer. The easterly extent of the E-Clay is shown on **Figure 5**. Structure contours drawn on the bottom show it to be about 560 to

620 feet beneath the surface in the plan area (Croft, 1972). Page (1986) provides structure contours to the top of the Corcoran clay. Based on Page's interpretation, the depth to the top is between 500 to 550 feet over the majority of the area with a thickness of 20-40 feet. The structure contours reveal the structure of the clay as a southerly dipping anticline with about 50 feet of relief from the north to south beneath the JID area. On well completion reports it is commonly described as blue or green clay, claystone, or siltstone. The Corcoran Clay has also been described as greenish-grey, dense, compact, and non-laminated claystone or siltstone. The bottom 20 feet is usually silty and it is a characteristic marker on E logs. A few scattered sand lenses exist and in the eastern portions of the area can make up as much as 30 percent of the clay sequence.

Alluvial Deposits of Westside Origin

The Plan Area, being near but east of the axis of the valley, has for the most part been dominated by deposition from the Sierra Nevada. However, there is some indication that subsurface deposits west of JID originated from the Coast Ranges. Contemporaneous deposition from eastside and westside sources is shown in a drill hole located in 15S/16E, Section 17E (about 1 mile west of the Plan Area) at depths of 22 feet where westside deposits overlie eastside deposits. This indicates that the sediments from the two sources occur and overlap west of the Plan Area. USBR (1955) indicates that the westside deposits thin and pinch out easterly. While these sediments probably form a minor component of the area's useable aquifer, water originating from these sediments to the west could have a great impact on water quality.

2.4 - Aquifer Characteristics

Specific Yield

In order to establish the storage capacity of the underground reservoir it is necessary to derive estimates of the specific yield of the sediments. USBR (1955) derived estimates of specific yield for the upper water-bearing zone within JID. These values are based on specific yield estimates from two separate studies done in similar geologic settings. The USBR report defined the upper water-bearing zone as the depth interval between the 1948 static water level in shallow wells and the top of the Corcoran clay (about 30 feet to 500 to 550 feet bgs). USBR computations show specific yield for JID ranges from as high as 22 percent to as low as 6 percent for the sediments above the Corcoran clay. Specific yield contours show a tongue of higher specific yield extends southwestward across the northern portions of the JID area corresponding to eastside alluvial sediments. The higher specific yields are associated with this tongue of coarser grained sediments of Sierran origin.

Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about 11 percent for the District and about 12 percent for the Eastside well field area. Findings from the KRCD Groundwater Management Plan Update (2005) indicate that specific yield in JID is 11.3 to 12 percent.

Safe Yield

Safe yield, or perennial yield, is difficult to quantify because of the shared nature of the aquifer and uncertainty in defining the term. In this analysis perennial yield is defined as the amount of pumping that can be supported over an average hydrologic base period that will not result in a long-term decline in water levels. The base period must be long enough to include both wet and dry hydrologic cycles.

One factor complicating the estimate of perennial yield for JID is that the District and Eastside well field region is not a "closed" ground water basin. That is, groundwater in the region is hydraulically connected to groundwater in adjacent areas within both the "Kings Basin" and the "Tulare Lake Hydrologic Region". If groundwater management activities substantially raised static water levels subsurface inflow would decrease, subsequently decreasing perennial yield.

A previous analysis performed by Provost & Pritchard Consulting Group, Inc. investigated the safe yield using the hydrology from 1975 to 1993. The analysis concluded that the perennial yield for JID is approximately 1,000 AF per year less than the District's estimated average annual pumping of 12,500 AF from within the District, and about 2,700 AF per year less than the average annual pumping from the Eastside well field. This results in an estimate of perennial yield of 11,500 AF per year for JID. Total average annual pumping for the Eastside well field area is unknown as the District's wells account for just a portion of the region's pumpage. Private irrigation wells pump an unknown additional amount. However, the total average annual amount pumped in the study period (1975-1993) appears to be around 2,700 AF per year more than the perennial yield.

Storage Capacity

If it is assumed that the useable ground water reservoir is the unconfined aquifer lying above the E-clay, an estimated ground water storage capacity can be calculated. The elevation of the base of the E-clay averages about 400 feet below sea-level within the District, with an average thickness of around 80 feet. The average ground surface elevation in the District is about 175 feet, resulting in an average total depth for the unconfined aquifer of about 495 feet. Assuming that it is undesirable to have the water table less than ten feet from the ground surface, the average thickness of the useable aquifer is around 485 feet. Applying an average specific yield of 0.11, and multiplying by the total District area of 26,392 acres results in an estimate of total unconfined aquifer storage capacity of 1,400,000 AF.

Groundwater Quantity

The entire District and surrounding lands overlie portions of an enormous aquifer. For water quality reasons most of the ground water pumping occurs along the Fresno Slough and eastward. The District currently operates about 60 turbine pumps which tap this aquifer.

The combined capacity of the wells in 2008 was approximately 93,310 gallons per minute (gpm), or around 208 cubic feet per second (cfs). The locations of the District wells are shown on **Figure 3**. As of 2007 there were only two known private in JID wells being used to supplement District water supplies.

Under the authority of a groundwater deed recorded on September 1, 1920, JID pumps a large portion of their ground water supply from outside the District. The area encumbered by the ground water deed is shown on **Figure 3**. The District operates a wellfield east of the Fresno Slough Bypass consists of about 35 wells feeding two canals; the Lassen Avenue Canal and the McMullin Grade Line (**Figure 3**). From 1986 to 1994, which was largely a drought period, the eastside wells supplied an average annual supply of about 21,000 AF. This was a little more than half of the District's total ground water pumping, which averaged around 42,000 AF per year through the same period.

JID generally uses surface water to the extent it is available and supplements it as necessary with groundwater. In years of average surface water supply total ground water pumping can be expected to be around 25,000 to 35,000 AF, with 15,000 to 20,000 AF coming from the eastside wellfield.

Transmissivity

Transmissivity data for the Plan area is sparse. Schmidt (2004) derived transmissivity values from a 5-day pumping test performed on Well C-81 at the K Basin. Schmidt notes that the transmissivity values are valid for the aquifer below the C-clay at that location. The perforated interval of the well from 250 to 500 feet bgs indicates that this well taps the aquifer between the C-clay and the Corcoran clay. Transmissivity values from that pumping tests ranged from 73,000 gpd/ft to 48,000 gpd/ft.

A study by Davis et al., (1964) summarized numerous regional specific capacity values from Pacific Gas & Electric pump tests performed across the San Joaquin Valley. Using data from field tests in the JID area, they calculated specific capacities ranging from 57 to 85 gpm per foot. Driscoll (1986) provides an approximate relationship between specific capacity data and transmissivity. Using this method, transmissivity values for the northern part of JID range from 106,500 to 127,500 gpd/ft, and range from 85,500 to 86,000 gpd/ft in the southern portion of the District. These values of specific capacity and transmissivity are probably valid for the unconfined aquifer, as at the time of the report most wells drilled in the area were most likely completed above the E-clay.

The City of San Joaquin performed pump tests in their Well No. 5 in July 2003. Estimated specific capacities ranged from 10.7 to 11.0 gpd/ft. Drawdown measurements from a step-drawdown test indicated a transmissivity of 43,000 gpd/ft, and for a constant discharge test indicated 39,000 gpd/ft.

Wells Yields and Depths

Well yields in JID range from around 400 to 2,000 gallons per minute (gpm), with most around 1,000 to 1,500 gpm (**Attachment 2**). Wells in the east side wellfield have yields ranging from about 800 to 2,300 gpm, with the typical well producing about 1,500 gpm. Well depths in the East-Side Well Field and along the James Bypass average about 500 feet deep ranging from 365 to 808 feet.

The characteristics of the three wells in the City of San Joaquin are shown in **Table 2.1** below.

Table 2.1 – City of San Joaquin Wells

Description	Well No. 3	Well No. 4	Well No. 5
Total Depth	510 ft	500 ft	495 ft
Perforated Interval	210-510 ft	300-500 ft	300-435 ft
Year Constructed	1968	1978	2003
% of City water in 2009	50	8	42
Yield	1,200 gpm	1,200 gpm	1,100 gpm

2.5 - Groundwater Levels

Regional Groundwater Levels

Figure 7 is a map showing regional groundwater levels (this map represents the best available depiction of regional groundwater depth, despite being slightly dated). Groundwater depths range from about 40 to 150 feet bgs in the Plan Area. Groundwater generally flows from northwest to southeast, and there is a considerable groundwater depression east of the Plan Area in the Raisin City Water District.

Historical Ground Water Levels

Appendix C includes a collection of hydrographs for indicator wells in JID. Groundwater level data is not available for the City of San Joaquin, but groundwater levels in the City are assumed to be similar to those shown on regional map (**Figure 7**).

Prior to development of JID, regional groundwater levels were typically within ten feet of the ground surface, and wells tapping the aquifer below the E-clay initially exhibited artesian flow. As land was brought into agricultural production, and with the advent of deep well turbine pumps, groundwater levels began to decline. By about 1950 water levels had begun a sharp decline that continued into the mid-1970's. In this period a significant portion of the unconfined aquifer was dewatered, and a large cone of depression developed outside of JID in the Raisin City area.

Beginning in the mid-1970's and continuing to the present, is a trend of much slower ground water decline. Water levels have continued to fluctuate in response to drought and

flood years but have not exhibited nearly as strong a downward trend. This slowing in groundwater level decline probably resulted from increased groundwater inflow induced by the large cone of depression that has formed in the region, as well as groundwater recharge projects implemented by JID.

Water levels in wells tapping the confined aquifer in the region west of JID, (below the E-clay) also declined precipitously through the 1950's and 60's. However, due to the confined nature of the aquifer, these declines track the piezometric or pressure surface of the ground water, and therefore do not indicate a physical reduction of water in storage in the confined aquifer. This downward trend reversed dramatically in the mid-1960's in response to initiation of delivery of imported surface water from the USBR's Central Valley Project (CVP). This surface water supply resulted in decreased pumping from beneath the E-clay in regions west of JID. Water levels in wells pumping from the confined aquifer once again began to decline steeply in the early 1990's when imported water supplies declined as a result of an extended drought.

The Lower Kings Basin GMP provided an evaluation of regional groundwater levels in the Kings Basin. The GMP concluded that there has been a significant regional decline in groundwater levels between 1950 and 2000 and estimate a continued decline. The construction and operation of Pine Flat Dam, while helping to address groundwater issues by providing surface water, has not completely mitigated overdraft conditions in the Lower Kings Basin. According to the GMP, the average annual rate of groundwater overdraft in the Lower Kings Basin is 68,000 AF/year. Groundwater levels are expected to decline in the future if current groundwater management practices remain unchanged.

2.6 - Groundwater Quality

Overall ground water quality has not appeared to change significantly over the years. Ground water quality is generally better on the east side of the District, although salt plumes caused by the unregulated discharge of oil-field brines have degraded ground water in the District's east side wellfield. The poorer quality ground water on the west side of the District is apparently now advancing further into JID.

Ground water pumped by the District is generally of poorer quality (higher salt content and more sodic) than its surface water supply. However, most of the ground water supply is still of good to fair quality for irrigation. The relatively high sodium content of the water has caused infiltration problems in some areas of the District. **Appendix D** includes total dissolved solids measurements for wells in JID from 1977-2009. **Appendix F** includes groundwater quality graphs and a summary of groundwater quality in different regions on JID. In general, groundwater quality is the best in the southern part of JID, and northern parts of the eastside well field, and is worst in the central part of the wellfield. Refer to the groundwater quality maps and tables in **Appendices D** and **F** for more detail.

Oil wells in the area have always brought up brackish water (exceeding 60,000 ppm in salts) with the oil. Prior to the mid-1950's this brackish water was disposed in unlined pits

and was allowed to percolate into the ground water. This led to degradation of groundwater in the Eastside well field due to disposal of saline waters in the Raisin City Oilfield. Unlined pits are now illegal, and deep well injection is used to dispose of the brackish water.

Surface Water Quality

Surface water in JID comes primarily from the Kings River and Delta Mendota Canal (through Fresno Slough and Mendota Pool, respectively). Kings River water is of excellent quality for irrigation. Salt content, measured as total dissolved solids (TDS), typically runs around 50 parts per million (ppm) and boron content is generally less than 0.1 ppm. Infiltration problems sometimes occur due to the purity of the water. Beneficial calcium ions tend to be leached from the soil, reducing permeability. Water supplied from the Delta-Mendota Canal to the District is of good quality for irrigation. TDS for the water is generally around 400 ppm and boron content is typically less than 0.5 ppm.

City of San Joaquin

Groundwater quality in the City is very good, possibly as a result of JID importing significant quantities of pure surface water into the area. Surface water treatment is currently limited to wellhead treatment with chlorine. However, the City is concerned about the migration of poorer quality groundwater from outlying areas, and would like to monitor the encroachment of these water sources.

3 - BASIN MANAGEMENT OBJECTIVES

The Plan Participants have adopted the following five Basin Management Objectives:

1. **Stabilize Water Levels.** Stabilize average long-term groundwater levels by 2015 to prevent the loss of groundwater reserves, and prevent the need for well deepening, and reduce the new for installing new wells.

2. **Increase Groundwater Storage.** Increase groundwater storage capabilities through the development of groundwater banking projects including the JID Water Augmentation Project.

3. **Prevent Further Land Subsidence.** Prevent further land subsidence that can cause a reduction in groundwater storage space and damage water infrastructure. Prevent land subsidence caused by groundwater withdrawals through efficient use of groundwater supplies and full utilization of surface supplies.

4. **Prevent Groundwater Degradation.** Prevent groundwater degradation by protecting groundwater through proper well construction and abandonment, proper use of agricultural amendments, importing clean high quality surface water, and preventing intrusion of poor quality groundwater from neighboring areas.

5. **Improve Coordination between the City of San Joaquin and James Irrigation District.** Improve integrated groundwater management between the City and JID through better coordination, data sharing, joint projects, and annual coordination meetings.

6. **Improve Water Conservation.** Improve water conservation as an alternative to developing new water supplies or increased groundwater pumping. Conservation measures include urban and agricultural best management practices such as metering, plumbing retrofits, efficient irrigation systems, and educational programs.

7. **Increase Knowledge of Local Geology and Hydrogeology.** Increase knowledge of the local geology and hydrogeology through technical studies, and subsurface investigations. Gain a better understanding of regional groundwater quality and flow conditions, and potential impacts from surrounding water sources with poor water quality. Seek funding for these investigations through State and Federal grant programs.

More specific goals related to these BMOs are found in following sections. All existing and on-going activities described in Sections 4-9 will be maintained, unless stated

otherwise. (In Sections 4-9 the Existing Activities are not repeated under Planned Actions, even though they will be continued in the future). All new policies and projects described in Sections 4-9 will be pursued, but their implementation will be subject to available funding and staff time.

4 - STAKEHOLDER INVOLVEMENT

4.1 - Groundwater Advisory Committee

The purpose of a Groundwater Advisory Committee (GAC) is to oversee the creation, updating and implementation of a Groundwater Management Plan. Preferably, the Committee should be comprised of a broad cross section of interests in the Plan Area. James Irrigation District initially invited the public to participate but no local residents expressed interest. JID also invited several local agencies to participate in the Groundwater Advisory Committee but the City of San Joaquin was the only party showing interest. Eventually, JID and the City agreed to jointly prepare a GMP. As a result, both the San Joaquin City Council and JID Board of Directors served as temporary Groundwater Advisory Committees for overseeing the development of the GMP. These two GACs offered several useful and insightful comments that were incorporated into this GMP. After adoption of this GMP, a GAC comprising members of both agencies will be formed to assist with implementing the GMP. The GAC will include two to three members from each agency and will meet annually.

Existing Activities

Assisted with the development of this GMP.

Planned Actions

The Committee will attempt to meet annually, or more frequent if deemed appropriate, and will have the following responsibilities:

- Review trends in groundwater levels and available information on groundwater quality;
- Evaluate the effectiveness of current groundwater management policies and facilities;
- Discuss the need for new groundwater supply/enhancement facilities;
- Educate landowners on groundwater management issues;
- Assess the overall progress in implementing the programs outlined in the Groundwater Management Plan;
- Recommend updates or amendments to the Groundwater Management Plan;
- Identify regional and multi-party groundwater projects; and
- Review and comment on Annual Groundwater Reports.

4.2 - Relationships with Other Agencies

The Plan Area is located in the Kings Groundwater sub-basin and San Joaquin Valley Groundwater basin, which extend beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies, and private water users (see **Figure 2**). This emphasizes the importance of inter-agency cooperation, and the District and City have historically made efforts to work conjunctively with many other water management agencies.

The City of San Joaquin and James Irrigation District have strengthened their working relationship by collaborating on this GMP and signing a Memorandum of Understanding (MOU). The MOU outlines a plan for the two agencies to share information, meet regularly, and collaborate on groundwater management and water conservation projects (see **Appendix E**).

Below is a list of some other agencies that the District or City have worked with in managing local groundwater resources**:**

- Kings River Conservation District
- Kings River Water Association
- United States Bureau of Reclamation
- Department of Water Resources
- McMullin Recharge Group
- San Luis and Delta-Mendota Water Authority
- Association of California Water Agencies
- Agricultural Water Management Council
- Tranquillity Irrigation District
- Mid-Valley Water District

Following is a brief discussion on the relationships between these agencies and the Plan Participants.

Kings River Conservation District
KRCD is a legislatively defined special district that supports local interests in water planning and management, develops projects, collects groundwater data, and prepares an annual report of groundwater conditions; however, KRCD does not have the legislative authority to manage groundwater. The District has recently passed a resolution in support of the KRCD's *"Lower Kings Basin Groundwater Management Plan Update"*.

Kings River Water Association
JID is a member of the Kings River Water Association (KRWA), a 28-member group of water agencies that was formed in 1927 to administer and manage water uses on the Kings River. The benefits of KRWA membership include conflict resolution mechanisms and improved coordination among member agencies. The KRWA opens lines of communication so that members can work together effectively to utilize, trade, and transfer waters from the Kings River.

USBR/DWR
JID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires JID to take water level measurements from specified wells two times a year and share the data with USBR. USBR shares this data with the DWR.

McMullin Recharge Group

The McMullin Recharge Group (Group) is comprised of James Irrigation District, Mid-Valley Water District, Raisin City Water District, Tranquillity Irrigation District, Terranova Management Co, LLC., and Kings River Conservation District. The Group works cooperatively to investigate groundwater recharge projects in the area of the McMullin Grade, just east of the James Irrigation District, adjacent to the Eastside Well Field. The group members share information and JID has acquired valuable knowledge of the local geology as a consequence of their participation.

San Luis and Delta-Mendota Water Authority

James Irrigation District is a member agency of the San Luis and Delta-Mendota Water Authority (SLDMWA), an umbrella organization for 32 water agencies in the Central Valley. The SLDMWA was established in 1992 and represents approximately 2,100,000 acres of federal and exchange water service contractors within the western San Joaquin Valley, San Benito and Santa Clara Counties. The JID General Manager is on the Board of Directors at SLDMWA and is a member of its Water Resources Committee.

The SLDMWA serves the information and representation needs of its members by developing, providing, and disseminating information to legislative, administrative and judicial bodies concerning a variety of issues such as: Sacramento and San Joaquin Delta exports, water supply, water quality, water development, conservation, distribution, drainage, contractual rights, surface and groundwater management, and any other common interest of the member agencies. The SLDMWA also works with other governmental and public agencies to promote the common welfare of the landowners and member water agencies.

The SLDMWA prepared a regional water management plan in 2005 entitled "*Westside Integrated Water Resources Plan*". The Plan provides guidance for JID and other water agencies on regional priorities and multi-agency projects.

Association of California Water Agencies

JID is an active member of the Association of California Water Agencies (ACWA). ACWA fosters cooperation among all interest groups concerned with stewardship of the state's water resources. JID attends the ACWA annual meeting and benefits from the educational and informational services that ACWA offers.

Agricultural Water Management Council

JID is a member of the Agricultural Water Management Council (AWMC or Council). The AWMC was formed in 1996, following the work of an advisory committee formed by Assembly Bill (AB) 3616, Agricultural Efficient Water Management Act of 1990. The

Council consists of members of the agricultural and environmental communities and other interested parties with the expressed goal for water suppliers to voluntarily develop Water Management Plans and implement Efficient Water Management Practices (EWMPs) to further advance water use efficiency while maintaining and enhancing economic, environmental and social viability and sustainability of soil and crop production. Members sign a Memorandum of Understanding that includes a comprehensive methodology by which each and every Efficient Water Management Practice is analyzed and provides a consistent analysis by all participating water suppliers.

Tranquillity Irrigation District

JID had a long-term relationship with the neighboring Tranquillity Irrigation District. The two Districts have collaborated on SCADA monitoring projects in the Fresno Slough, and have discussed developing interties between the districts to provide better service to their growers.

Mid-Valley Water District

In 1999 and 2000, the Mid-Valley Water District, with the cooperation of James Irrigation District and Reclamation District No. 1606, evaluated the feasibility of a groundwater recharge basin near the James Bypass between Manning Avenue and American/Placer Avenues.

Existing Activities

- On-going involvement with the agencies and associations listed above.

Planned Actions

- When relevant to JID, implement the multi-agency projects identified in the Westside Integrated Water Resources Plan.

4.3 - Plan to Involve the Public and Other Agencies

The District and City of San Joaquin are already involved with many neighboring and regional agencies on groundwater management projects. Nevertheless, the Plan Participants are always interested in building new relationships with other agencies that share the same groundwater basins, and will also strive to involve the public in groundwater management decisions. Additional cooperative relationships can be achieved through the data sharing, inter-agency committees, interagency meetings, memorandums of understandings, formal agreements, and collaborations on groundwater projects. Furthermore, the development of this integrated GMP will foster cooperation between the City and JID.

Existing Activities

- Conducted public hearings to discuss the content of this GMP prior to its adoption.

Planned Actions

- Hold annual Groundwater Advisory Committee meetings with representatives from JID and the City.
- Provide copies of the JID annual groundwater reports to the public at their request. Notify the public of the availability of the annual reports in the JID District newsletter.
- Publish information on groundwater management accomplishments in the JID newsletter and City website.

5 - MONITORING PROGRAM

This section discusses monitoring of groundwater levels, groundwater quality, land surface subsidence, and surface water. Monitoring is considered critical to future management decisions, and the proposed monitoring program is intended to:

1. Provide warning of potential future problems;
2. Use data gathered to generate information for water resources evaluations;
3. Develop meaningful long-term trends in groundwater characteristics; and
4. Provide data comparable from place to place in the Plan Area.

JID prepared a Groundwater Quality Monitoring and Mitigation Plan in 2010 (see **Appendix F**). The plan includes a discussion on the District's existing groundwater quality, monitoring well network, groundwater level and monitoring program, and recommendations for protecting and mitigating groundwater quality. The plan enhances the discussion provided below on groundwater monitoring in JID.

5.1 - Groundwater Level Monitoring

The District regularly measures spring and fall water levels in District wells and a few private wells in cooperation with a valley-wide monitoring program coordinated by the USBR and the DWR. In addition, groundwater levels are monitored monthly in some shallow wells. **Figure 3** illustrates the location of wells that are monitored. **Attachment 2** includes a list of attributes for these wells. The City of San Joaquin does not regularly measure groundwater levels in their wells, but relies on the regional data collected by JID. However, the City will be installing three monitoring wells at their wastewater treatment plant in 2010 or 2011, which will be monitored on a regular basis.

The purpose of a groundwater level monitoring program is to provide information that will allow computation of the change in ground water storage. Contour maps depicting groundwater levels in the District and surrounding area will be prepared annually, along with estimates of changes in groundwater storage.

Existing Activities

- Measurement of groundwater levels in shallow monitor wells each month
- Measurement of groundwater levels each spring and fall in active and abandoned JID production wells
- Share groundwater level data with USBR and DWR

Planned Actions

- Periodically review the monitoring network to determine if it provides sufficient areal coverage to evaluate groundwater levels.
- Protect wells in monitoring program from being abandoned.
- Encourage landowners and developers to convert unused wells to monitoring wells.
- Prepare annual groundwater reports, which will include groundwater contour maps and detailed evaluations of groundwater level trends (see Section 9.2).
- Work with KRCD in the development of a Kings Basin Groundwater Data Center
- Perform a Well Canvass to collect detailed information and precise coordinates on each production well, monitoring well and abandoned well in the Plan Area (see **Appendix F** for more details on the proposed well canvass).
- Investigate the feasibility of installing a SCADA/telemetry system to monitor and operate production wells in JID. If available seek funding to assist with expenses.

5.2 - Groundwater Quality Monitoring

The City performs groundwater quality monitoring as required by the State of California. JID test each well for electrical conductivity annually and performs agricultural suitability analyses on all new wells.

The aforementioned groundwater quality monitoring efforts have one or more of the following objectives:

1) Spatially characterize water quality according to soils, geology, surface water quality, and land use;
2) Establish a baseline for future monitoring;
3) Compare constituent levels at a specific well over time (i.e. years and decades);
4) Determine the extent of groundwater quality problems in specific areas;
5) Identify groundwater quality protection and enhancement needs;
6) Determine water treatment needs;
7) Identify impacts of recharge and banking projects on water quality;
8) Identify suitable crop types that are compatible with the water characteristics; and
9) Monitor the migration of contaminant plumes.

Existing Activities

- Measure electrical conductivity in JID production wells on an annual basis.
- Perform agricultural suitability analysis on all newly constructed wells.

Planned Actions

- Regularly collect new water quality information from other agencies and review it to identify any impending groundwater quality problems.
- Protect wells in monitoring program from being abandoned.

- Prepare groundwater quality maps when sufficient information is available with the aid of a qualified hydrogeologist. Attempt to characterize groundwater quality with depth and provide the information to growers so they can use it when designing and installing wells.
- Work with KRCD in the development of a Kings Basin Groundwater Data Center.
- Perform Agricultural Suitability Analysis every 5 years (2015, 2020, 2025, etc.) in selected wells in areas of concern. This will be timed with the submission of 5-Year Water Management Plans to the USBR.
- Test for Additional Constituents in wells near the City of San Joaquin. If funding from the City of San Joaquin is available, perform more detailed water quality sampling in JID wells near the City of San Joaquin. This information could be useful in determining the quality of groundwater that may be migrating toward the City. Constituents that could be tested include arsenic, gross alpha, Total Organic Carbon, and other constituents important to drinking water quality.
- Regularly calibrate the hand-held TDS meter used to test wells each year, to help ensure that measurements are accurate and trends are properly identified.

5.3 - Groundwater Monitoring Protocols

Monitoring protocols are necessary to ensure consistency in monitoring efforts and are required for monitoring evaluations to be valid. Consistency should be reflected in factors such as location of sample points, sampling procedures, testing procedures, and the time of year when the samples are taken. Without such common ground, comparisons between reports must be carefully considered. Consequently, uniform data gathering procedures will be practiced by the Plan Participants.

The District has developed new water level and water quality monitoring protocols, which can be found in **Appendix G**. The District has also adopted protocols prepared by a local laboratory, Fruit Growers Laboratory of Visalia, California. These are included as **Attachment 4** and supplement the protocols described above. The City has not adopted specific protocols, but will follow JID's protocols until they adopt their own.

Existing Activities

None

Planned Actions

- The District will work with KRCD to establish uniform protocols that are used basin wide.
- The City will review JID's protocols and adopt them or develop their own protocols.

5.4 - Surface Water Monitoring

Surface water sources in the Plan Area include the Fresno Slough and Fresno Slough Bypass. In addition, the Mendota Pool is located near JID and is a source of surface water.

Existing Activities

- Monitor flowrates in the Fresno Slough Bypass.
- Monitor surface water quality in the Mendota Pool at P Booster.

Planned Actions

None

5.5 - Land Surface Subsidence Monitoring

Land subsidence results from excessive groundwater pumping beneath laterally extensive confining clay layers. The removal of groundwater from a confined aquifer causes increased pressure on the aquifer skeletal system below the confining layer. This causes compaction of the fine-grained layer at depth, and is evident at the ground surface as land subsidence. Land subsidence has been monitored throughout the San Joaquin Valley. The most serious subsidence occurred north of the Districts and monitoring efforts have declined in recent years.

A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Between 1926 and 1970, a maximum of 28 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million acre-feet of water storage space out of the sediments during the same period. From 1975 to 1992, subsidence occurred mostly in drought years when groundwater pumping replaced unavailable surface water supplies. The Department of Water Resources has continued to measure subsidence along the California Aqueduct in the winter of 1993-1994. Very little quantitative data has been collected since 1970 by others. In neighboring Tranquillity Irrigation District, there is a benchmark on Lift Station No. 1 that is periodically resurveyed to check for land subsidence.

It is likely that some of the local land subsidence has been arrested with the importation of large volumes of surface water since the District established its surface water contracts. However, there is often a time delay in subsidence after groundwater withdrawals, so the Plan Area may still be experiencing residual subsidence. In addition, groundwater levels can drop appreciably in extended droughts, which could also lead to further subsidence. Lands within the Plan Area will be observed for land

subsidence, and, if land subsidence becomes a problem, this Plan will be amended to include preventative and mitigative measures.

Existing Activities
None

Planned Actions
- Periodic resurvey of control points and local benchmarks to check for land subsidence. The control points and local benchmarks will be checked relative to High Precision Geodetic Network benchmarks.

6 - GROUNDWATER RESOURCES PROTECTION

6.1 - Well Abandonment

Existing State and Fresno County law requires that owners or lessees properly destroy their abandoned wells. Proper destruction of abandoned wells is necessary to protect groundwater resources as abandoned or improperly destroyed wells can result in water of different chemical qualities from different strata mixing, and useable groundwater being degraded. This is especially important because part of the Plan Area has a confined aquifer.

The administration of a well construction, abandonment and destruction program has been delegated to the Counties by the State legislature. Fresno County has adopted a permitting program consistent with Department of Water Resources Bulletin 74-81 for well construction, abandonment, and destruction.

The Plan Participants will properly abandon their own wells when they are no longer useful. In addition, they will encourage landowners and developers to properly abandon their own wells, or preferably, convert unusable wells to monitoring wells so that they can become a part of JID's groundwater monitoring program.

Existing Activities

None

Planned Actions

- When possible, convert unusable production wells to monitoring wells.
- Destroy any District or City owned wells that have no use according to County and State standards.
- Seek funding to perform a survey of all inactive wells and properly abandon those that have no potential for rehabilitation or use them as monitoring wells.

6.2 - Wellhead Protection

The Federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. The program is based on the concept that the development and application of land use controls, usually applied at the local level in California, and other preventative measures can protect groundwater.

A Wellhead Protection Area (WHPA), as defined by the 1986 Amendments, is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily determined from topography, WHPA's can vary in size and shape depending on subsurface geologic conditions, the direction of groundwater flow, pumping rates and aquifer characteristics.

Under the WHPA, States are required to develop an EPA-approved Wellhead Protection Program. To date, California has no state-mandated program, but instead relies on local agencies to plan and implement programs. This is one of the factors that prompted the State Legislature to enact AB 3030. Wellhead Protection Programs are not regulatory in nature, nor do they address specific sources. They are designed to focus on the management of the resource rather than control a limited set of activities or contaminant sources.

Essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources. Wells constructed by the Plan Participants will be designed and constructed in accordance with DWR Bulletin 74-81. In addition, landowners will be encouraged to follow the same standards for privately owned wells. DWR Bulletin 74-81 provides specifications for the following:

- Methods for sealing wells from intrusion of surface contaminants;
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism;
- Site grading to assure drainage is away from the well head; and
- Set-back requirements from known pollution sources.

Existing Activities

- Provide wellhead protection on all newly constructed wells according to County and State standards.

Planned Actions

- Encourage local growers to incorporate proper wellhead protection into all new wells, and retrofit old wells with proper wellhead protection.

6.3 - Saline Water Intrusion

Saline water intrusion is a concern in two portions of the Plan Area. The first is a generalized condition on the west side of JID. The groundwater in the western portion of the District is significantly saltier than in the eastern portion. Additionally, given the

direction of ground water flow is in a southeasterly direction, this poorer quality water is encroaching on many of the District's wells.

The second area of concern, the Raisin City Oil Field salt plumes, lies outside the District boundaries but affects the District's east-side wellfield. These plumes formed when brines pumped from oil wells were disposed in surface ponds. It is believed that these plumes currently impact JID wells, even though the practices that created them were halted over three decades ago.

Currently, the District strives to prevent the importation of saline surface waters that could ultimately degrade the groundwater. When alternative water sources are available for importation, the District considers not only the cost but also the quality, including salinity, of the water. The District will evaluate all possible alternatives, and, when practical and feasible, select water sources with acceptable levels of salinity.

Existing Activities
None

Planned Actions
- Review available water quality data to identify areas with the potential for saline water intrusion.

6.4 - Migration of Contaminated Groundwater
Ground water contamination can originate from many sources or activities. Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Sources of groundwater contamination can include irrigation, dairies, improper application of agricultural chemicals, septic tanks, industrial sources, stormwater runoff, and disposal sites.

Clean-up of contaminated ground water is a complex and expensive task generally involving a number of organizations. Agencies with roles to play in mitigating ground water contamination include the California Regional Water Quality Control Board (RWQCB), the California Department of Toxic Substances Control (DTSC) and the U.S. Environmental Protection Agency (EPA). Each agency has its own set of regulatory authorities and expertise to contribute. The degree to which they participate depends on the nature and magnitude of the problem. If JID or the City identify a ground water contamination problem, they will refer the information to the appropriate regulatory agency.

According to the Lower Kings Basin GMP, the migration of contaminated groundwater is a secondary concern for the area. Contaminated plumes are relatively small and localized in the Lower Kings Basin. Furthermore, the Plan Participants do not know of

any contaminant plumes in their service area, aside from salinity from the Raisin City Oilfields. Nevertheless, the Plan Participants recognize that migration of contaminated groundwater is always possible. The City and District will continue to monitor groundwater quality and remain cognizant of the possibility of contaminated groundwater migration into the Plan Area.

Existing Activities

- Regularly review data and reports from regulatory agencies on contaminant plumes to provide warning of potential future problems.
- Construct wells with adequate seals between the formations to prevent the downward migration of poor quality water.

Planned Actions

- Seek to locate recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes.

6.5 - Groundwater Quality Protection

The City relies exclusively on groundwater and JID cannot support all of their crop demands with their surface water supplies. Clearly, groundwater is a very important resource in the area. The groundwater, however, will have limited or no use if it has poor quality. Therefore, protecting the quality of the groundwater is a cardinal component of this GMP. Groundwater quality can be protected through proper use of pesticides, herbicides and fertilizers, stormwater quality management, septic system management, and water vulnerability planning and management.

JID has outlined several existing and proposed methods for protecting and mitigating groundwater quality. These are document in their Groundwater Quality Monitoring and Mitigation Plan (**Appendix F**)

Existing Activities

- Educate staff on proper use of herbicides used in JID canals.

Planned Actions

- Seek funding to improve security at water facilities and reduce the potential for contamination from acts of vandalism or terrorism.
- Educate growers on the proper use of pesticides, herbicides and fertilizers in the District newsletter.
- Implement groundwater mitigation methods documented in **Appendix F**.

7 - GROUNDWATER SUSTAINABILITY

Between 2000 and 2009, groundwater has comprised about 45% of the water used in JID in a typical year, but has comprised up to 78% of water supplies. During years with low surface water allocations, groundwater is essential to prevent the loss of permanent crops. The City of San Joaquin relies exclusively on groundwater and has no surface water rights or facilities to accept surface water. Therefore, preserving the sustainability of groundwater is essential for the economic well being of the District growers and City residents.

7.1 - Issues Impacting Groundwater Sustainability

The James Irrigation District relies on both surface and groundwater for irrigation demands. **Table 7.1** shows surface and groundwater usage from 2000-2009.

Table 7.1 – James Irrigation District Surface and Groundwater Use (2000-2009)

Year	Surface Water		Groundwater	
	Volume (AF)	%	Volume (AF)	%
2009	15,900	22	55,100	78
2008	21,300	27	56,900	73
2007	34,300	42	48,200	58
2006	67,400	91	6,300	9
2005	50,300	69	22,500	31
2004	38,600	47	43,000	53
2003	39,000	51	37,400	49
2002	37,400	43	48,700	57
2001	26,400	35	48,600	65
2000	35,400	49	36,400	51
Avg	36,600	48	40,300	52

Table 7.1 shows that for typical years, groundwater constitutes about 50% of the District's water use. In almost all years the District's surface water supply is fully utilized, and groundwater is pumped to supplement the surface water. Typically, groundwater pumping begins in the middle of the irrigation season and groundwater is often the only water source available at the end of the irrigation season (August to October).

2005 and 2006 were not typical years since flood waters were released down the Kings River. When this was available JID used the flood water instead of their CVP supply,

and saved their CVP supply for a later date. This permitted for a larger and longer supply of surface water which allowed for decreased groundwater pumping, and groundwater recharge as a result of diverting flood flows. A two year supply of flood water only occurs occasionally and cannot be relied upon.

The District's surface water supplies are sporadic, unreliable and unpredictable. In addition, due to recent regulatory actions, surface water supplies from the Central Valley Project have become less dependable and shortages occur more frequently. This has caused the District's available surface supplies to be reduced causing more reliance on pumping groundwater. Furthermore, the acquisition of new water contracts or substantial water transfers in the future is unlikely. In summary, groundwater supplies are vital to the JID and consequently the District considers the proper management of their groundwater resources to be imperative.

The City of San Joaquin relies exclusively on groundwater. When local and regional groundwater supplies are stressed, such as during droughts, this can impact groundwater supplies in the City. It is unlikely that the City can secure a long-term surface water contract, and therefore they must protect and preserve the local groundwater resources.

7.2 - Overdraft Mitigation

Overdraft of the groundwater supply can lead to a variety of problems, including subsidence and increased pumping costs. Additionally, if overdraft continues unchecked, the groundwater supply may be unreliable when surface water is scarce, as in a time of extended drought. Groundwater overdraft is considered the principal groundwater problem in the Plan Area.

Groundwater Overdraft Estimates

JID estimates overdraft using historical groundwater levels during a hydrological base period. This base period must extend for a long enough time that both wet periods and droughts are covered, and the water supply conditions approximate the average. The term overdraft is used here to indicate a long-term water-level decline in an area during an average hydrologic base period. It is not used to describe short-term water-level declines during droughts.

The procedure to estimate overdraft from groundwater levels uses many measurements over a long period of time. In the Plan Area, measurements are made in the winter or early spring, following a period of minimal pumping, and again in the fall, following a period of heavy pumping. The complete water-level data record can be used to prepare well water-level hydrographs and to determine long-term water level changes. A well water-level hydrograph is a plot of depth to water versus time for a particular well.

After the well water-level hydrographs are prepared, the trends in the water levels in the base period are closely examined. In most agricultural areas the annual low values are in the late summer or early fall, at the end of a long irrigation season, and annual high values are in the winter or early spring, just before pumping begins for the next growing season. Linear regressions are then performed on the data within the base period that appear valid and representative of the water-level conditions. The slope of these "best-fit" lines are then used as the long-term average annual changes in ground water level.

JID calculated overdraft during the period from 1975 to 1993, but has not performed any more recent analyses. The hydrographs created indicate gradual long-term water-level declines in both the District and the east side wellfield for the chosen hydrologic base period. In order to determine the change in ground water storage, a parameter known as the "specific yield" was multiplied by the average water-level change during the period evaluated. Specific yield is the ratio of the volume of water which will drain freely from a material to the total volume of the formation. Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about eleven percent for the District and about twelve percent for the east side wellfield area. Using these specific yields, the ground water overdraft was calculated to be about 1,000 AF per year for the District, and around 2,700 AF per year for the eastside wellfield for the chosen hydrologic base period.

Overdraft could be a significant concern if the Plan area experiences increased pumping, reduced recharge, and/or increased ground water outflow. Periodic analyses of ground water overdraft, perhaps every five years, are needed to reassess the need for overdraft mitigation.

Mitigation Measures

Groundwater overdraft is due to an imbalance in the rates of extractions and replenishment. There are several methods to correct this imbalance. The first is to decrease the extraction to match the rate of replenishment. The second is to increase groundwater replenishment to match the extraction rate. The third method is a combination of the first two, to balance replenishment and extraction. Each of the methods are applied over an extended period, making use of the storage capacity of the aquifer. Extractions can exceed replenishment in drought periods as long as replenishment equally exceeds extractions in wetter periods.

Factors that will affect the future rate of overdraft include surface water supplies available to JID through the Central Valley Project and future water demands in the District.

The District utilizes both surface water and groundwater conjunctively to meet the water needs of its growers. The Plan Participants understand that the existing condition of overdraft is regional in nature and correction and mitigation of the problem will need to be addressed not only by the District and City, but also by neighboring agencies.

Groundwater Recharge

Mitigation measures to negate current overdraft and contribute to lessening future overdraft conditions rely on the importation of additional surface supplies. Increasing JID's surface water supply would rely on improving the District's ability to use excess Kings River flows. Flood water appears adequate on the Kings River to mitigate the overdraft condition if sufficient recharge capacity can be developed. JID already recharges water in the K-Basin Recharge Project and plans to recharge additional flood waters with their proposed Water Augmentation Project (see Section 7.4).

Mitigative measures to reduce demands can include conversion to more efficient irrigation systems, and urban conservation measures discussed in Section 7.5. Demand reduction can also be achieved by cropping changes or land fallowing, but these would have adverse economic impacts and therefore are not considered.

Water Transfers

In 2001 the JID Rules and Regulations were amended to restrict the transfer of surface and groundwater supplies outside of the District. The purpose of this amendment was to prevent further groundwater overdraft. Specifically, the Rules and Regulations state:

> "*Any transfer of surface water which is replaced by increased groundwater pumping would therefore exacerbate groundwater overdraft....Similarly, if a Water User were to pump groundwater within the District and export it, the same effect would occur*." (pg 8)

Such exports are only allowed under certain circumstances; for example, surface water exports are allowed if the land that would have used the water is fallowed. Refer to the Rules and Regulations for more details on this policy. Clearly, the District recognizes the gravity of their groundwater overdraft problem and this amendment illustrates their commitment towards preserving their groundwater resources.

Limitations on Pumping

The California Water Code gives water and irrigation districts the power to limit or suspend groundwater extractions. However, such limits will only be implemented if the Plan Participants determine through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen impacts to groundwater. In the unlikely event that it becomes necessary to reduce groundwater extractions, the District intends to accomplish such reductions under a voluntary program, which would include suitable incentives to compensate users for reducing their groundwater pumping. The District will not attempt to restrict or otherwise interfere with any landowner or water user exercising a valid right to pump and utilize groundwater.

Economic Inducements

The District recognizes that management of water supplies should reflect water conservation and the protection of groundwater resources. The District currently provides an indirect economic inducement by establishing water rates high enough to promote water conservation yet low enough to compete with groundwater pumping costs. This pricing system encourages the use of surface water to meet irrigation demands when available, thereby preserving the underlying groundwater resource.

Existing Activities

- Restrict groundwater exports from the District.
- Set surface water rates low enough to be competitive with groundwater pumping costs.

Planned Actions

- Urban water conservation measures (see Section 7.5)
- Seek funding to prepare a Drought Preparedness Plan that will identify triggers and response measures for droughts.

7.3 - Groundwater Replenishment

Replenishment of ground water is an important technique to manage a groundwater supply and mitigate a condition of overdraft. The estimated overdraft for the Plan Participants and the east side wellfield can probably be offset with recharge projects that would use excess Kings River flows (flood releases from Pine Flat Reservoir).

The types of groundwater replenishment include the following:

- Direct groundwater recharge
- Incidental groundwater recharge
- Injection wells
- In-lieu recharge
- Groundwater banking
- Canal seepage
- Pipeline seepage
- Flood flow seepage
- Deep percolation from precipitation
- Deep percolation from irrigation

Direct Groundwater Recharge. Two recharge projects are currently in operation in JID. The first involves the diversion of Kings River flood water from the Fresno Slough Bypass (James Bypass) into basins in the upland areas of the Bypass between the two outer flood channels. The Bypass area has fairly permeable soils and provides a modest opportunity for ground water replenishment. This project may have potential for expansion. The second project includes the 220-acre K-Basin Project. Some of this water is recovered with wells and some of the water remains underground for recharge. The District is also

developing recharge capability with the Water Augmentation Project, described in Section 7.4

Incidental Groundwater Recharge. Incidental groundwater recharge occurs in the three stormwater basins operated by the City of San Joaquin, located at Colorado Avenue, California Avenue and Cherry Lane. Flows to these basins are not measured and there are no current estimates of the volume of incidental recharge.

Injection Wells. Injection wells pump water directly into the groundwater basin and are primarily used in urban areas, where land is at a premium. Capital costs are high and include conveyance, treatment and well construction. Some injection well projects have been denied by the Regional Water Quality Control Board due to water quality issues, especially disinfection byproducts in the source water. Given the high cost of injection wells, regulatory hurdles and the presence of more viable and lower costs options for recharging water, this option was removed from further consideration.

In-lieu recharge. The District views in-lieu deliveries as the most practical and effective means of groundwater replenishment. In-lieu deliveries, also called indirect deliveries, involve the delivery of surface water to landowners and water users who would otherwise have pumped groundwater, thus leaving water in the aquifer for future use. From 2000 to 2006, JID imported between 26,000 and 67,000 AF/year of surface water, and, as a result, JID is performing a significant amount of in-lieu recharge.

Groundwater banking. Groundwater banking agreements often require that a portion of the banked water be left in the aquifer as a payment to the banking agency. JID is planning to develop a groundwater bank through the Water Augmentation Project. Water banking partners will be required to leave 10% of their water behind for District recharge.

Canal seepage. Canal seepage in JID is estimated to be about 12,300 AF in a typical year.

Pipeline Seepage. Seepage from City of San Joaquin pipelines, and JID's Lateral G pipeline, help to recharge the groundwater. No estimates of the seepage are currently available.

Flood flow seepage. Natural seepage occurs in the District from flood flow waters in the Fresno Slough and the James Bypass channel. However, this seepage volume has not been measured or estimated.

Deep percolation from precipitation. In JID, deep percolation from normal rainfall events is probably negligible. Some deep percolation occurs during exceptionally long and heavy storms. However, such storms are infrequent.

Deep percolation from irrigation. Deep percolation occurs when some of the water applied for irrigation percolates beyond the crop root zone and accumulates in the aquifer. The extent of deep percolation varies with the irrigation method, irrigation efficiency, and antecedent moisture condition. During 2002 and 2003, deep percolation from local irrigation was estimated to be from 8,000 to 10,000 AF/year, but was only estimated to be about 2,000 AF in 2009.

Existing Activities

- Groundwater recharge in the 220-acre K-Basin recharge project.
- Groundwater recharge in the Fresno Slough and Fresno Slough Bypass
- Measure the volume of water delivered to groundwater recharge basins.
- Periodically remove sediment and rip the soils in recharge basins to maintain recharge rates.

Planned Actions

- Work cooperatively to minimize development on lands that are favorable for artificial recharge.
- Design and construct the Water Augmentation Project, which will increase recharge capabilities in the District
- Estimate seepage from City of San Joaquin pipelines either from water balance calculations or through field tests.
- Install staff gauges in City of San Joaquin stormwater basins so incidental recharge can be estimated.

7.4 - Conjunctive Use of Water Resources

Conjunctive use of water is defined as the coordinated use of both subsurface and surface water sources so that the combination will result in optimum benefits. Conjunctive operation of a ground water basin is defined in DWR Bulletin 118-80 as:

> *"Operation of a ground water basin in coordination with a surface water reservoir system. The basin is intentionally recharged in years of above average precipitation so ground water can be extracted in years of below average precipitation when surface water supplies are below normal."*

Such management results in the groundwater storage being reduced in dry periods and increased in wetter periods. To avoid a condition of overdraft, replenishment must balance extraction over the long-term.

A conjunctive use program requires:

- A source of surface water in years of high surface water supply.
- Recharge facilities.
- Conveyance facilities to import and export water to and from the ground water storage area.

- Available storage capacity in the aquifer.
- Extraction facilities.
- Distribution facilities for surface and ground water.

Existing conjunctive use operations can be expanded by adding interconnections and promoting water supply exchanges between districts that allow for more flexibility in the region's water supply. The region's assets of federal, state, and local water supplies, dewatered groundwater storage, numerous interconnected conveyance facilities, and significant irrigation demand make it an ideal location to regulate surface and groundwater supplies conjunctively.

The region must absorb wet year water supplies in order to maintain a reliable and economical water supply. Wet year water is available on short notice and not always at times when the water can be delivered for an irrigation demand. Therefore, it is important that the region work cooperatively to increase its ability to absorb surface water when available. Regional Water Management Plans, including the 'Westside Integrated Water Resources Plan', can help identify viable regional projects.

Regional Conjunctive Use Projects

In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes several wells to recover some of the recharged water.

The JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 2,100 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. JID will work with the City in locating the wells and will keep the City apprised of progress on the project. The project is currently being designed and construction is expected to be completed by the end of 2011 or 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

One example of a 'regional' groundwater recharge project is the proposed McMullin Group recharge project. This project would use flood flows to recharge the groundwater system. The project, which includes a series of ponds and canals, was investigated and

a draft feasibility study was completed in April 2000. At that time, two sites in the McMullin Recharge Project area were considered covering 138 acres. With support from DWR grant funding, additional hydrogeologic evaluations have been made of the sites since the completion of the draft feasibility study. In response to interpretation of the hydrogeologic evaluations, several recharge ponds have been proposed for development. These ponds can be operated using available floodwater. This project was identified as a regional goal in the Lower Kings Basin GMP with estimated costs of $2.2 million and a completion date of 2010.

The City of San Joaquin does not have a surface water supply, but does divert stormwater to basins where some is percolated, thereby recharging the groundwater.

Existing Activities

- Continue groundwater recharge and banking in the K-Basin Recharge Project.

Planned Actions

- Support the development of new surface storage and water supply projects that would permit the participants to better utilize surface water supplies.
- Investigate additional groundwater banking projects and facilities.
- When transferring surface water, attempt to transfer it to neighboring agencies so it benefits local groundwater levels.
- Design and construct the JID Water Augmentation Project.
- Construct four production wells in JID as part of a Federal Drought Relief grant.
- Actively recruit regional water agencies to store water in JID's groundwater banking facilities.
- Discuss options with the Fresno Irrigation District to purchase surplus surface water to reduce demand on local groundwater resources.

7.5 - Water Conservation and Education

City of San Joaquin

The City of San Joaquin prepared a Water Conservation Plan in 2009. The plan identified several measures that can help reduce water consumption. The Plan outlined two general conservation strategies:

1) **Twenty Percent Reduction in Water Use.** A citywide reduction in water use of 20% by the year 2011 (to mirror the reduction goals of the current California Green Building Standards Code). These savings will be accomplished through equipment upgrades and a targeted education and community outreach program. Showerhead and faucet replacements are planned to be part of the upgrades installed as part of the city's low income housing rehabilitation program. Beginning in the 2010-2011 academic year, students at San Joaquin Elementary school will receive water conservation training.

2) **Water Meters.** Install water meters on all service accounts by the year 2020. California state law requires meters on all service accounts by the year 2025. Installing meters can also lead to reduced water use, and will enable to city to charge residents based on actual water usage. Studies show that cities with metered water use up to 15% less water than cities without meters. When meters are used to institute a tiered pricing structure, another 10% savings occurs. In addition to providing customers with feedback on their consumption levels, service meters in conjunction with supply meters, enable a system to better account for leaks in the system, The guidance from the EPA estimates that by installing meters water use can be reduced by 20%. Currently, only some commercial and industrial accounts are metered. Residential meters are planned for the future as required by the State. In the Water Conservation Plan, meters were not found to be the most economical alternative for conserving water, so the City will seek funding to assist with their purchase and installation.

The City's current ordinance that allows landscape watering only on certain days is also a fairly effective method in preventing over watering. The City will include inserts in water bills reminding residents of these landscape watering rules.

James Irrigation District

The District considers water conservation and education important aspects of their overall groundwater management efforts. All water deliveries are metered and billed based on the volume used. Therefore, all customers have an incentive to minimize water usage. Water conservation education is achieved through the annual grower's meeting and district newsletter. JID has also constructed several regulation reservoirs, that help to reduce operational spills and thus conserve water.

Existing Activities

- JID's monthly water statements include water use information for each customer. In addition, the District maintains historic water use by turnout. This data is available to water users on request as it could be beneficial in making on-farm water management decisions.
- The District holds an annual grower's meeting and publishes a semi-annual newsletter to help educate local growers on important issues such as water conservation and water quality protection.

Planned Actions

- Evaluate the feasibility of a grey water system in the City of San Joaquin.
- Seek funding to install water meters in the City of San Joaquin
- Implement the City of San Joaquin's water conservation education program.

7.6 - Water Recycling

The City does not currently recycle any of their water. Wastewater effluent is currently discharged to aerated lagoons at the western end of JID for evaporation and percolation. The annual volume of water treated is about 121 million gallons. The City plans to improve their wastewater treatment system to include advanced secondary treatment with activated sludge, nitrogen removal, and sludge handling. Construction of the new facilities is expected in 2010 or 2011. The effluent will have better quality that is suitable for non-edible crops. The City has held discussions with farmers to use the effluent, and also plans to meet with JID to discuss delivery of the water into the JID distribution system. No other urban agencies are located in the area that could feasibly deliver recycled water to the Plan Area.

The City has noticed some high salt contents in their wastewater. They are investigating whether a commercial or industrial entity is dumping wastewater with high salt loads.

Existing Activities

None

Planned Actions

- Remain cognizant of opportunities to purchase recycled water from other municipalities.
- Hold a joint meeting with the City and JID to discuss beneficial use of recycled WWTP water on JID crops. Discuss the merits of performing a feasibility study on importing recycled water to JID.
- Investigate the source of saline water in the San Joaquin wastewater.

8 - GROUNDWATER OPERATIONS

8.1 - Well Construction Policies

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. Department of Water Resources Bulletin 74-81 provides useful guidelines for the construction of groundwater wells. In addition, Fresno County has enacted and is responsible for enforcing a County Well Ordinance that regulates well construction. Proper wellhead protection is essential to ensure that contaminants do not inadvertently enter a well. Well construction policies that are intended to ensure proper wellhead protection are discussed in Section 6.2 – Wellhead Protection.

In addition, the following quality assurance procedures will be followed when constructing District or City owned wells. Landowners are also encouraged to follow these procedures when constructing private wells:

1. Well construction will be performed under contract by a licensed and experienced well driller, in accordance with specifications prepared by a licensed engineer or geologist, and reviewed by legal counsel.
2. A licensed engineer or geologist will oversee construction of the wells.
3. A licensed land surveyor will oversee survey of any newly constructed wells.
4. Wells will be constructed according to guidelines in DWR Bulletin 74-81.

Existing Activities

- Construct wells according to DWR Bulletin 74-81.
- Construct wells using qualified and licensed contractors, engineers, geologists and land surveyors.
- Use plastic well casings in areas where the groundwater and soils are highly corrosive.

Planned Actions

None

8.2 - Operation of Facilities

The City currently has three productions wells but has an immediate need for one more wells due to the age and condition of their current wells (the three wells are 10, 30 and 40 years old). The City is concerned about how they will pay for a new well and are seeking funding opportunities.

The City will be installing three monitoring wells at the water treatment plant expansion in 2010 or 2011. The wells are expected to have depths ranging from 50 to 80 feet deep.

Groundwater facilities in JID include the K-Basin Recharge Project, about 65 extraction wells and about 20 monitoring wells. Proper construction, operation, and maintenance of these groundwater facilities is an important part of groundwater management.

The District normally constructs two new irrigation supply wells each year and subsequently retires two older wells that have a combination of the lowest efficiencies and poorest water quality. This helps to ensure the District's water reliability (by retiring older wells), and ensuring higher water quality. This also expands the grid of available testing points.

JID will also strive to provide the best facilities for delivery of surface water supplies, since they are used conjunctively with groundwater. JID realizes that the success of conjunctive use programs is often contingent on the quality of surface water conveyance systems.

Existing Activities

- Development of a groundwater bank as part of the JID Water Augmentation Project
- Maintenance and upgrading of conveyance facilities for capacity and stability.
- Maintenance of recharge facilities including de-vegetation, disking, deep ripping, and de-silting, as necessary to improve recharge potential.
- Replace at least two wells each year to help ensure the wells are efficient and have suitable water quality.

Planned Actions

None

9 - GROUNDWATER PLANNING AND MANAGEMENT

9.1 – Land-Use Planning

An important component of developing a Groundwater Management Plan is the review of land-use plans for the surrounding area or basin, and coordinating efforts with regional and local land-use planning agencies. Land-use planning activities in unincorporated areas of Fresno County are performed by the County of Fresno's Department of Public Works planning department, and overseen by the Fresno County Planning Commission. Responsibility for land-use planning in incorporated areas lies with each city's planning staff. The City of San Joaquin is the only urban development within the Plan Area, and its staff is responsible for land-use planning within its Sphere of Influence.

The intent of this Plan is not to dictate land-use planning policies, but rather to establish some land-use planning goals that can aid in protecting and preserving groundwater resources. The Plan Participants will comment on environmental documents for land-use related activities that may impact groundwater. They will also work cooperatively with other agencies to minimize adverse impacts to groundwater supplies and quality as a result of proposed land-use changes. Some specific land-use planning goals include: (1) preserving areas with high groundwater recharge potential for recharge activities; (2) protecting areas sensitive to groundwater contamination; (3) requiring hydrogeologic investigations, water master plans, and proven and sustainable water supplies for all new developments; and (4) requiring appropriate mitigation for any adverse impacts that land-use changes have on groundwater resources.

Existing Activities

- Notify residents and agencies of projects that have the potential to impact groundwater within their sphere of influence.
- When appropriate, comment on environmental documents and land-use plans that have the potential to impact groundwater.

Planned Actions

None

9.2 - Groundwater Reports

The City of San Joaquin has not historically prepared Annual Groundwater Reports, primarily due to their small size, limited water use, limited water supply data, and lack of available staff. However the City plans to improve groundwater monitoring and data collection, and develop an outline for a brief groundwater report or groundwater memorandum consistent with their needs. This groundwater memorandum will be completed prior to the Annual Groundwater Advisory Committee meeting and used during discussions with JID. The City will consider preparing a comprehensive Groundwater Report as they expand.

JID has a goal to prepare groundwater reports every year to document groundwater levels, available groundwater storage, historical trends, and other important groundwater related topics. This information will be used to forecast future problems, plan future groundwater projects, and develop new groundwater policies. The annual report will cover the prior calendar year and will be completed each year by April 30th. See **Attachment 5** for a report outline.

Existing Activities

- JID prepares a Water Management Plan every five years for the United States Bureau of Reclamation as a requirement to maintain their Central Valley Project water supply. The Water Management Plan includes sections on groundwater usage and groundwater projects.

Planned Actions

- Prepare an annual Groundwater Memorandum documenting the City's groundwater efforts and statistics including groundwater pumping, well construction, groundwater studies, groundwater quality data, and other pertinent information. As the City expands their groundwater monitoring and management efforts, the memorandum would evolve into an annual report as described below for JID.
- Prepare an annual JID Groundwater Report that will include the following:

    1. Groundwater level data;
    2. Groundwater contour maps and groundwater flow directions;
    3. Groundwater storage calculations;
    4. Evaluation of one-year and five-year historical trends in groundwater levels, contours, and storage, and perceived reasons for any changes;
    5. Evaluate the adequacy of monitoring efforts and monitoring protocols.
    6. Estimates of deliveries to recharge basins;
    7. Summary of important groundwater management actions;
    8. Discussion on whether management actions are meeting the management objectives;
    9. Summary of proposed management actions for the future;
    10. Summary of groundwater related actions taken by other regional groups;
    11. Recommendations for changes in the content or format of the annual report;
    12. Recommendations for updates to the GMP.

9.3 - Plan Implementation

Implementation of this updated GMP is expected to result in significant amounts of new knowledge and an achievable improvement in groundwater management in JID and the City of San Joaquin. **Attachment 6** includes an implementation schedule for this GMP from 2010-2015. The schedule does not include existing activities that will be continued, but rather documents new projects.

The goals listed in this GMP are considered reasonable and within the capabilities of the District and City. However, most of the goals will require some funding or staff time to achieve. Since staff time and funding are only available in finite quantities, and can often fluctuate, the Plan Participants must by necessity prioritize efforts and cannot guarantee that all of the goals will be accomplished. The Plan Participants recognizes the importance of groundwater management, and will make their best efforts to meet the goals outlined in this plan. If staff or funds are limited, then the projects in the implementation schedule will be prioritized. Plan implementation for the City will rely largely on grant funding.

9.4 - Plan Re-evaluation

The Groundwater Advisory Committee will be responsible for monitoring the progress in implementing the GMP objectives. Refer to Section 4.1 for more information on the membership, policies, and procedures of the Committee. The Committee will attempt to meet at least once a year to review and evaluate groundwater conditions as well as evaluate the effectiveness of the GMP. As new policies, practices, and ordinances become necessary or desirable to enhance the management of the local groundwater supply, this Plan will be amended as necessary.

Existing Activities

None

Planned Actions

- Update the GMP at least every five years, or more frequently if deemed appropriate.
- Evaluate the effectiveness of the GMP and need for an update at the annual Groundwater Advisory Committee meetings.
- Document recommendations for improving or updating the GMP in each annual Groundwater Report.

9.5 - Dispute Resolution

Dispute resolution is addressed in JID through the District's *Rules and Regulations Governing Water Distribution and Canal Maintenance* as follows:

> "*When Landowners/Water Users cannot resolve differences or controversies with the Ditchtender, the Superintendent or Assistant Superintendent, they are expected to discuss the problem with the Manager prior to asking the Board of Directors for final determination. Unresolved disputes must be presented in writing to the Board of Directors. The Board of Directors will take no action until a written complaint is received. The Board of Directors reserves the authority to act as the final level of appeal on differences and controversies between Water Users and District employees*." (pg 9-10)

If necessary, the District Manager may also use legal counsel or technical consultants to assist in addressing disputes. In addition, the Districts participation in numerous multi-agency organizations (see Section 4.2 - Relationships with Other Agencies)

provides several forums and dispute resolution mechanisms when issues arise between different agencies. No groundwater disputes have occurred in JID in recent years.

The City of San Joaquin does not have special procedures for groundwater disputes, but rather they would be handled through standard dispute resolution processes. These would involve contacting the Department of Public Works, and if necessary meeting with the City Manager or the City Council.

Several mechanisms are also available for resolving regional groundwater disputes through agencies such as KRCD, KRWA, and SLDMWA. The Lower Kings Basin Groundwater Management Plan Update also includes a discussion on the resolution of regional groundwater disputes.

Existing Activities

- Resolve groundwater disputes through general dispute resolution procedures.

Planned Actions

- Discuss issues of concern at the annual GAC meetings in an effort to prevent future disputes.

9.6 - Program Funding and Fees

Several alternatives are available to the City and JID for funding groundwater projects, and are described below:

Water Replenishment Fees

Under AB3030, local agencies have the authority to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort and the Plan Participants will make any and all efforts to ensure the private, non-metered use of groundwater by the local growers.

Capital Improvement Fees

The District has the authority to finance capital improvement projects and collect repayment charges from the benefited parties. This process would require a favorable vote from the constituency, and is considered a realistic alternative for large capital projects, such as groundwater recharge or banking projects. The City also has several mechanisms to finance long-term capital projects, and collect revenue through water user fees.

Grants and Loans

The Plan Participants will pursue available grants and low-interest loans from the Department of Water Resources as well as other State and Federal agencies. The District and City will also seek opportunities to jointly submit grant and loan applications.

The District and City realizes that funding from State and Federal agencies for groundwater projects will be partially based on their progress in implementing this GMP.

Groundwater Banking Fees

JID is currently developing a groundwater bank that will be partially used to store water for other agencies. The revenue generated from operating the bank could be reinvested into other groundwater projects.

Other Revenue Sources

Groundwater projects can also be financed through water user fees and assessments that are collected regularly from all landowners.

Exiting Activities

- Regularly research grant and loan opportunities from the State and Federal government.

Planned Actions

- Identify beneficial groundwater projects that become economically feasible when costs are shared among two or more participants.
- Seek funding for projects that could benefit both the City and District.

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JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX G

WATER BANKING PROGRAM PROSPECTUS

JAMES IRRIGATION DISTRICT

Incorporated February 16, 1920

BOARD OF DIRECTORS
Kenneth R. Hale, President
Robert Motte, Vice-President
George Ayerza, Sr.
Thomas W. Chaney
John W. Kinnunen

8749 Ninth Street
Post Office Box 757
San Joaquin, California 93660-0757

John Mallyon, Manager
Donna Hanneman, Secretary

Telephone: (559) 693-4356
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Water Banking Program Prospectus

Overview

The following is a solicitation of interest in purchasing a long-term water supply or water banking services from the James Irrigation District. Those interested should immediately contact Richard M. Moss, California, at (559) 636-1166. As you will read, the James Irrigation District is uniquely positioned from a geographic, hydrologic and water rights entitlement/contractual basis to offer water banking services to others as well as to offer water generated from the District's own banking program for sale on a long-term basis to willing purchasers throughout California.

Description of District

The James Irrigation District is an agricultural water purveyor located in the heart of the San Joaquin Valley near the town of San Joaquin, 25 miles southwest of Fresno in California. The District has been in formal operation since 1920 with predecessor interests dating back to the mid-1800's. The 26,000-acre (23,000 acres irrigated) district is farmed primarily to row crops, cotton, alfalfa and seed alfalfa. More recently, many acres of almonds have been planted in the District. It has a mixture of soil types ranging from light (sandy) textured soils on the eastern side of the District to very heavy clay soils for much of the central and western part of the District.

The District is underlain with a good quality groundwater aquifer with capacity to store an estimated 1.5 million acre-feet of water. The District is located near the "trough" of the San Joaquin Valley and sits between the Fresno Slough, the northern most distributary of the Kings River, and the James Bypass, the floodway that transports Kings River floodwaters to Mendota Pool and the San Joaquin River. The District can pump water from or deliver water to the Mendota Pool, an operational reservoir located on the San Joaquin River near the town of Mendota, which is also the terminus of the federal Central Valley Project (CVP) Delta-Mendota Canal and the headworks for the historic diversions from the San Joaquin River by the San Joaquin River Exchange Contractors (which hold some of the oldest and firmest water rights in the state). In some respects the Mendota Pool serves as a "switchyard" for water and water transactions with some of the most senior water rights holders in the state and some of the more junior water rights holders in the state receiving water directly or indirectly from Mendota Pool, as well having the ability to receive water from the San Joaquin River, the Kings River, the federal CVP and the California State Water Project. On the average, more than 1.5 million acre-feet of water pass through Mendota Pool every year.

The James Irrigation District has available to it several different water sources, including:

- A good quality groundwater aquifer with a dedicated well field and overlying and deeded rights to groundwater extraction within and outside of the District's boundaries. The District currently owns and operates 58 wells and deep well turbine pumps;

- Water rights to the Kings River granting it access to floodwater;

- The ability to contract for floodwater from the San Joaquin River via the CVP's Friant Division (with delivery through the Friant-Kern Canal and the Kings River) or to take San Joaquin River floodwater reaching Mendota Pool;

- The ability to contract for surplus CVP water made available from the Delta-Mendota Canal and Mendota Pool;

- A perpetual right (in settlement of water rights issues, called "Schedule 2 Water") to 9,700 acre-feet of CVP water made available from the Delta-Mendota Canal and Mendota Pool subject only to an approximately 22 percent shortage in certain (infrequent) critically dry years for the Sacramento River; and

- Contractual entitlement to 35,300 acre-feet of CVP water via a long-term water service contract subject to CVP agricultural water shortages from the CVP's Mendota Pool Unit.

It is this unique combination of access and rights to various water resources and equally unique geographical setting that allows James Irrigation District to provide water banking services using its groundwater reservoir and extraction wells and/or to make a water supply available for sale to others.

How is James Irrigation District Able to Make Water Available in a Dry Year?

James Irrigation District has embarked on an aggressive program of construction of direct groundwater recharge facilities (sinking basins) and groundwater wells and pumps. It intends to use these new facilities to generate new yield for use within the District by capturing available floodwater from either the Kings or San Joaquin rivers or other sources. Some of the additional yield from this new groundwater storage capability will be exchanged for the District's surface water to facilitate the sale of banked floodwater. The District has constructed a major new groundwater recharge facility and has validated on a large-scale basis the technical and policy foundation upon which the Water Sales portion of the Program is based. The balance of the needed construction of new facilities (groundwater wells) will commence with the finalization of water sales or banking agreement(s).

The third party Water Banking portion of the Program will operated by the District taking surface water deliveries from its banking customer either for direct recharge or by using

the existing distribution system to offset use by the District's water users at times they would otherwise be using their groundwater. The inverse of these operations will occur when water is to be returned to the District's Water Banking customers.

Sale of New Yield from Banking Facilities

James Irrigation District is offering a portion of the new water supplies produced through its banking program for long-term sale. This water is significantly differentiated by its relative firmness of availability. This supply is some of the most reliable water in California, and is even more reliable than Municipal and Industrial water supplies available by way of water service contract from the CVP.

Quantity - James Irrigation has available for sale up to 1,250 acre-feet per year of surface water supply produced through its banking program to be made available at O'Neill Forebay.

Term - The James Irrigation District is interested in providing a long-term program of banked water sales for the term of its CVP long-term contract water supply and renewals thereof.

Price – The price of the water is split into two components: (i) an initial one-time payment for each acre-foot of annual entitlement to be purchased of $450 per acre-foot, and (ii) an annual charge of $450 per acre-foot for each acre-foot of entitlement to be purchased (to be paid annually regardless of how much water is actually delivered). The annual charge will be adjusted annually using the All Urban Consumers, All Items Index, Western Cities with populations between 50,000 and 1,500,000 (CPI-U) as an index with the November 2007 CPI-U as its base over the term of the contract(s). Once purchased, this water supply will be available to the buyer for as long as the District retains its water service contract with the Bureau of Reclamation, up until 2054.

Other terms of sale such as build-up provisions, return of unused water, etc. of significance should be noted and flagged for negotiation early as part of the potential buyers' indication of interest.

Such supplies would be available every year, unless and to the extent the District's Schedule 2 water supply of at least 7,600 acre-feet is not made available to the District (which to date has never occurred).

Water Banking Services

James Irrigation District is also offering water banking or firming services using water supplied by banking partner(s). Much like the firm ability to provide water banked by the District itself for sale, water supplied by a partner and banked with the District can be returned in even the driest of years.

Quantity - James Irrigation District has available for return as part of its Water Banking Program up to 1,250 acre-feet per year of surface water supply to be made available at O'Neill Forebay. Water to be banked with James Irrigation District must be made

available at the District's turnout from the Mendota Pool or at other locations agreeable to the District. All costs of providing the water to be banked are to be borne by the banking partner. Water to be banked with James Irrigation District must be made available at times acceptable to the District. The original banked water quantity put with the District will be reduced by ten (10) percent to account for spreading, aquifer and any other losses and related mitigation..

Term - The James Irrigation District is interested in providing a long-term program of water banking for a term of twenty-five (25) years. The water banking program may be renewed upon terms and conditions mutually agreeable to the parties. Any water remaining in the Water Bank at the end of the term will become the asset of the James Irrigation District unless there is a renewal agreement that specifically addresses existing water supplies already in the bank.

Price - The price of the banking service is split into three (3) components: (i) an initial one-time payment of $1,750 per acre-foot of annual return capacity, (ii) a $30 per acre-foot fee when each acre-foot is actually placed into the Water Bank, and (iii) a $30 per acre-foot fee when each acre-foot is returned from the Water Bank. The placement and return charges will be adjusted annually in using the All Urban Consumers, All Items Index, Western Cities with populations between 50,000 and 1,500,000 (CPI-U) as an index with the November 2007 CPI-U as its base over the term of the contract(s). There is no limit to how much water can be placed and subsequently returned, only a limit (three times the annual return capacity purchased) that can be stored in the bank at any one time (see Banking Capacity below). It should be noted that the costs to be paid to James Irrigation District are in addition to any operation and maintenance (O&M) costs associated with operating the Water Bank including the O&M costs for a portion of the District's distribution system, groundwater recharge system and groundwater extraction system. This cost is currently estimated to be $18 per acre-foot for annual O&M plus an additional $45 per acre-foot energy charge in years when groundwater extraction occurs on behalf of the banking partner. These charges will be adjusted annually to reflect actual costs.

Banking Capacity – Three (3) acre-feet of storage capacity within the James Irrigation District's groundwater reservoir for each acre-foot of annual return capacity will be provided by the District.

<u>District Goals</u>

The District's Program has some fundamental underlying goals:

- The Program must generate significant, quantifiable benefits to the District and its landowners;

- The Program should not have any significant adverse impacts (short-term or long-term) on the District, its landowners or any third parties. This includes impacts to local groundwater supplies; and

- The Program should not have any adverse implications on the District's ability to continue to receive water (or the benefits of that water) under its existing water or contract rights.

The Program (or any portion of it) will not be pursued unless it meets those goals.

It should also be noted that James Irrigation District might pursue an expansion of this initial offering or other such programs. While the commitments made pursuant to this Program are intended to be kept, there is no intention of priority associated with this Program over other programs the District is currently involved with or may become involved with in the future.

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX H

GROUNDWATER QUALITY DATA

JAMES IRRIGATION DISTRICT WELL PUMPS REPORT

WELL WATER QUALITY TESTS 2014

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #	2014 PPM	2013 PPM	2012 PPM	2011 PPM	2010 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
COALINGA	ABANDONED	C-49																								A	1,025	1,000	800		775	700		700	625	650				784
COALINGA	ABANDONED	C-53																A	350	350				400		350	325	300	250		200	400		300	250	250				310
COALINGA	ABANDONED	C-54																					A	300		250		250	200		175	300		200	200	225				233
MAIN CANAL		C-55	1,375	1,325	1,450	N/T	1,200	1,200	1,275	1,200		1,325	1,200	1,100	1,300	1,200	1,300	1,300		1,300	1,275			1,100	1,200	1,150	1,225	1,250	1,250	1,000		1,100	1,050		1,100	1,125	1,150			1,250	1,216
MAIN CANAL		C-56	1,200	1,200	1,100	N/T	1,000	1,100	1,100	1,075		1,150	1,100	1,000	1,150	1,100	1,150	1,200		1,200	1,125			1,000	1,100	1,100	1,075	1,050	1,075			950	900		1,000	975	1,000			1,050	1,079
COALINGA	ABANDONED	C-57												A	1,275	1,300	1,400	1,500		1,000	550				450		425		500			300	300		225	250	225				693
KERMAN		C-58	750	800	800	N/T	650	650	650	575	900	800	575	550	575	625	625	650		900	850			250	575		525	550	775			800	800		800	500	900				681
KERMAN	ABANDONED	C-59							A	1,600	1,450	1,675	1,400	1,400	1,600	1,700	1,700	1,800		1,750	1,750			700	1,250		1,300	1,200	1,250	1,000		980	1,100		1,100	9,000	1,000				1,714
KERMAN		C-60	1,000	975	850	N/T	825	825	900	850	850	900	750	700	700	825	850	850		850	850			650	750		700	675	750			575	600		600	550	600				770
COALINGA		C-61		850	975	N/T	750	725	800	800	850	800	675	800	800	825	850	850		750	750			600	550		750	725	600	500		400	300		350	275	275				673
KERMAN		C-62	2,200	2,150	1,550	N/T	1,625	1,750	1,825	1,875	2,000	2,000	1,750	1,500	1,700	1,800	2,050	1,950		2,000	2,150			1,500	1,450		1,725	1,500	1,650			1,300	1,300		1,325	1,300	1,550				1,721
MAIN CANAL	ABANDONED	C-63																	A	350				350	350		325	300	300	250	225	225	250		250	260	300			275	286
MAIN CANAL	ABANDONED	C-64																													A	1,400			1,400	1,380	1,380			1,200	1,352
MAIN CANAL		C-65	1,050	1,000	850	N/T	950	950	1,000	950		1,050	1,000	950	900	1,000	1,050	1,075		1,050	1,075			1,000	1,025		1,175	1,200	1,250			1,100	1,100		1,200	1,000	1,025				1,038
MAIN CANAL	ABANDONED	C-66																																	A	1,090			1,025	1,058
KERMAN		C-67	1,000	1,025	1,125	N/T	1,200	850	1,100	850	1,225	1,000	850	1,250	825	1,100	1,350	1,300		1,500	1,500				975		950	925	1,300			925	1,200		1,275	1,000	1,300				1,112
MAIN CANAL		C-68	1,075	1,000	900	N/T	925	1,000	1,050	1,000		1,100	1,000	900	1,050	950	1,000	1,050		1,000	1,000			1,100	950		1,000	1,000	1,000	800					900	920	950			1,000	985
COALINGA		C-69	500	550	550	N/T	400	400	400	300	350	350	325	300	325	350	325	300		300	250			300	300		275	225	250	200		150	250		175	175	175				313
COALINGA		C-70	3,475	3,050	2,950	N/T	2,500	2,400	2,900	2,800		2,750	2,500	1,350	2,700	2,700	2,800	2,700		2,450	2,400				1,650		1,450		1,500			1,000	1,000		700	600	625				2,123
COALINGA		C-71	450	500	550	N/T	475	475	525	425		550	475	450	450	500	450	450		400	350				350		325		250	200		175	200		175	200	200				382
COALINGA		C-72	475	500	525	N/T	450	500	575	475		650	550	525	550	550	525	500		450	475				450		375		300	250		175	200		200	225	225				427
MAIN CANAL		C-73	500	500	500	N/T	500	500	500	375	500	550	450	450	475	475	500	500		550	600			600	500		475	500	450	400	350	400	400		400	400	425			450	473
COALINGA		C-74	700	650	725	N/T	P	575	575	450	500	525	450	500	500	500	450	450		400	375				400		300		850	800		150	250		175	200	180				465
MAIN CANAL	ABANDONED	C-75													A	750	1,000	1,025		1,000	1,025			900	900		900	650	850	800		700	700		700	800	780			900	846
MAIN CANAL		C-76	450	450	375	N/T	500	400	450	225	400	425	400	400	375	375	350	350		350	325			350	350		300	450	300	250	230	250	250		250	250	300			300	348
COALINGA		C-77	650	650	650	N/T	525	525	550	450		500	450	475	450	450	400	400		350	325			300	325		250	250	250	200		125	250		200	200	200				383
COALINGA		C-78	400	325	300	N/T	250	275	300	150	175	225	225	200	225	200	200	200		200	200			250	225		200	200	200			150	250		175	175	175				224
COALINGA		C-79	1,200	1,125	1,025	N/T	900	925	900	750	800	875	675	650	700	725	650	700		600	650				550		450	425	400	350		300	300		325	325	325				652
COALINGA		C-80	400	325	300	N/T	275	275	275	175	200	200	225	200	150	250	200	200		200	175			200	225		200	175	200			125	250		175	200					222
MAIN CANAL		C-81	1,075	1,025	1,000	N/T	1,000	1,000	1,025	950	1,000	1,100	950	900	1,000	950	950	900		850	850			600	900		900	900	850	800		875	700		700						913
COALINGA		C-82	750	700	550	N/T	675	675	700	575	600	650	625	550	600	600	525	500		500	475				450		350														582
COALINGA		C-83	450	425	375	N/T	350	300	375	250	200	225	275	250	250	250	200	225																							293
KERMAN		C-84	500	450	475	N/T	450	450	425	300	400	450	400	400	400	400	375	375																							417
COALINGA		C-85	1,300	925	975	N/T	675	750	900	650	750	750	500	400	375	350	275	275																							657
MAIN CANAL	ABANDONED	C-86					A	750	800	625	675	800	750		750	775	750																								742
MAIN CANAL		C-87	875	825	700	N/T	800	850	875	750		850	850	800	800																										816
COALING		C-88	300	425	450	N/T	300	375	350	200	250	225	275	200																											305
COALINGA		C-89	250	275	250	N/T	200	200	250	125	175	180	200																												211
MAIN CANAL	ABANDONED	D-04																							A	450	450	350	400	275	325	350		400	375	500			475	395
KERMAN	ABANDONED	D-06																					A	400		375	350	400	300		300	400		400	350	475				375
MAIN CANAL	ABANDONED	D-08										A	500	450	475	500	475	500		450	450			450	450		400		400	300	250	325	300		300	300	300			300	394
MAIN CANAL	ABANDONED	D-09																	A	400	525			400			425	875	400	300	300	325	300		350	325	300			350	398
MAIN CANAL	ABANDONED	D-10										A	500	400	450	450	450	500		500	450				450		400	450	400	300	280	325	400		350	350	375			375	408
MAIN CANAL		D-15	925	950	750	N/T	900	900	900	850	850	950	850	700	800	850	850	900		950	900			800	750		750	750	700	700		625	700		700	600	690			650	800
KERMAN	ABANDONED	D-16																	A	350	375			400	450		375	950	950	900		225	250		300	300	300				471
KERMAN	ABANDONED	D-17																												A		550	800		700	500	625				635
MAIN CANAL	ABANDONED	D-21																												A	1,000			1,000	900	980			900	956
KERMAN	ABANDONED	D-22																												A	825	800		800	1,000	850				855
KERMAN	ABANDONED	D-23																												A	875	850		900	750	875				850
MAIN CANAL	ABANDONED	D-24														A	850	900		1,000	1,050				1,300		975	1,200	900	900		825	1,000		1,100	850	1,150			925	995
MAIN CANAL	ABANDONED	D-25																																A	700	750			800	750
MAIN CANAL		D-29	1,350	1,350	1,400	N/T	1,200	1,200	1,250	1,250		1,400	1,250		1,400	1,350	1,400	1,400		1,400	1,400			1,300	1,300	1,400	1,350	1,350	1,375			1,200	1,200		1,200	1,225	1,250			1,350	1,315
MAIN CANAL		D-30	475	450	400	N/T	450	450	450	300		475	400	400	400	400	400	400		400	500				400		350	350	300	300	230	250	225		250	250	275			275	364
KERMAN		D-31	400	375	400	N/T	350	325	325	275	325	350	250	300	300	325	300	300		300	350				300		250	250	250	200		175	200		225	250	250				293
COALINGA		D-32	550	500	525	N/T	525	500	550	700	450	525	500	450	525	500	500	450		450	650				475		400	375	350	300		225	200		250	250	275				443
COALINGA		D-33	2,200	Pending	2,800	N/T	1,400	1,625	1,600	1,475		1,275	1,125	1,050	1,025	950	850	1,000		700	800				650		550	500	450	350		275	300		250	250	225				947
COALINGA		D-34	675	700	700	N/T	600	625	750	575	650	650	600	550	600	600	575	600		550	600				525		450	450	450	400		350	350		350	400	400				545
COALINGA		D-35	750	700	525	N/T	650	675	900	575	675	675	650	600		675	650	625		600	625				575		475	500	450	400		325	300		350	350	375				563
COALINGA	ABANDONED	D-36													A	400	350	400		350	275			300	300		300	225	250			200	250		175	175	200				277
INSIDE	ABANDONED	D-37			A	N/T	1,000	1,000	1,075	1,100	1,100	1,250	1,150	1,050	1,050	1,050	1,000	1,000		950	950				950	775	725	700	1,200			900	600		1,200	675					976
MAIN CANAL		D-38	1,025	1,050	1,100	N/T	950	1,000	1,025	975		1,050	1,025	1,000	1,100	1,100	1,100	1,125		1,100	1,150			1,000	1,050	1,125	1,100	1,100	1,100			900	1,000		1,000						1,050
MAIN CANAL		D-39	1,100	1,075	1,150	N/T	1,000	1,000	1,050	1,000		1,075	1,025	1,000	1,150	1,100	1,125	1,175		1,200	1,200			1,400	1,175		1,425		1,700	1,500		1,500									1,188
MAIN CANAL		D-40	1,000	900	700	N/T	900	900	950	875	900	1,125	950	1,000	950	950	950	1,025		1,000	1,000			900	850		875	850	850			850									924
KERMAN		D-41	1,675	1,625	1,300	N/T	1,450	1,450	1,400	1,450	1,750	1,650	1,450	1,300	1,500	1,550	1,500	1,550		1,450	1,700			1,200	1,150		1,100	1,050	1,000	900											1,398
KERMAN	ABANDONED	D-42						A	1,225	1,000	900	975	950	850	925	1,050	1,000	1,050		1,000	1,000			900	975		900	875	1,175	700											969
KERMAN		D-43	1,300	1,175	1,150	N/T	1,000	1,100	1,075	950	900	1,100	1,025	1,050	1,100	1,075	975	800		750	750			700	750		600	550	550	500											910
INSIDE	ABANDONED	D-44															A	1,500		1,750	1,775				1,500	1,275	1,150	1,025													1,425
INSIDE	ABANDONED	D-45																	A	2,500	2,500				1,725	1,675	1,725														2,025
INSIDE		D-46	350	350	350	N/T	350	325	375	275	325	325	325	300	300	300	350	350		350	350				350															333
INSIDE	ABANDONED	D-47			A	N/T	725	900	750	650	700	900	650	600	650	600	600	625		600	800				500															683
MAIN CANAL		D-48	350	350	300	N/T	350	325	350	225	300	325	300	275	300	300	300	325		300	300			300	300															309
KERMAN		D-49	1,300	1,250	1,000	N/T	1,175	1,200		1,250	1,200	1,425	1,300	1,300	1,325	1,325	1,250			1,100	1,225			1,250																1,242
KERMAN		D-50	450	400	450	N/T	375	375	350	375	325	350	325	300	325	350	350	350		350	350			400																364
COALINGA		D-51	475	425	450	N/T	375	350	400	250		350	325	300	325	325	300	300		300	275																			345
KERMAN		D-52	1,200	1,050	950	N/T	1,050	1,100	1,100	1,000	1,175	1,225	1,000	1,000	1,100	1,100	1,200			1,050	1,100																			1,088
COALINGA		D-53	1,625	1,425	1,675	N/T	1,125	1,200	1,450	1,350		1,550	1,000	1,250	725	750	900	1,000		600	400																			1,127
MAIN CANAL		D-54	325	350	300	N/T	350	375	350	225	325	425	350	300	325	325	325	350		400																				338
MAIN CANAL		D-55	400	375	325	N/T	375	400	400	275	325	375	350	300	350	350	350	375		400																				358
INSIDE		D-56	1,000	800	800	N/T	700	725	800	675	725	900	700	800	700	650																								767
KERMAN		D-57	550	550	575	N/T	525	525	575	450	500	650																												544
MAIN CANAL		D-58	400	375	350	N/T	375	375	400	300	350	375																												367
KBSN RECOVRY		D-59		400	450	N/T	375	350																																394
KBSN RECOVRY		D-60		500	600	N/T	650	800	850																															680
COALINGA		D-61	400	425	350	N/T	Legal																																	392
COALINGA		D-62	600	550	600	N/T	525	575																																570
COALINGA		D-63	700	600	650	N/T	550	525																																605
COALINGA		D-64		Pending	N/T	N/T	Pending																																	0
KBSN RECOVRY		D-65	900	850	800	N/T	900																																	863
KBSN RECOVRY		D-66	825	800	800	N/T	850																																	819
KBSN RECOVRY		D-67	1,050	975	950	N/T	1,000																																	994
KBSN RECOVRY		D-68	950	950	900	N/T	1,050																																	963

JAMES IRRIGATION DISTRICT WELL PUMPS REPORT

WELL WATER QUALITY TESTS 2014

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #	2014 PPM	2013 PPM	2012 PPM	2011 PPM	2010 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
INSIDE		D-69	325	300	300																																			308
INSIDE		D-70	425	325	350																																			367
INSIDE		D-71	300	300	300																																			300
INSIDE		D-72	350	350	375																																			358
AVERAGE			841.667	767.308	767.803		749.597	747.083	807.456	731.466	690.476	833.276	735.776	691.364	770.089	772.845	784.052	793.750	0.000	817.241	824.569	0.000	0.000	710.606	712.963	1214.286	686.792	697.159	702.941	519.444	267.500	541.100	569.500	0.000	580.882	689.700	589.796	0.000	0.000	728.947	
TOTAL WELLS TESTED			63	65	66		62	60	57	58	42	58	58	55	56	58	58	56	0	58	58	0	0	33	54	7	53	44	51	36	8	50	50	0	51	50	49	0	0	19	
A = ABANDONED 28			0	0	2	0	1	1	1	0	0	2	0	1	2	1	1	0	3	2	0	0	0	2	0	1	1	0	0	0	3	2	0	0	1	1	0	0	0	0	28
																			^^^^^												^^^^^									

LEGEND:

P = PENDING; REPAIRS / REPLACEMENT IN PROCESS

N/T = NOT TESTED

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX I

JAMES IRRIGATION DISTRICT NEWSLETTER

JAMES IRRIGATION DISTRICT

Looking Upstream

Winter 2013-14 *A Review of District Water News* Volume 17, No. 1

Drought Leaves CVP Supply In The Dust

James Is Relying On Wellfields As Valley's Water Crisis Grows

One of California's most severe droughts ever has made it official — that James Irrigation District will receive no Central Valley Project water this year.

Now JID and its growers are hoping the wells don't run dry, too.

"These are going to be very difficult times," says John Mallyon, JID Manager. "We're sitting here with an empty bucket."

The formal U.S. Bureau of Reclamation declaration came as no surprise.

For months James and other contractors in the

(Continued on Page 2)

Water Woes To Be March 14 Lunch Topic

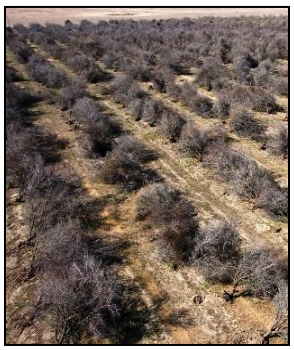
This year's lack of water supply will be the main topic when James Irrigation District growers meet for JID's annual grower meeting and luncheon.

It is set for 12 noon Friday, March 14, at JID's office in San Joaquin.

Please RSVP by calling 693-4356.

President Gets Look At Impacts

President Obama may have skipped the James Irrigation District during his West Side visit February 14 but he heard an earful on the drought's Central Valley Project devastation.



Almond trees being ripped out in the neighboring Westlands Water District as land is falllowed because of the crippling lack of water. President Obama viewed such sad scenes while flying by helicopter over the West Side on February 14.

The President made an aerial inspection over parts of the West Side before landing 17 miles west of Firebaugh for a

(Continued on Page 2)

JAMES IRRIGATION DISTRICT

Incorporated February 16, 1920

8749 Ninth Street
Post Office Box 757
San Joaquin, CA 93660

Telephone: (559) 693-4356
Fax: (559) 693-4357

BOARD OF DIRECTORS:

- Michael Carvalho, *President*
- Riley Chaney
- Thomas W. Chaney
- Micah Combs
- Robert Motte

OTHER OFFICERS:

- John Mallyon, *Manager*
- Donna Y. Hanneman, *Secretary*

IRRIGATED LANDS REGULATORY PROGRAM

May 19 Signup Deadline Looms

Growers in the James Irrigation District have until May 19 to take perhaps the most important steps to comply with new water quality protection mandates.

The Central California Regional Water Quality Control Board's Irrigated Lands Regulatory Program Tulare Lake Basin General Order covers James.

Under its provisions, the Regional Board considers any land being irrigated to have potential to discharge into groundwater.

All irrigated parcels, regardless of size, must comply with the Regional Board's requirements.

To Learn More

Visit the Kings River Water Quality Coalition website:

www.kingsriverwqc.org

Or call 365-7958.

The May 19 deadline is a requirement for growers or farm operators to join the Kings River Water Quality Coalition and enroll all irrigated parcels for coverage.

The alternative is to sign up directly with the Regional Board, a state agency, but fees for individual compliance will be significantly greater than the cost of Coalition membership.

The Coalition was organized by Kings River interests to support growers. The Regional Board is the enforcing agency.

Irrigated lands can also be covered through an individual discharge permit but fees would be higher and individuals would bear costs of monitoring and reporting.

Regional Board adoption of the Tulare Lake Basin order came last year.

Board officials warn that failure to participate could lead to administrative penalties on landowners of $1,000 per day.

Briefly

NEW DIRECTOR

- **James Irrigation District has** a new Board member. Riley Chaney was appointed to fill the remaining two years of the term of long-time Director Kenny Hale, who retired last year. Chaney grows almonds, cotton, seed alfalfa, onions and tomatoes.

DITCHTENDERS

- **Two new ditchtenders are on** the job and serving the James Irrigation District. Victor Rodriguez joined the JID team in October while Eric Groppetti came on board in November.

RIVER RESTORATION

- **San Joaquin River Restoration** Program interim flows have been halted a few weeks before they would otherwise would have been stopped by drought conditions, saving 12,500 acre-feet of water. The Fresno Irrigation District is banking the water for the Bureau of Reclamation. It will be used as an emergency municipal supply in the Friant Division, which may receive no Central Valley Project supply this year.

James, Tranquillity Seek New Kings Agreement Talks

The James and Tranquillity irrigation districts have notified other lower Kings River units of their intention to renegotiate a water use agreement due to expire in December 2015.

JID Manager John Mallyon said since the present agreement was enacted in 2003, water supply situations have worsened and a number of important facilities changes have been made.

"We have to maximize our water supply abilities," he said.

Obama

(Continued from front page)

meeting with water, agricultural and civic leaders as well as a tour of the Joe Del Bosque ranch and its ground fallowed because of a lack of water.

Accompanying the President on the aerial tour were Rep. Jim Costa and U.S. Senators Dianne Feinstein and Barbara Boxer. Governor Brown joined the President for the West Side sessions.

Before Obama arrived in Fresno, the administration announced it expects to provide California producers an estimated $100 million for 2014 losses and up to $50 million for losses in previous years.

"Our goal here is to provide growers help and assistance," Agriculture Secretary Tom Vilsack told reporters.

There were no pledges of more water. Those present at the meeting said Obama was briefed on the value of the valley's agriculture and shrunken water supply's negative impact on growers, farm workers, support businesses and food supplies and prices. Water infrastructure needs and endangered species concerns were also voiced.

Nisei Farmers League President Manuel Cunha said later in an interview, "The President flying over this valley really started to see the impact."

President Obama views the drought parched West Side through the window of his Marine One helicopter on February 14.

JID To Rely On Wells

(Continued from front page)

federal CVP systems have been anticipating they would receive no water this year, even if average precipitation were to occur (which hasn't come close to happening).

Making matters worse, Reclamation announced February 15 that the San Joaquin River dry-year Exchange Contractors riparian supply of 75% cannot now be achieved. The Bureau stated that it can only allocate a 40% supply, or 336,000 acre-feet because of reduced Shasta Lake inflows. The result is almost certain to be a first-ever "call" for release of the Exchange Contractor's historic San Joaquin River water from Friant Dam.

Although James has a small amount of rescheduled CVP water in storage at San Luis Reservoir, Mallyon said the District currently has no choice but to put the burden on JID's system of wells in a pair of wellfields east of San Joaquin.

"Our wells have been taking a real beating since we started water deliveries in mid-January," Mallyon said. "That's pretty much our supply."

The District hopes to be able to offer water service through the summer.

To do so, Mallyon said, JID will need to bank some water in Mendota Pool to ensure an adequate supply will be available during the peak water use months. The wellfields are not capable of meeting the District's peak demands.

San Joaquin Rain Total Is Miniscule

James Irrigation District's surface supply isn't all that's extremely short this year.

Effective precipitation at the JID office in San Joaquin since July 1, 2013, amounts to only about one inch.

James, FID Partnering On Banking

A groundwater recharge and banking project aimed at improving conditions east of San Joaquin has received a major grant award that will move the work planned by the James and Fresno irrigation districts toward reality.

The Upper Kings Basin Integrated Regional Water Management Authority, in which both districts participate, has received $3.4 million in Proposition 84 funds for the first phase in the Southwest Groundwater Banking Project. The joint JID-FID project has a cost share of $1.16 million.

The project seeks to halt and ultimately reverse the critical groundwater overdraft problem in and around the Raisin City Water District. Unused regional floodwater supplies available to FID are to be utilized and imported into the Raisin City area – which has no existing surface water availability but is heavily developed for agriculture.

The project, initially 60 acres, is to be developed about six miles south of Kerman between the two districts. It will permit existing James surface supplies to be made available for exchange or to extend the water delivery season.

The ultimate project is to create an average annual water supply of up to 15,000 acre-feet.

Debate Continues Over Water Bond

State legislators are continuing to debate a variety of bills that would reconfigure and trim an $11.2 billion water infrastructure due to appear on the November ballot.

The need for new surface storage remains the key issue.

If a new bond does not emerge, the measure originally enacted in 2009 but twice delayed will go before voters.

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX J

AGENDA FROM 2014 ANNUAL GROWER'S MEETING

JAMES IRRIGATION DISTRICT

INCORPORATED FEBRUARY 16, 1920

ANNUAL MEETING

AGENDA

Friday, March 14, 2014, 1:00 p.m.

8749 9th Street, San Joaquin, California 93660

Telephone (559) 693-4356

Americans With Disabilities Act

A person with a qualifying disability under the Americans With Disabilities Act of 1990 may request the District provide a disability-related modification or accommodation in order to participate in any public meeting of the District. Such assistance includes appropriate alternative formats for the agendas and agenda packets used for any public meetings of the District. Requests for such assistance and for agendas and agenda packets shall be made in person, by telephone, facsimile or written correspondence to John Mallyon, General Manager, at the District office, at least 48 hours before a public District meeting.

I. **CALL TO ORDER**

II. **OTHER BUSINESS / PUBLIC COMMENTS**

III. **DISTRICT ELECTIONS**

IV. **BAY-DELTA ISSUES / BAY-DELTA CONSERVATION PLAN**

V. **WATER SUPPLY: 2014**

- A. U.S.B.R. / Central Valley Project Allocation
- B. Riparian Rights / Schedule II
- C. District Water Supply Forecast: 2014-2015
- D. James Irrigation District "Application for Water Service" - Due March 1, 2014
- E. Winter Deliveries - Discuss requests for winter deliveries, logistical problems of being able to provide water, billing rates and system maintenance problems.

VI. **U.S.B.R. RECLAMATION REFORM ACT (RRA) FORMS**

- A. U.S.B.R. Reclamation Reform Act (RRA) Forms due March 1, 2014

VII. **KINGS RIVER WATER QUALITY COALITION**

- A. Irrigated Lands Regulatory Program
- B. Tulare Lake Basin General Order Implementation

VIII. **SAN LUIS & DELTA-MENDOTA WATER AUTHORITY**

- A. Membership Assessment

JAMES IRRIGATION DISTRICT

INCORPORATED FEBRUARY 16, 1920

ANNUAL MEETING

AGENDA

Friday, March 14, 2014, 1:00 p.m.

8749 9th Street, San Joaquin, California 93660

Telephone (559) 693-4356

IX. WATER SUPPLY AUGMENTATION PROJECTS INITIATED BY THE DISTRICT

A. Lateral K Basin: Banking/Storage
   1. Report re: funds that have been generated as a result of constructing this facility
   2. Drilling additional wells - Report re: yields achieved as a result of drilling new wells

B. Kings Basin Water Authority - California Department of Water Resources Integrated Regional Water Management Plan / Proposition 84

C. Water Quality

X. POWER SUPPLY ISSUES

A. Power & Water Resources Pooling Authority

B. Pacific Gas & Electric Company

XI. 2014-2015 IRRIGATION BILLING RATES

A. Budget / Rates

B. Water Rate Structure

C. Refund

XII. DISTRICT ASSESSMENTS

XIII. OPERATIONS & MAINTENANCE

XIV. ADJOURN

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX K

DISTRICT SAMPLE WATER ORDER FORM

JAMES IRRIGATION DISTRICT

8749 9th Street, P. O. Box 757, San Joaquin, CA 93660-0757

Phone: 693-4356 Fax: 693-4357

CONTACTS:	HOME	MOBILE
Sample Contact		123-4567

IRRIGATION ORDER / YEAR: 2015

ORDER DATE: _____ TIME: _____ AM / PM

OFFICE _____

FIELD _____

TELEPHONE _____

MONTHLY SHEET

ACCOUNT NAME: **SAMPLE CUSTOMER** ACCOUNT NO. **XXX** TAKEN BY: _____

AREA #	GATE #	2014 CROP	2015 CROP	FIELD #	ACRES IRR	IRR METHOD	START CFS	START DATE	START TIME	COMMENTS	RATE
01	ES-3*	PISTACHIO TRS	PISTACHIO TRS	094608	70	DRIP TAPE	4.0			MONTHLY	117.00
01	H-26*	TOMATOES	TOMATOES	094611	36	DRIP TAPE	4.0			MONTHLY	117.00
01	I-7A*	ONIONS	COTTON	094609	75	FLOOD	4.0				117.00
01	I-8*	COTTON	ONIONS	094610	75	SPRINKLER	4.0			MONTHLY	117.00
					256		16.0				

ORDERED BY: _____ CONFIRMED BY: _____

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX L

BOARD RESOLUTION ADOPTING WATER MANAGEMENT PLAN

RESOLUTION NO. 15-___

RESOLUTION OF THE BOARD OF DIRECTORS OF THE JAMES IRRIGATION DISTRICT FOR THE ADOPTION OF A WATER MANAGEMENT PLAN

WHEREAS, the District has prepared an updated Water Management Plan in compliance with United States Bureau of Reclamation ("Reclamation") Guidelines;

WHEREAS, the Water Management Plan covers the calendar years of 2010 to 2014 and sets goals for the forthcoming years of 2015-2019;

WHEREAS, the local office of Reclamation has reviewed and approved the Water Management Plan;

WHEREAS, the District will make reasonable efforts to meet the established water management goals outlined in the Water Management Plan;

WHEREAS, the Board of Directors believes that adopting the Water Management Plan will be in the best interests of its constituents and water users and can help meet the projected long-term water needs of the James Irrigation District.

BE IT RESOLVED, by the Board of Directors that the District hereby adopts the 2009-2014 James Irrigation District Water Management Plan.

PASSED AND ADOPTED at a regular meeting of the Board of Directors of James Irrigation District on _____, 2015.

_____

(General Manager)

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

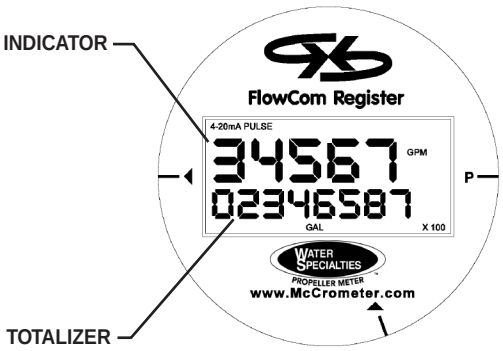
APPENDIX M

WATER METER INFORMATION

WATER SPECIALTIES™
PROPELLER METER

MODEL OF12-D

OPEN FLOW METER
SOLID STATE ELECTRONIC PROPELLER METER
DIGITAL INDICATOR - TOTALIZER
SIZES 10" thru 72"



TYPICAL
DIGITAL INDICATOR-TOTALIZER

DESCRIPTION

MODEL OF12-D OPEN FLOW METERS are designed for accurate metering of ditch turnouts, reservoir outlets, closed conduits or other similar installations. The rigid, light weight construction and simple installation allow easy removal for winter storage or transfer to other locations. The upper mounting plate is equipped with a padlock hasp. The lower bracket has suitable guides for easy installation. An optional revolving mounting bracket, with padlock hasp, is also available. The revolving mounting bracket allows the meter assembly to be raised approximately 2 inches permitting the column to be rotated 180 degrees and easily withdrawn. The revolving mounting bracket is ideal when high velocity flow conditions exist. An optional remote mounting kit with up to 100 feet of cable is available to locate the indicator-totalizer at remote locations.

INSTALLATION can be made to any wall or vertical structure which will center the propeller in the flow measuring area. The meter location must have a controlled flow measuring area and a full flow of liquid for proper accuracy. Fully opened gate valves, fittings or other obstructions that tend to set up flow disturbances should be a minimum of ten pipe diameters upstream from the meter. Installations with less than ten pipe diameters of straight pipe require straightening vanes. Meters with straightening vanes require at least five pipe diameters upstream.

PROPELLER is magnetically coupled with the electronic sensor through the sealed gearbox. This completely eliminates water entering the meter assembly, and eliminates all moving parts except for the propeller. The propeller is a conical shaped three bladed propeller, injection molded of thermoplastic material resistant to normal water corrosion and deformity due to high flow velocities.

BEARING in propeller is a water lubricated ceramic sleeve and spindle bearing system with a ceramic/stainless steel spindle. Dual ceramic thrust bearings, standard on all meters, handle flows in both forward and reverse directions. The bearing design promotes extended periods of maintenance free propeller operation.

DIGITAL INDICATOR-TOTALIZER has a non-volatile EEPROM memory to store totalizer count (updated hourly while running). Features a large two line display. Five digit top line indicates flow rate, and eight digit bottom line provides volumetric flow data. Indicator is available in 22 different units, including GPM, CFS, MGD. Totalizer is available in 20 different units, including Gallons, AF, CF. Units of measurement are user-selectable. Battery life is 6 -10 years. Housing is NEMA 4X rated.

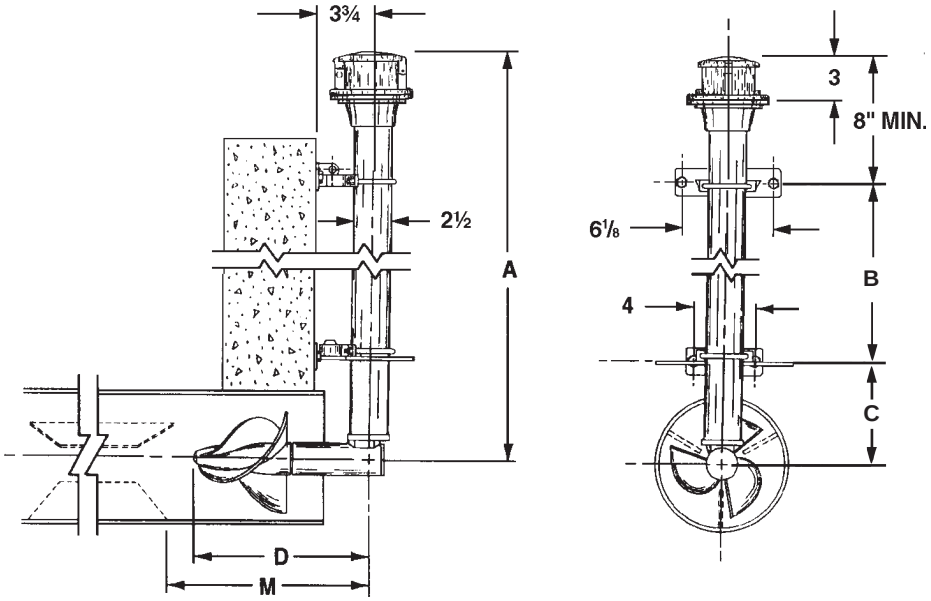
Available with optional 4-20mA and/or pulse output.

SPECIFICATIONS

ACCURACY	Plus or minus 2% of actual flow within the range specified for each meter size.
TEMPERATURE RANGE	140° F Maximum. Consult factory for special construction for higher temperatures.
MINIMUM FLOWS	As shown for each meter size and construction are required for accurate registration. See flow chart.
MAXIMUM FLOWS	As shown for each meter size and construction are rated for continuous operation. See flow chart.
INTERMITTENT FLOWS	As shown for each meter size are rated for 10% to 15% of the total time the meter is operating. Consult factory for High Velocity construction when intermittent flows are higher than shown on flow chart and/or when longer operating periods are required.
MATERIALS	Used in construction are chosen to minimize the corrosive effects of the liquids measured by the meter assembly. PROPELLER MAGNETS - permanent ceramic type PROPELLER BEARING - ceramic sleeve type PROPELLER SPINDLE - ceramic coated stainless steel PROPELLER - injection molded thermoplastic GEARBOX - stainless steel SEPARATOR - stainless steel BOLTS - stainless steel DROP PIPE - bronze METER HEAD - cast bronze MOUNTING BRACKETS -cast bronze
OPTIONAL EQUIPMENT	Includes a remote mounting kit with up to 100 feet of cable, digital transmitter, revolving mounting frame and a wide range of controls and instruments for indicating, totalizing and recording flow data for each meter. Special constructions and materials are available upon request.
ORDERING INFO	Must be specified by the customer and includes: "A" dimension (see back of data sheet) Pipe I.D. Minimum & maximum flow ranges Temperature of meter environment Indicator scale and units Totalizer dial units Type of materials and construction Optional equipment desired

MODEL OF12-D

OPEN FLOW METER
SOLID STATE ELECTRONIC PROPELLER METER
DIGITAL INDICATOR-TOTALIZER
SIZES 10" thru 72"



METER & PIPE SIZE	FLOW RANGES,GPM			DIMENSIONS					SHIPPING WEIGHT POUNDS*
	MIN.	MAX.	INT.	A*	B	C	D	M	
10	300	2000	3000				11½	13½	80
12	400	3000	3500				11½	13½	80
14	500	4000	4500				11½	13½	80
16	600	5000	6000				11½	13½	80
18	800	6000	7500				11½	13½	80
20	900	8000	9000				11½	13½	80
24	1000	10000	13500				11½	13½	80
30	1800	15000	21000				11½	13½	80
36	2000	20000	30000				11½	13½	80
42	3000	30000	40000				11½	13½	80
48	5500	35000	50000				11½	13½	80
54	6500	45000	55000				11½	13½	200
60	7500	60000	80000				11½	13½	200
66	8500	75000	95000				11½	13½	200
72	9500	90000	115000				11½	13½	200

*** NOTE: Model OF12-D meters are equipped with a 6 foot "A" dim. unless otherwise specified.**

**** NOTE: Shipping weights are approximate. Actual weight depends upon "A" dim.**

McCROMETER
www.mccrometer.com

3255 WEST STETSON AVENUE • HEMET, CALIFORNIA 92545 USA
TEL: 951-652-6811 • FAX: 951-652-3078

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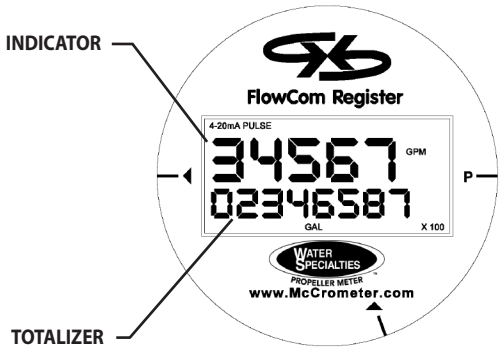
WATER SPECIALTIES™
PROPELLER METER

MODEL LP32-D

150 psi STRAP-ON SADDLE METER
SOLID STATE ELECTRONIC PROPELLER METER
STAINLESS STEEL STRAP-ON SADDLE
DIGITAL INDICATOR-TOTALIZER
SIZES 6" thru 20"



TYPICAL
DIGITAL INDICATOR-TOTALIZER

DESCRIPTION

MODEL LP32-D STRAP-ON SADDLE METERS are designed for irrigation or other low pressure service up to 150 PSI working pressure. The stainless steel saddle and u-straps permit installation on a wide range of steel, cast iron, plastic (3/16" PVC wall minimum), asbestos, and other pipe materials for each nominal meter size. It is necessary upon ordering to furnish the I.D. dimension of the pipe the meter is to be mounted on, for calibration purposes. The pipe O.D. dimension or wall thickness must also be furnished for proper sizing of the U-straps.

INSTALLATION is made by cutting a hole in the existing pipe line and then attaching the meter securely to the line. U-straps for attaching the meter saddle to the line are furnished with each meter. The meter can be installed horizontally, or inclined on suction or discharge lines. The meter must have a full flow of liquid for proper accuracy. Fully opened gate valves, fittings, or other obstructions that tend to set up flow disturbances should be a minimum of ten pipe diameters upstream and two pipe diameters downstream from the meter. Installations with less than ten pipe diameters of straight pipe require straightening vanes. Meters with straightening vanes require at least five pipe diameters upstream and two pipe diameters downstream. An optional remote mounting kit with up to 100 feet of cable for the indicator-totalizer is available.

PROPELLER is magnetically coupled with the electronic sensor through the sealed gearbox. This completely eliminates water entering the meter assembly, and eliminates all moving parts except for the propeller. The propeller is a conical shaped three bladed propeller, injection molded of thermoplastic material resistant to normal water corrosion and deformity due to high flow velocities.

BEARING in propeller is a water lubricated ceramic sleeve and spindle bearing system with a ceramic/stainless steel spindle. Dual ceramic thrust bearings, standard on all meters, handle flows in both forward and reverse directions. The bearing design promotes extended periods of maintenance free propeller operation.

DIGITAL INDICATOR-TOTALIZER has a non-volatile EEPROM memory to store totalizer count (updated hourly while running). Features a large two line display. Five digit top line indicates flow rate, and eight digit bottom line provides volumetric flow data. Indicator is available in 22 different units, including GPM, CFS, MGD. Totalizer is available in 20 different units, including Gallons, AF, CF. Units of measurement are user-selectable. Battery life is 6 -10 years. Housing is NEMA 4X rated.

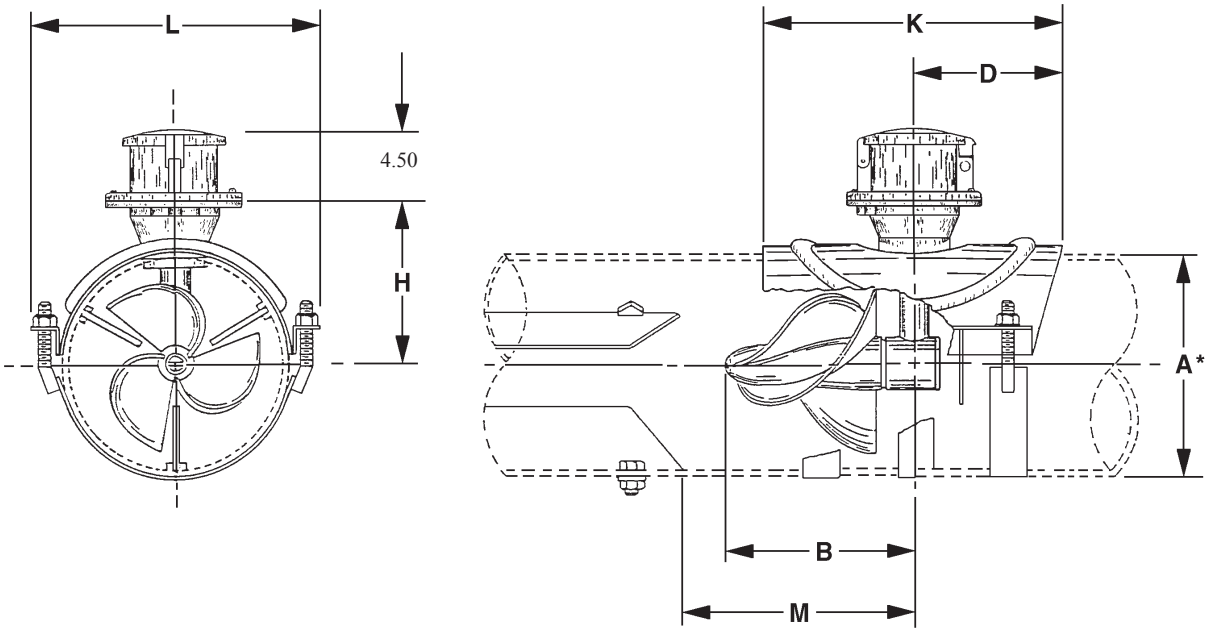
Available with optional 4-20mA and/or pulse output.

SPECIFICATIONS

ACCURACY	Plus or minus 2% of actual flow within the range specified for each meter size.
PRESSURE RANGE	Up to 150 PSI maximum working pressure.
TEMPERATURE RANGE	140° F Maximum. Consult factory for special construction for higher temperatures.
MINIMUM FLOWS	As shown for each meter size and construction are required for accurate registration. See flow chart. NOTE: Minimum flow will be higher when auxiliary equipment is added.
MAXIMUM FLOWS	As shown for each meter size and construction are rated for continuous operation. See flow chart.
INTERMITTENT FLOWS	As shown for each meter size are rated for 10% to 15% of the total time the meter is operating. Consult factory for High Velocity construction when intermittent flows are higher than shown on flow chart and/or when longer operating periods are required.
MATERIALS	Used in construction are chosen to minimize the corrosive effects of the liquids measured by the meter assembly. PROPELLER MAGNET - permanent ceramic type PROPELLER BEARING - ceramic sleeve type PROPELLER SPINDLE - ceramic sleeve/stainless steel PROPELLER - injection molded thermoplastic GEARBOX - stainless steel SEPARATOR - stainless steel BOLTS - stainless steel SADDLE - stainless steel LUG STRIPS - stainless steel U-STRAPS - stainless steel
OPTIONAL EQUIPMENT	Includes a remote mounting kit with up to 100 feet of cable, digital transmitter, and a wide range of controls and instruments for indicating, totalizing, and recording flow data for each meter. Special constructions and materials are available upon request.
ORDERING INFO	Must be specified by the customer and includes: minimum & maximum flow ranges, pipe I.D. and O.D. or wall thickness, position of meter (horizontal, inclined), temperature of meter environment, indicator scale and units, totalizer dial units, type of materials and construction, and optional equipment desired.

MODEL LP32-D

150 psi STRAP-ON SADDLE METER
SOLID STATE ELECTRONIC PROPELLER METER
STAINLESS STEEL STRAP-ON SADDLE
DIGITAL INDICATOR-TOTALIZER
SIZES 6" thru 20"



METER & PIPE SIZE	FLOW RANGES, GPM			DIMENSIONS					SHIPPING		WEIGHT POUNDS
	MIN.	MAX.	INT.	A	B	D	H	K	L	M	
6	200	1200	1500	$6^{5}/_{8}$	8	6	5¼	12	13	10	20
8	250	1500	2000	$8^{5}/_{8}$	8	6	6¼	12	12½	10	25
10	300	2000	3000	10¾	8	6	$7^{3}/_{8}$	12	13¼	10	28
12	350	3000	3500	12¾	8	6	$8^{3}/_{8}$	12	15¼	10	32
14	450	4000	4500	14	8	6	9¼	12	15½	10	35
16	500	5000	6000	16	8	6	10¼	12	17½	10	38
18	800	6000	7500	18	8	6	11¼	12	19½	10	43
20	950	8000	9000	20	8	6	12¼	12	21½	10	49

*** PLEASE SPECIFY PIPE I.D. AND O.D.**

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TEL: 951-652-6811 • FAX: 951-652-3078

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James Irrigation District

Drought Management Plan

Adopted: August 9, 2016

OBJECTIVES

This drought contingency plan has been developed for use by the James Irrigation District. This drought contingency plan serves to:

- Conserve available water supplies during times of drought and emergency
- Minimize adverse impacts of water supply shortages
- Minimize the adverse impacts of emergency water supply conditions.

OFFICIAL DESIGNEES

The Official Designee is responsible for ordering the implementation and termination of drought response stages. The Official Designee for the James Irrigation District is:

Steven P. Stadler, P.E.
General Manager
(559) 693-4356

The Official Designee may designate additional individuals to perform the duties.

INITIATION AND TERMINATION OF DROUGHT RESPONSE STAGES

The Official Designee will order the implementation of a drought response stage when one or more of the trigger conditions for that stage are met. The Official Designee may order a drought response stage prior to the conditions being met at their own discretion.

The Official Designee may also order the termination of a drought response stage when the termination criteria are met or at their own discretion.

DROUGHT AND EMERGENCY RESPONSE STAGES

Stage 1 - Mild

This stage is intended to raise awareness of potential drought problems.

Trigger Conditions

- When James Irrigation District's Central Valley Project contract allocation is equal to or less than 40%.

Actions Available

- Communicate the current drought stage with growers
- Request that growers take voluntary measures to reduce water usage

Stage 2 - Moderate

This stage is intended to raise awareness of potential for drought management actions.

Trigger Conditions

- When James Irrigation District's Central Valley Project contract allocation is equal to or less than 10%.

Actions Available

- Communicate the current drought stage with growers
- Request that growers take voluntary measures to reduce water usage
- Advise growers of potential operational actions

Stage 3 - Severe

This stage is intended to undertake planning for drought management actions and to advise growers of potential allocation of irrigation supplies and/or deliveries.

Trigger Conditions

- When James Irrigation District's Central Valley Project contract allocation is 0%.

Actions Available

- Communicate the current drought stage with growers
- Request that growers take voluntary measures to reduce water usage
- Advise growers of potential operational actions.
- Prepare Schedule for Allocation of Irrigation Supplies
- Prepare Schedule for Allocation of Irrigation Deliveries
- Provide Schedule for Allocation of Irrigation Supplies and Schedule for Allocation of Irrigation Deliveries
- Review available water supplies and inform growers if the allocation schedules will be implemented

Stage 4 - Emergency

This stage is intended to implement drought management actions the allocation of irrigation supplies and/or deliveries.

Trigger Conditions

- When James Irrigation District's Central Valley Project contract allocation is 0%
- When the U.S. Bureau of Reclamation declares a Shasta Critical Year.

Actions Available

- Communicate the current drought stage with growers
- Request that growers take voluntary measures to reduce water usage
- Advise growers of potential operational actions.
- Prepare Schedule for Allocation of Irrigation Supplies
- Prepare Schedule for Allocation of Irrigation Deliveries
- Provide Schedule for Allocation of Irrigation Supplies and Schedule for Allocation of Irrigation Deliveries
- Implement allocation schedules and revise allocation schedules as required.

OPERATIONAL ACTIONS

During times of drought, there may be constraints on the District's delivery system that are caused by the District's effort to utilize its water efficiently. An example of this may be a delay in filling a lateral until the lateral can serve multiple water orders or limiting the time certain laterals are running to limit losses. These actions are undertaken in certain situations which are hard to predict. When these actions are undertaken, the grower generally received all of the water that was ordered but must take delivery at a different time than was originally scheduled.

These operational actions are available to the District at any time but are typically undertaken more frequently during drought periods. To avoid undue impacts on growers, the District will communicate the potential for these actions to occur.

ALLOCATION OF IRRIGATION SUPPLIES

The allocation of irrigation supplies is required when the quantity of water available to the District for the water year will not meet the quantity of water requested by the growers during the season. If this occurs, the water supply shall be allocated to growers based on their acreage such that growers will receive an equal amount on a per acre basis. The amounts will be determined and then placed on a Schedule for Allocation of Irrigation Supplies. This schedule shall be used by growers to determine the amount of water they will have available for the remainder of the water year. This schedule will also be used by District staff to limit irrigation deliveries to those growers exceeding their allocation.

ALLOCATION OF IRRIGATION DELIVERIES

The allocation of irrigation deliveries is required when the quantity of water available to the District for the water year will meet the quantity of water requested by the growers during the season but the demand for water to growers at certain times will exceed the rate at which water is brought into the District. If this occurs, the water delivery shall be allocated to growers based on their acreage such that growers will receive an equal rate of delivery on a per acre basis.

Smaller growers will be pooled together and each smaller grower will be allowed to receive a delivery rate consistent with his irrigation method for a fixed time duration. The deliveries for the smaller growers will be rotated.

The amounts will be determined and then placed on a Schedule for Allocation of Irrigation Deliveries. This schedule shall be used by growers to determine the rate of water they can receive at any given time. This schedule will also be used by District staff to limit irrigation deliveries to those growers exceeding their allocation.

PENALTY FOR VIOLATION OF WATER USE RESTRICTION

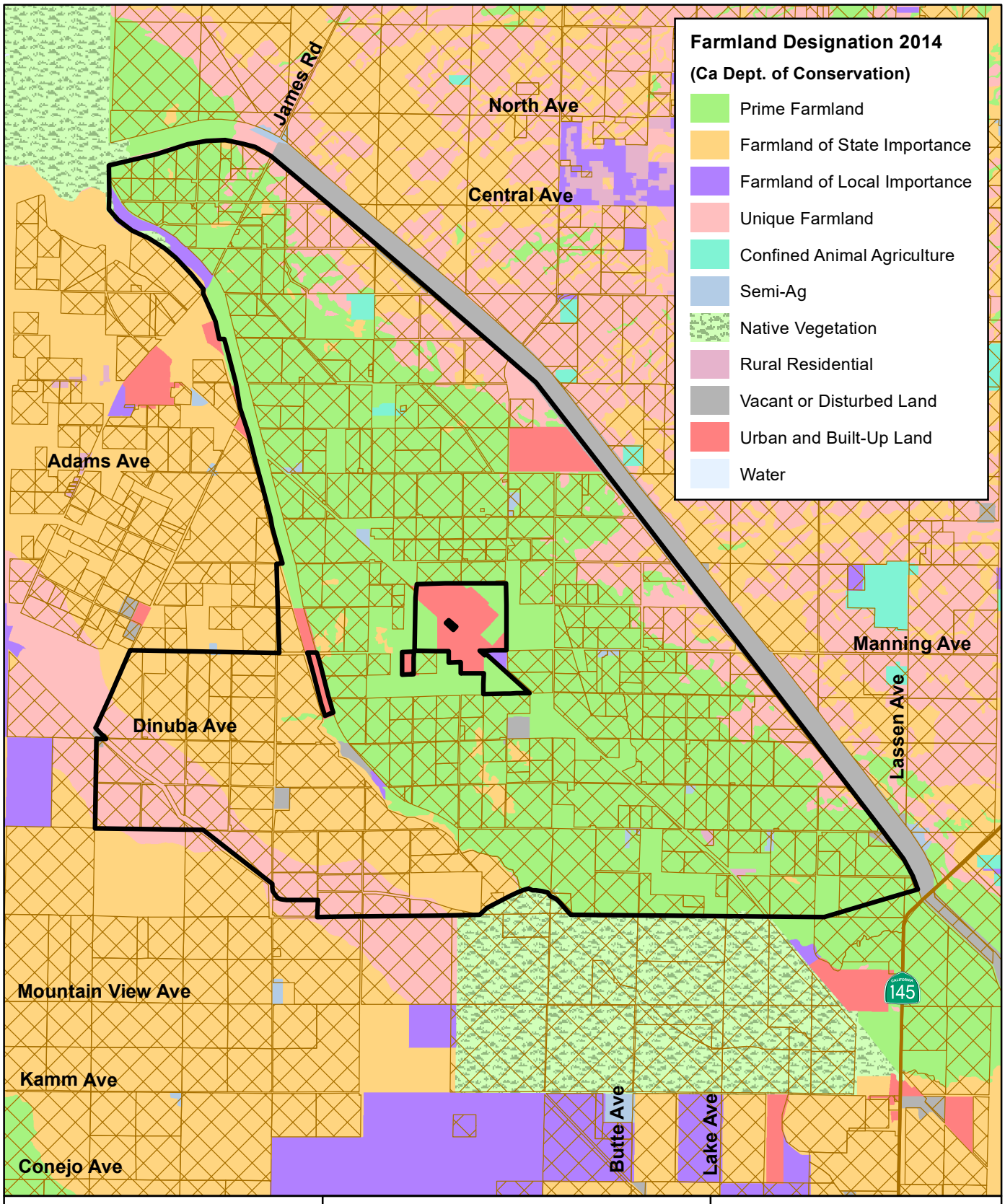
The James Irrigation District receives and approves irrigation water orders to its customers. In most instances, the District also has to fill District laterals and open turnout gates to effectuate water deliveries. Given that the District has control of the water being delivered to its customers, the water use restrictions are under the control of the District and there are no penalties under this drought contingency plan for violating water use restrictions.

Customers circumventing the District's management actions to impose allocations will be in violation of the District's Rules and Regulations and will be subject to the penalties prescribed therein.

REVIEW AND UPDATE OF DROUGHT CONTINGENCY PLAN

This drought contingency plan will be reviewed and updated at least every five years. It is recommended that the drought contingency plan be reviewed and updated in coordination with the review and update of the District's Water Management Plan.

Appendix L – Exhibit 9 of the James Irrigation District Comment Letter



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Williamson Act Parcel - Fresno Co. 2017

James ID

James Irrigation District

Farmland and Williamson Act

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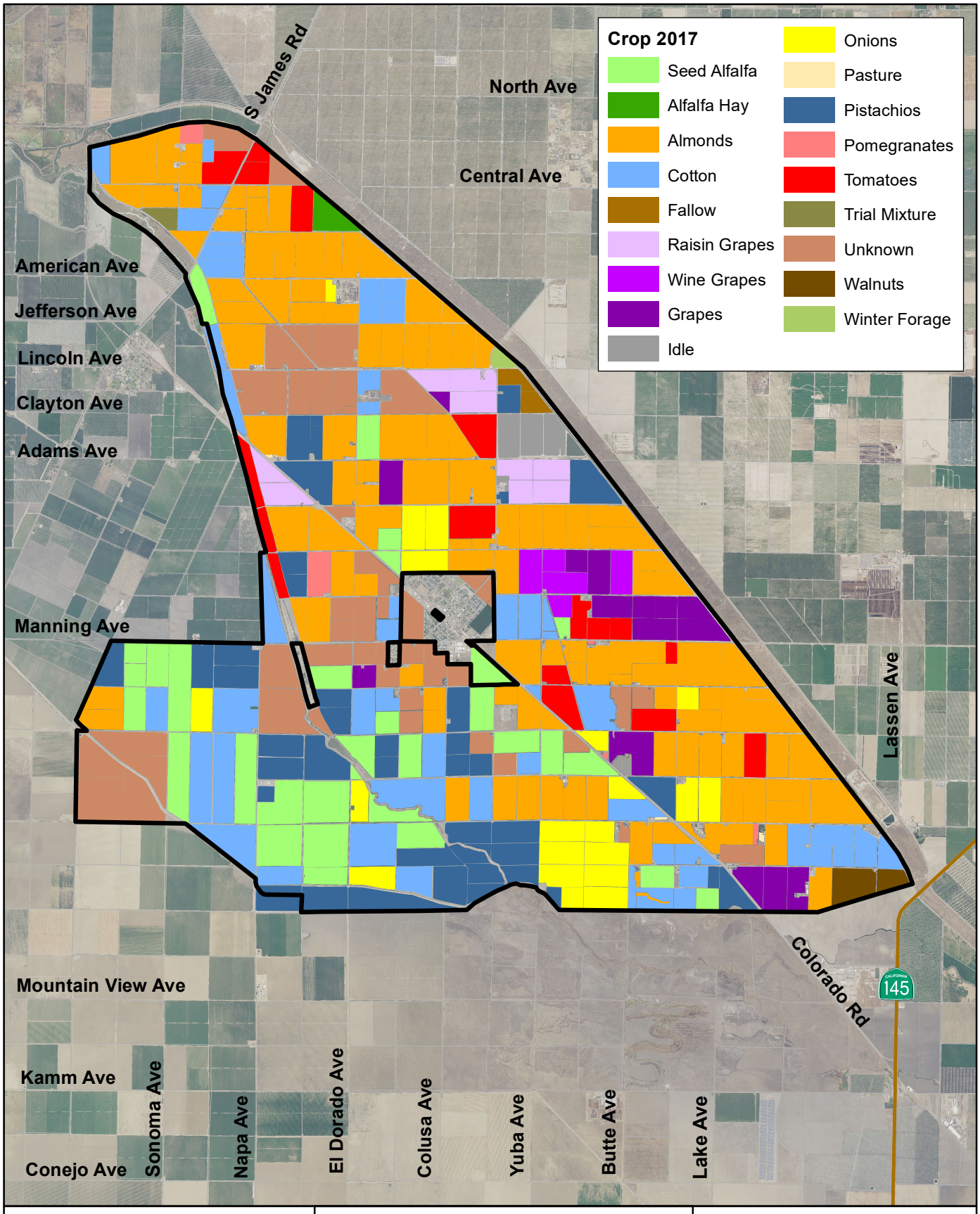
Appendix L – Exhibit 10 of the James Irrigation District Comment Letter

District Crop Production Report (Jan-Nov) - 2018

		ACRES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	ALF SEED	3162.00	152.01	555.33	34.29	362.15	2052.37	2073.65	1451.34	154.31	400.23	381.57			7617.25
2	ALF SEED 19	275.00										119.67	65.46		185.13
3	Alfalfa hay - FORAGE	76.00	0.59	26.36		13.43	47.74	51.65	70.65	52.44	45.67	24.26			332.79
4	Almonds - NUTS	7867.00	151.19	1128.75	367.88	1768.96	3144.99	3772.83	3714.77	2208.74	1757.39	1643.11	1269.65		20928.26
5	Cotton: Lint (American)	4198.00	166.72	2366.16	259.33	25.85	89.33	2370.86	3264.78	2632.65	630.01	2.55	1.33		11809.57
6	Cotton: Lint (Upland)	18.00	3.15	7.59				7.25	17.37	17.15					52.51
7	FALLOW	98.00													0.00
8	Grapes raisin	613.00		27.86	16.56	73.98	228.75	323.77	327.98	67.82	38.36	24.53	45.73		1175.34
9	Grapes wine	1153.00		32.53	70.73	173.53	295.98	517.28	645.35	551.85	313.32	66.44	197.90		2864.91
10	LETTUCE SEED	67.00		0.71	2.63	20.57	18.11	16.98	22.40	16.86	2.02				100.28
11	Nothing	0.00													0.00
12	Onions Dehy.	1685.00	279.35	450.03	343.94	791.46	1424.65	1283.99	131.73						4705.15
13	Onions Dehy. 19	502.00										38.46	36.01		74.47
14	Pasture Irrigated	5.00		2.32		0.77	1.52	3.78	5.40	1.12	0.93	0.77			16.61
15	Pistachios - NUTS	2428.00	2.84	157.39	127.15	64.52	427.64	573.35	643.83	731.84	201.15	188.84	38.63		3157.18
16	Pomegranate - FRUI	139.00		2.27	0.12	20.69	30.45	35.41	49.33	62.17	17.48	4.01	0.18		222.11
17	SI SORGHUM	2.00													0.00
18	Sileage corn - FORAGE	29.00						34.57	104.30	52.43	21.22				212.52
19	Sudan Hay	52.00						78.29	40.75	43.76					162.80
20	TEST TRIAL MIXTURE	40.00					6.14	14.02	14.51	6.70	2.39				43.76
21	Tomatoes (canning)	1141.00	22.81	206.11	8.58	158.11	454.86	855.30	594.51	115.58	0.11		55.52		2471.49
22	Tomatoes (fresh market)	1.00													0.00
23	Walnuts	151.00				22.14	53.90	79.68	91.60	83.28	76.21	28.83	19.08		454.72
24	WHEAT GRAIN	19.00													0.00
25	Wheat SILEAGE	17.00		24.51		12.95									37.46
26	WINTER FORAGE	27.00													0.00
		23765.00	778.66	4987.92	1231.21	3509.11	8276.43	12092.66	11190.60	6798.70	3506.49	2523.04	1729.49	0.00	56624.31

Appendix L – Exhibit 11 of the James Irrigation District Comment Letter



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Road
James ID

Aerial - NAIP Imagery 2016

James Irrigation District

Land Use (JID 2017)

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Appendix L – Exhibit 12 of the James Irrigation District Comment Letter

RECLAMATION

Managing Water in the West

2013 Delta-Mendota Canal Groundwater Pump-in Program Water Quality Monitoring Plan

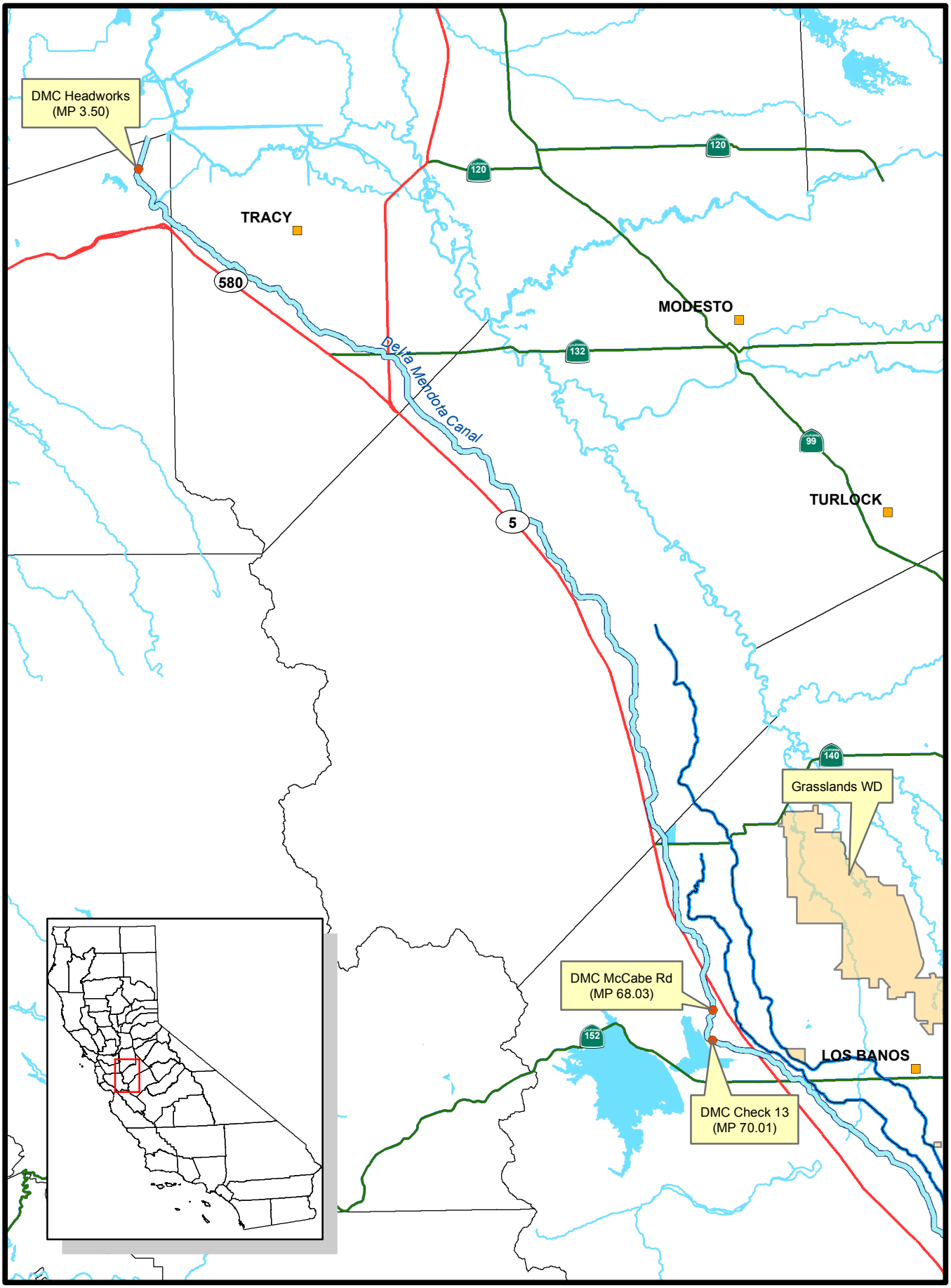
U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
South-Central California Area Office

Revised: 07 Jan 2013

Mission Statements

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

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



DMC Water Quality Monitoring

0 2.5 5 10 15 20 Miles

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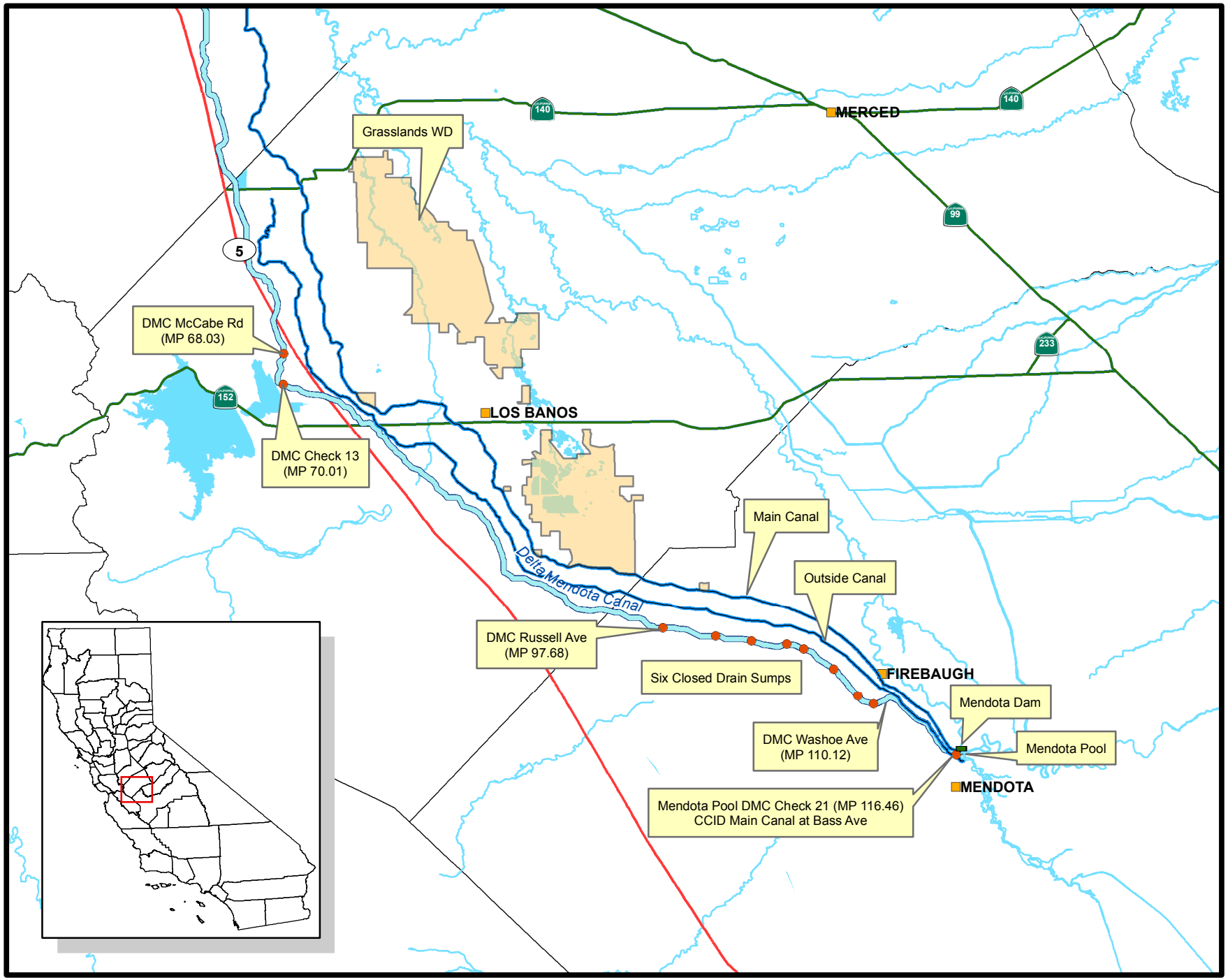
ArcGIS 9.2
Projection: WGS NAD 1984
DMC Water Quality Monitoring
U.S. Bureau of Reclamation



DMC Water Quality Monitoring

0 2.5 5 10 15 20 Miles

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ArcGIS 9.2
Projection: WGS NAD 1984
DMC Water Quality Monitoring
U.S. Bureau of Reclamation

List of Abbreviations and Acronyms

Authority	San Luis and Delta-Mendota Water Authority
ºC	degrees Celsius
DMC	Delta-Mendota Canal
DMC Headworks	DMC Milepost 2.5, Jones Pumping Plant
DMC Check 13	DMC Milepost 70, O'Neill Forebay
DMC Check 20	DMC Milepost 111, near Firebaugh
DMC Check 21	DMC Milepost 116, terminus at Mendota Pool
COC	chain of custody
CVP	Central Valley Project
DFG	California Department of Fish and Game
EC	electrical conductivity, µS/cm
Exchange Contractors	San Joaquin River Exchange Contractors Water Authority
ºF	degrees Fahrenheit
mg/L	milligrams per liter, equivalent to parts per million
QA	Quality Assurance
QC	Quality Control
QCO	Quality Control Officer
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Regional Board	California EPA, Central Valley Regional Water Quality Board
TDS	Total dissolved solids, mg/L
USGS	U.S. Geological Survey
µg/L	micrograms per liter, equivalent to parts per billion
µS/cm	microSiemens per cm, salinity in water

2013 Delta-Mendota Canal Groundwater Pump-in Program Water Quality Monitoring Plan

Introduction

The overall supply of Central Valley Project (CVP) water has been reduced by drought and restrictions on pumping from the Sacramento-San Joaquin Delta. Under the Warren Act of 1911, Reclamation may execute temporary contracts to convey non-project water in excess capacity in federal irrigation canals. In 2013, Reclamation proposes to execute temporary contracts with water districts to convey groundwater in the Delta-Mendota Canal (DMC) subject to the monitoring and reporting requirements outlined in this document.

Reclamation has limited the total amount of groundwater to be conveyed in 2013 to 50,000 acre-feet. This amount would be allocated to the districts based on need. The following districts could potentially participate in this program:

- Banta-Carbona Irrigation District
- Byron Bethany Irrigation District
- Del Puerto Water District
- Mercy Springs Water District
- Pacheco Water District
- Panoche Water District
- San Luis Water District
- West Stanislaus Irrigation District

This document describes the plan for measuring the changes in the quality of water in the DMC caused by the conveyance of groundwater during 2013, plus changes in groundwater elevation to estimate subsidence. Various agencies will use these data to assess water quality in the DMC, Mendota Pool, and wetlands water supply channels, and physical condition of local groundwater resources.

This document has been prepared by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), in cooperation with the San Luis & Delta-Mendota Water Authority (Authority), and the San Joaquin River Exchange Contractors Water Authority (Exchange Contractors), with assistance from staff of Banta Carbona Irrigation District, Del Puerto Water District, San Luis Water District, and Panoche Water District.
This monitoring plan will be conducted by staff of Reclamation, the Authority, and Water Districts and will complement independent monitoring by other Federal, State, and private agencies.

Several sampling techniques will be used to collect samples of water, including real-time, grab, and composite. The techniques used at each location are summarized in Section 3.

Continuous measurement of specific conductance (salinity) will be recorded at four stations in the canal using sondes connected to digital data loggers. The data will be averaged every 15 minutes, sent via satellite to the California Data Exchange Center where it will be posted in the Internet as preliminary data:

http://cdec.water.ca.gov/queryDaily.html

Central Valley Operations Office will post the daily average salinity measurements on its website:

http://www.usbr.gov/mp/cvo/wqrpt.html

The real-time data will be collected by Reclamation and used in a mass balance to calculate and predict water quality conditions along the DMC. The calculated results will be reported to various agencies, and compared with independent field measurements collected by the Reclamation, the Exchange Contractors, US Geological Survey, and California EPA Central Valley Regional Water Quality Control Board (Regional Board).

Based on available funding, Reclamation will operate autosamplers at four locations along the DMC and Mendota Pool that will collect daily composite samples for measurement of selenium and salinity.

Reclamation and the Regional Board will collect grab samples from various locations in the watershed to measure selenium and many other parameters.

Reclamation will use these data to assess changes in water quality and groundwater conditions caused by the 2013 Groundwater Pump-in Program, and will implement the terms and conditions of the 2013 Warren Act Contracts, exchange agreements, and the 04 January 2013 Letter from the Exchange Contractors to Reclamation (Appendix 1).

Background

The Delta Division of the federal Central Valley Project (CVP) delivers water to almost a million acres of farmland in the San Joaquin Valley of California. The CVP is also the sole source of clean water for state and federal wildlife refuges and many private wetlands in Fresno, Merced, San Joaquin, and Stanislaus Counties.

The source of water for the Division is delta of the Sacramento and San Joaquin Rivers. This water is suitable in quality for irrigation and wetlands. The region is regularly affected by droughts that reduce the supply of water. Environmental regulations also restrict the operation of the Jones Pumping Plant to divert water from the Delta. The salinity of water in the Delta is highly variable due to the influence of tides and outflow of river water.

The Delta-Mendota Canal (DMC) carries CVP water to farms, communities, and wetlands between Tracy and Mendota. The 116 mile canal is operated and maintained by the San Luis and Delta-Mendota Water Authority (Authority) under contract with Reclamation. Inflows of tailwater and subsurface water add contaminants to the DMC. The conveyance of groundwater may further degrade the quality of water in the canal.

The districts and refuges in the Delta Division use groundwater to supplement their contractual supply from the CVP. Three Delta Division districts also have riparian rights to water in the San Joaquin River. These other supplies of groundwater and riparian water are called "Non-Project Water" because they have not been appropriated by the United States for the purposes of the CVP.

The Warren Act of 1911([1]) authorizes Reclamation to execute temporary contracts to impound, store, and carry water in federal irrigation canals when excess capacity is available. Such contracts will be negotiated by Reclamation with Delta Division water districts to allow the introduction of non-project water into the DMC to supplement the supply of CVP water to help farmers deliver enough water to irrigate and sustain valuable permanent crops like grapes, citrus, and deciduous fruit, and to sustain the local multi-billion dollar farming economy.

The quality of local groundwater is variable and must be measured to confirm that there will be no harm to downstream water users when the non-project water is pumped into the DMC. Reclamation has developed a set of standards for the acceptance of non-project water in the DMC based on the requirements of downstream water users.

In 20132, environmental regulations and climate change may continue to reduce the supply of surface water for the Central Valley Project. Water managers now must depend on groundwater to supplement a diminished supply of surface water for irrigation. However, continuous pumping of groundwater can quickly reduce local aquifers and can cause irreversible damage to facilities through subsidence.

Reclamation will require information about each source of groundwater and more monitoring of the aquifer to measure overdraft, prevent subsidence, and determine the feasibility of continuing this program in the future. Staff from the Authority and water districts will be required to take regular measurements of depth to groundwater, pump rates, and in-stream salinity measurements.

This monitoring plan will ensure that monitoring data will measure any changes in the quality of CVP water in the DMC and Mendota Pool, and assess impacts on local aquifers.

Monitoring Mission and Goals

The mission of this monitoring plan is to produce physical measurements that will determine the changes in the quality of the water in canal caused by the conveyance of groundwater during 2013. The data will be used to implement the terms of the 2013

[1] Act of February 21, 1911, ch. 141, 36 Stat. 925

Warren Act Contracts and exchange agreements, and to ensure that the quality of CVP water is commensurate with the needs and expectations of water users.

The monitoring program will also deal with changes to groundwater resources to identify and prevent long-term problems to local aquifers and facilities.

Program Goals

The general goals of monitoring are:

- Evaluate the quality of water in each well, and

- Confirm that the blend of CVP water and groundwater is suitable for domestic, agricultural, and wetlands uses.

- Provide reliable data for regulation of the 2013 DMC Groundwater Pump-in Program to prevent contamination problems

- Provide measurements of groundwater dynamics (depth, recharge) to identify overdraft and subsidence

Study Area

The Study Area for this program encompasses the Delta-Mendota Canal from Tracy to Mendota, and the Mendota Pool. The canal is divided into two reaches in relation to the O'Neill Forebay and the connection to the State Water Project.

Water Quality Standards

The quality of water in each source of groundwater must meet the standards listed in Tables 6 and 7. The lists have been developed by Reclamation to measure constituents of concern that would affect downstream water users. In particular, the concentration of selenium in any pump-in water shall not exceed 2 µg/L, the limit for the Grasslands wetlands water supply channels specified in the 1998 Basin Plan.[2] The salinity of each source of pump-in water shall not exceed 1500 mg/L TDS. The other constituents are mainly agricultural chemicals listed in the California Drinking Water Standards (Title 22)[3].

[2] California Regional Water Quality Control Board, Central Valley Region, Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.pdf

[3] California Code of regulations, Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010 4037), and Administrative Code (Sections 64401 et seq.), as amended. http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Lawbook/dwregulations-06-24-2010.pdf

Water Quality Monitoring Plan

In-stream Monitoring

The quality of water in the DMC will be measured at the locations listed in Tables 1, 2, and 3.

Reclamation will operate and maintain the real-time stations listed in Table 1. Based on available funding, Reclamation will continue to collect water samples at the sites listed in Table 2 under the DMC Water Quality Monitoring Program. Reclamation will be responsible for the costs of sampling and analysis of water sampled from the DMC under this monitoring program.

Table 3 is a list of places along the canal near groups of wells that could pump into the canal under this program. If the real-time monitoring is not sufficient to identify in-stream changes in quality caused by the addition of groundwater, Reclamation may require weekly measurements at the checks listed in Table 3 to determine local effects from each group of wells. Furthermore, if flow of CVP water in the canal is limited, Reclamation will require detailed monitoring to identify the individual and cumulative changes in water quality caused by the addition of groundwater.

Table 1. Real-Time Monitoring Stations

Location	Operating Agency	Parameters	Frequency	Remarks
DMC Headworks Milepost 3.5	CVO	EC	Real-time	CDEC Site: DMC
DMC Check 13 Milepost 70	CVO	EC	Real-time	CDEC site : ONI
DMC Check 20 Milepost 111	CVO	EC	Real-time	CDEC site : DM2
DMC Check 21 Milepost 116.5	CVO	EC	Real-time	CDEC site : DM3

Key: CDEC: California Data Exchange Center CVO: Central Valley Operations Office EC: Electrical conductivity

Table 2. Water Quality Monitoring Stations

Location	Operating Agency	Parameters	Frequency	Remarks
DMC Headworks Milepost 3.5	Reclamation	EC, selenium	Daily composite	Autosampler
DMC at McCabe Rd Milepost 68	Reclamation	Various	Monthly	Grab sample
DMC Check 13 Milepost 70	Reclamation	EC, selenium	Daily composite	Autosampler
DMC at Russell Ave Milepost 97.7	Reclamation	EC, selenium, boron, mercury	Monthly	Grab sample
DMC at Telles Farm Bridge Milepost 100	Reclamation	EC, selenium	Monthly	Grabs sampler
DMC at Washoe Ave Milepost 110.1	Reclamation	EC, selenium, boron, mercury	Monthly	Grab sample
DMC Check 21 Milepost 116.5	Reclamation	EC, selenium	Daily composite	Autosampler
CCID Main Canal at Bass Ave	Reclamation	EC, selenium	Daily composite	Autosampler

Key: Reclamation: MP-157 Environmental Monitoring Branch

Table 3. In-Stream Monitoring Stations (Optional)

Location	Responsible Agency	Parameters	Frequency	Remarks
DMC Check 2 Milepost 16.2	SLDMWA	EC	Weekly	Field measurement
DMC Check 3 Milepost 20.6	SLDMWA	EC	Weekly	Field measurement
DMC Check 6 Milepost 34.4	SLDMWA	EC	Weekly	Field measurement
DMC Check 7 Milepost 38.7	SLDMWA	EC	Weekly	Field measurement
DMC Check 9 Milepost 48.6	SLDMWA	EC	Weekly	Field measurement
DMC Check 12 Milepost 64.0	SLDMWA	EC	Weekly	Field measurement
DMC Check 16 Milepost 85.1	SLDMWA	EC	Weekly	Field measurement
DMC at Telles Bridge Milepost 100.9	SLDMWA	EC	Weekly	Field measurement

Key: SLDMWA: San Luis and Delta-Mendota Water Authority

Wellhead Monitoring

Initial Analysis

All districts participating in the 2013 DMC Groundwater Pump-in Program must provide the following information about each well to Reclamation prior to pumping groundwater into the DMC:

- the location of each well, pumping rate, and point of discharge into the DMC;

- complete water quality analyses (Table 5 or 6)[4]

- the depth to groundwater in every well before pumping into the DMC commences.

Though most of the wells are privately owned, the Districts must provide access to each well for Reclamation and Authority staff.

All water samples must be sampled and preserved according to established protocols in correct containers. Analyses should be conducted by laboratories that have been approved by Reclamation, listed in Table 7. Each sample of well water must be sampled and analyzed at the expense of the well owner. Reclamation staff will review the analytical results and notify the District which wells may pump into the DMC in 2013.

[4] Note: Laboratory analyses of water in each well may be measured within three years

Compliance Monitoring

Daily Salinity

Mean daily salinity of water in the DMC will be assessed with the sensors along the canal that report real-time data to CDEC, listed in Table 1. Reclamation and the Authority will monitor daily changes in salinity along the canal.

Weekly Monitoring

Reclamation may require weekly measurements of salinity along the DMC if the real-time sensors are not sufficient to identify changes. If necessary, Reclamation will direct the Authority to measure the EC of water in the canal at the places listed in Table 3. These sites are located downstream from clusters of wells that could pump into the DMC. In addition, Reclamation may also direct Authority staff to measure the EC of the water in each active well

The weekly volume of groundwater pumped into the DMC from each well will be measured by the Authority and sent to Reclamation at the end of each week.

Selenium Monitoring

Based on available funds, Reclamation will continue to measure selenium in the canal and Mendota Pool with autosamplers listed in Table 2. Reclamation may collect random samples of water from various active wells; the cost of these selenium tests will be borne by Reclamation. Based on available funds, Reclamation may also measure boron in the canal and wells.

Depth to Groundwater

The Authority will to measure the depth to groundwater in each active well quarterly. Table 8 is a summary of measurements collected by the Authority since May 1995. The current depth to groundwater in each well will be compared to the depths listed in Table 8. If the current depth exceeds the maximum depth observed in Table 8, then Reclamation will advise the District to stop pumping from that well until the depth of water in the well recovers to an agreed depth, such as the median observed depth.

Data Compilation and Review

All compliance monitoring data collected by the Authority (i.e., flow/ EC/depth of groundwater in each active well, flow/EC in the DMC) will be entered into worksheets and presented each week to Reclamation via e-mail. Reclamation will review the data to identify changes in the quality of water in the canal and in individual wells, and potential changes in the local aquifer that could lead to overdraft or subsidence.

Water Quality Monitoring Parameters and Data Management

The following sections describe the parameters for real-time and laboratory measurement of water quality, as well as methods for quality control, data management, and data reporting.

Real-Time Water Quality Monitoring Parameters

The Central Valley Operations Office (CVO) operates four sensors along the DMC that measure salinity and temperature of water. These continuous measurements are posted on the Internet in real-time.

Salinity

Salinity is a measure of dissolved solids in water. It is the sum weight of many different elements within a given volume of water, reported in milligrams per liter (mg/L) or parts per million (ppm). Salinity is an ecological factor of considerable importance, influencing the types of organisms that live in a body of water. Also, salinity influences the kinds of plants and fish that will grow in a water body. Salinity can be estimated by measuring the electrical conductivity (EC) of the water.

CVO uses this conversion factor for estimating Total Dissolved Solids (TDS) from

$$TDS\ (mg/L) = EC\ (\mu S/cm) * 0.618 + 16$$

Sampling For Laboratory Analyses of Water Quality

The following sections describe constituents for laboratory analyses of water quality, as well as methods for water quality sampling and chain of custody documentation.

Constituents

Table 5 and 6 are lists of constituents to be measured at in each well that will pump into the DMC during 2013. Parameters include selenium, mercury, boron, nutrients, and other compounds that cannot be measured with field sensors. Table 7 is a list of laboratories whose sampling and analytical practices have been approved by Reclamation.

Sampling methods

Grab samples will be collected in a bucket or bottle from the point of discharge into the canal. Samples of canal water should be collected mid-stream from a bridge or check structure. Grab samples should be poured directly into sample bottles appropriate to the analyses. This technique is for samples collected weekly or less frequently. The analytical laboratory will specify the sample volume, type of bottle, need for preservative, and special handling requirements. Reclamation may train field staff on proper sample collection and handling.

Time composite samples will be collected from the DMC by Reclamation using an autosampler. Daily composite samples will consist of up to eight subsamples taken per day and mixed into one sample. Weekly composite samples will consist of seven daily subsamples mixed into one sample.

Chain of Custody documentation

Chain of custody (COC) forms will be used to document sample collection, shipping, storage, preservation, and analysis. All individuals transferring and receiving samples will sign, date, and record the time on the COC that the samples are transferred.

Laboratory COC procedures are described in each laboratory's Quality Assurance Program Manual. Laboratories must receive the COC documentation submitted with each batch of samples and sign, date, and record the time the samples are transferred. Laboratories will also note any sample discrepancies (e.g., labeling, breakage). After generating the laboratory data report for the client, samples will be stored for a minimum of 30 days in a secured area prior to disposal.

Chain of Custody documentation

Chain of custody (COC) forms will be used to document sample collection, shipping, Quality control (QC) is the overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that stated requirements are met.

Quality assurance (QA) is an integrated system of management activities involving, planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

QA objectives will be used to validate the data for this project. The data will be accepted, rejected, or qualified based on how sample results compare to established acceptance criteria.

The precision, accuracy, and contamination criteria will be used by the QCO to validate the data for this project. The criteria will be applied to the blind external duplicate/split, blank, reference, or spiked samples submitted with the production samples to the analytical laboratories by the participating agencies to provide an independent assessment of precision, accuracy, and contamination.

Laboratories analyze their own QC samples with the client’s samples. Laboratory QC samples, including laboratory fortified blanks, matrix spikes, duplicates, and method blanks, assess precision, accuracy, and contamination. Laboratory QC criteria are stated in the analytical methods or determined by each laboratory. Since internal control ranges are often updated in laboratories based on instrumentation, personnel, or other influences, it is the responsibility of the QCO to verify that these limits are well documented and appropriately updated during system audits. The preferred method of reporting the QC results is for the laboratory to provide a QC summary report with acceptance criteria for each QC parameter of interest.

For water samples, the QCO will use a statistical program to determine if current concentrations for parameters at given sites are consistent with the historical data at these sites. A result is determined to be a historical outlier if it is greater than 3 standard deviations from the average value for the site. The presence of an outlier could indicate an error in the analytical process or a significant change in the environment.

Samples must be prepared, extracted, and analyzed within the recommended holding time for the parameter. Data may be qualified if the sample was analyzed after the holding time expires.

Completeness refers to the percentage of project data that must be successfully collected, validated, and reported to proceed with its intended use in making decisions.

Constraints with regard to time, money, safety, and personnel were some of the factors in choosing the most representative sites for this project. Monitoring sites have been selected by considering the physical, chemical, and biological boundaries that define the system under study.

Sites also were selected to be as representative of the system as possible. However, Reclamation will continue to evaluate the choice of the sites with respect to their representativeness and will make appropriate recommendations to the Contracting Officer given a belief or finding of inadequacy.

Comparability between each agency's data is enhanced through the use of Standard Operating Procedures that detail methods of collection and analysis. Each agency has chosen the best available protocol for the sampling and analyses for which it is responsible based on the agency's own expertise. Audits performed by the QCO will reinforce the methods and practices currently in place and serve to standardize techniques used by the agencies.

Chain of Custody documentation

Chain of custody (COC) forms will be used to document sample collection, shipping, Real-Time Data – Raw data from field sensors, must be identified as preliminary, subject to change

Provisional Data - Data that have been reviewed by the collecting agency but may be changed pending re-analyses or statistical review

Laboratory Data – Data produced by the laboratory following laboratory QA/QC protocols

Chain of Custody documentation

Chain of custody (COC) forms will be used to document sample collection, shipping, In-stream data will be collected by Reclamation. Routine measurements of flow, EC, and depth of groundwater in each well will be collected by the Authority and sent to Reclamation each week.

Reclamation will compile these data in a water balance model developed by Reclamation, the Authority, and Exchange Contractors to predict the change in salinity in the canal with the addition of groundwater.

Real-time data will be used to monitor day-to-day patterns and assess actual conditions. The real-time data will be posted in regular e-mail messages to the districts and Authority. Reclamation will compile all flow, water quality, and groundwater data into a final report for future reference.

Chain of Custody documentation

Chain of custody (COC) forms will be used to document sample collection, shipping, and handling.

Water Quality Requirements

Each week, Reclamation staff will use the real-time salinity measurements (Table 1) and optional weekly in-stream measurements (Table 3) to monitor and determine the changes in salinity in the DMC, and determine if the groundwater pump-ins have caused these changes. Reclamation staff will compile other water quality data collected for this program and by others do evaluate changes in the canal.

Reclamation and the Authority will allow groundwater to be pumped into the DMC if such water does not cause the concentration of important constituents in the canal to exceed certain thresholds listed in Tables 4a and 4b. The 2012 Exchange Contractors letter will have further conditions for the lower portion of the canal.

Table 4a. Maximum Allowable Concentration of Seven Constituents in the Upper DMC (between Jones Pumping Plant and Check 13)

Constituent	Monitoring Location	Maximum concentration in the DMC
Arsenic	McCabe Road	10 µg/L
Boron	McCabe Road	0.7 mg/L
Nitrates as N	McCabe Road	45 mg/L
Selenium	Check 13	2 µg/L
Specific conductance (EC)	Check 13	1,200 µS/cm
Sulfates	McCabe Road	250 mg/L
Total Dissolved Solids*	Check 13	800 mg/L

*Calculation: TDS (mg/L) = EC (µS/cm) x 0.618 + 16

Reclamation will direct the Authority contact the Districts to stop pumping groundwater into the upper DMC if the concentration of any of these constituents in the canal exceed the maximum allowable concentrations listed in Table 4a.

Table 4b. Maximum Allowable Concentration of Three Constituents in the Lower DMC

Constituent	Monitoring Location	Maximum concentration in the DMC
Selenium	Check 21	2 µg/L
Daily Change in TDS	Checks 13 – 20	Less than 30 mg/L per day
Total Dissolved Solids*	Check 20	450 mg/L

Reclamation will direct the Authority to contact the Districts to stop pumping groundwater into the lower DMC if any of the parameters listed in Table 4b are exceeded.

Reclamation will continue to monitor the effects of the six sumps near Firebaugh that pump subsurface groundwater into the canal. Note: the sumps are located downstream of the proposed wells listed in Table 8.

Reclamation reserves the right to modify this monitoring program at any time to change.

Revised: 07 Jan 2012 SCC-107

Table 5. Water Quality Standards for Acceptance of Groundwater into the Upper Delta-Mendota Canal Jones Pumping Plant to Check 13 (O'Neill Forebay)

Constituent	Units	Maximum Contaminant Level		Detection Limit for Reporting		CAS Registry Number	Recommended Analytical Method
Primary							
Aluminum	mg/L	1	(1)	0.05	(2)	7429-90-5	EPA 200.7
Antimony	mg/L	0.006	(1)	0.006	(2)	7440-36-0	EPA 200.8
Arsenic	mg/L	0.01	(1)	0.002	(2)	7440-38-2	EPA 200.8
Barium	mg/L	1	(1)	0.1	(2)	7440-39-3	EPA 200.7
Beryllium	mg/L	0.004	(1)	0.001	(2)	7440-41-7	EPA 200.7
Boron	mg/L	0.7	(13)			7440-42-8	EPA 200.7
Cadmium	mg/L	0.005	(1)	0.001	(2)	7440-43-9	EPA 200.7
Chromium, total	mg/L	0.05	(1)	0.01	(2)	7440-47-3	EPA 200.7
Lead	mg/L	0.015	(9)	0.005	(8)	7439-92-1	EPA 200.8
Mercury	mg/L	0.002	(1)	0.001	(2)	7439-97-6	EPA 245.1
Nickel	mg/L	0.1	(1)	0.01	(2)	7440-02-0	EPA 200.7
Nitrate (as NO3)	mg/L	45	(1)	2	(2)	7727-37-9	EPA 300.1
Nitrate + Nitrite (sum as nitrogen)	mg/L	10	(1)				EPA 353.2
Nitrite (as nitrogen)	mg/L	1	(1)	0.4	(2)	14797-65-0	EPA 300.1
Selenium	mg/L	0.002	(10)	0.0004		7782-49-2	EPA 200.8
Thallium	mg/L	0.002	(1)	0.001	(2)	7440-28-0	EPA 200.8
Secondary							
Chloride	mg/L	250	(7)			16887-00-6	EPA 300.1
Copper	mg/L	1	(10)	0.05	(8)	7440-50-8	EPA 200.7
Iron	mg/L	0.3	(6)			7439-89-6	EPA 200.7
Manganese	mg/L	0.05	(6)			7439-96-5	EPA 200.7
Molybdenum	mg/L	0.01	(11)			7439-98-7	EPA 200.7
Silver	mg/L	0.1	(6)			7440-22-4	EPA 200.7
Sodium	mg/L	69	(12)			7440-23-5	EPA 200.7
Specific Conductance	µS/cm	2,200	(7)				SM 2510 B
Sulfate	mg/L	250	(7)			14808-79-8	EPA 300.1
Total Dissolved Solids	mg/L	1,500	(7)				SM 2540 C
Zinc	mg/L	5	(6)			7440-66-6	EPA 200.7
Radioactivity							
Gross Alpha	pCi/L	15	(3)	3	(3)		SM 7110C
Organic Chemicals							
Dibromochloropane (DBCP)	µg/L	1	(4)	0.5	(5)	96-12-8	EPA 504.1
Ethylene Dibromide (EDB)	µg/L	18	(4)	2	(5)	206-93-4	EPA 504.1
Chlordane	µg/L	18	(4)	5	(5)	57-74-9	EPA 505
Endrin	µg/L	0.1	(4)	0.1	(5)	72-20-8	EPA 505
Heptachlor	µg/L	25	(4)	0	(5)	76-44-8	EPA 505
Heptachlor Epoxide	µg/L	70	(4)	10	(5)	1024-57-3	EPA 505
Lindane	µg/L	160	(4)	0	(5)	58-89-9	EPA 505
Methoxychlor	µg/L	0.2	(4)	0.01	(5)	72-43-5	EPA 505
Toxaphene	µg/L	2	(4)	0.1	(5)	8001-35-2	EPA 505
Diazinon	µg/L	0.16	(11)			333-41-5	EPA 507
Atrazine	µg/L	700	(4)	25	(5)	1912-24-9	EPA 508.1
Simazine	µg/L	0.01	(4)	0.01	(5)	122-34-9	EPA 508.1
Bentazon	µg/L	0.01	(4)	0.01	(5)	25057-89-0	EPA 515.1-4
2, 4, 5-TP (Silvex)	µg/L	30	(4)	10	(5)	93-72-1	EPA 515.1-4
2,4-D	µg/L	0.2	(4)	0.2	(5)	94-75-7	EPA 515.1-4
Molinate	µg/L	20	(4)	2	(5)	2212-67-1	EPA 525.2
Thiobencarb	µg/L	50	(4)	1	(5)	28249-77-6	EPA 525.2
Carbofuran	µg/L	4	(4)	1	(5)	1563-66-2	EPA 531.1-2
Glyphosate	µg/L	70	(4)	1	(5)	1071-83-6	EPA 547
Chlorpyrifos	µg/L	0.025	(11)			2921-88-2	EPA 8141

Table 5. Water Quality Standards for Acceptance of Groundwater into the Upper Delta-Mendota Canal Jones Pumping Plant to Check 13 (O'Neill Forebay)

Sources:

Sources:

Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010-4037), and Administrative Code (Sections 64401 et sea.), as amended

(1) Title 22. Table 64431-A Maximum Contaminant Levels, Inorganic Chemicals

(2) Title 22. Table 64432-A Detection Limits for Reporting (DLRs) for Regulated Inorganic Chemicals

(3) Title 22. Table 64442 Radionuclide Maximum Contaminant Levels (MCLs) and Detection Levels for Purposes of Reporting

(4) Title 22. Table 64444-A Maximum Contaminate Levels, Organic Chemicals

(5) Title 22. Table 64445.1-A Detection Limits for Purposes of reporting (DLRs) for Regulated Organic Chemicals

(6) Title 22. Table 64449-A Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Levels"

(7) Title 22. Table 64449-B Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Level Ranges"

(8) Title 22. Table 64678-A DLRs for Lead and Copper

(9) Title 22. Section 64678 (d) Lead Action level

California Drinking Water Regulations Sep 2011

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Lawbook/dwregulations-2011-09-22.pdf

California Regional Water Quality Control Board, Central Valley Region, Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins.

(10) Basin Plan, Table III-1 (ug/L) (selenium in Grasslands water supply channels)

(11) Basin Plan, Table III-2A (ug/L) (chlorpyrifos & diazinon in San Joaquin River from Mendota to Vernalis)

Sacramento & San Joaquin River Basin Plan 2009

http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.pdf

Ayers, R. S. and D. W. Westcot, ***Water Quality for Agriculture*** , Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985).

(12) Ayers, Table 1 (mg/L) (sodium)

(13) Ayers, Table 21 (mg/L) (boron)

Water Quality Standards for Agriculture 1985

http://www.fao.org/DOCREP/003/T0234E/T0234E00.HTM

revised: 10 Jan 2012 SCC-107

Table 6. Water Quality Standards for Acceptance of Groundwater into the lower Delta-Mendota Canal Check 13 (O'Neill Forebay) To Check 21 (Mendota Pool)

Constituent	Units	Maximum Contaminant Level		CAS Registry Number	Recommended Analytical Method
Bicarbonate	mg/L	61	(5)	71-52-3	SM 2320 A
Boron	mg/L	0.7	(3)	7440-42-8	EPA 200.7
Calcium	mg/L	80	(5)	7440-70-2	EPA 200.5
Chloride	mg/L	40	(5)	189689-94-9	EPA 300.1
Chlorpyrifos	µg/L	0.025	(2)	2921-88-2	EPA 8141
Chromium, total	µg/L	50	(1)	7440-47-3	EPA 200.7
Diazinon	µg/L	0.16	(2)	333-41-5	EPA 507
Hardness	mg/L				calculated
Magnesium	mg/L	16	(5)	7439-95-4	EPA 200.5
Mercury	µg/L	2	(1)	7439-97-6	EPA 245.1
Molybdenum	µg/L	10	(3)	7439-98-7	EPA 200.7
Nickel	µg/L	100	(1)	7440-02-0	EPA 200.7
Nitrate (as NO3)	mg/L	45	(1)	7727-37-9	EPA 300.1
Nitrite (as nitrogen)	mg/L	1	(1)	14797-65-0	EPA 300.1
pH	units	5.0 - 7.0	(5)		EPA 150.1
Potassium	mg/L	4.5	(5)	7440-09-7	EPA 200.5
SAR		<2	(5)		calculated
Selenium	µg/L	2	(2)	7782-49-2	EPA 200.8
Sodium	mg/L	69	(3)	7440-23-5	EPA 200.7
Specific Conductance	µS/cm	1,230	(4)		SM 2510 B
Sulfate	mg/L	250	(1)	14808-79-8	EPA 300.1
Total Dissolved Solids	mg/L	800	(4)		SM 2540 C

(1) Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010-4037), and Administrative Code (Sections 64401 et seq.), as amended.

(2) California Regional Water Quality Control Board, Central Valley Region, Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. Table III-2A

(3) Ayers, R. S. and D. W. Westcot, *Water Quality for Agriculture* , Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985).

(4) Second Amended Contract for Exchange of Waters, No I1r-1144, Article 9. Quality of Substitute Water.

(5) Spectrum Analytic, Inc. Guide to Interpreting Irrigation Water Analysis. Washington C.H., Ohio
http://www.spectrumanalytic.com/support/library/rf/A_Guide_to_Interpreting_Irrigation_Water_Analysis.htm

revised 11/23/2009 SCC-107

RECLAMATION
Managing Water in the West

Table 7. Approved Laboratory List for the Mid-Pacific Region Environmental Monitoring Branch

APPL Laboratory	**Address**	908 North Temperance Avenue, Clovis, CA 93611
	Contact	Diane Anderson (Project Manager) or Cynthia Clark
	P/F	(559) 275-2175 / (559) 275-4422
	Email	danderson@applinc.com; cclark@applinc.com
	Methods	*Approved for inorganic and organic parameters in water and soil*
Basic Laboratory	**Address**	2218 Railroad Avenue Redding, CA 96001 USA
	Contact	Nathan Hawley, Melissa Hawley, Ricky Jensen
	P/F	(530) 243-7234 / (530) 243-7494
	Email	nhawley@basiclab.com (QAO), mhawley@basiclab.com (PM), sthomas@basiclab.com (quotes)
		poilar@basiclab.com (sample custody), khawley@basiclab.com (sample custody)
	CC Info	nhawley@basiclab.com, Jennifer Rawson (ext. 203 - invoices)
		Reanalysis requests need to always be addressed to Melissa Hawley and CC'd to Nathan Hawley
		Quotes address to Sabrina Thomas and cc Nathan Hawley
	Methods	*Approved for inorganic/organic parameters*
Block Environmental Services	**Address**	2451 Estand Way Pleasant Hill, CA 94523 USA
	Contact	David Block
	P/F	(925) 682-7200 / (925) 686-0399; (925) 382-9760 Cell
	Email	dblock@blockenviron.com
	Methods	*Approved for Toxicity Testing*
California Laboratory Services	**Address**	3249 Fitzgerald Road Rancho Cordova, CA 95742
	Contact	Scott Pieters
	P/F	(916) 638-7301 / (916) 638-4510
	Email	scottp@californialab.com (p.m.), janetm@californialab.com (QA)
	Methods	*Approved for inorganic, organic, and microbiological parameters.*
Caltest Analytical Laboratory	**Address**	1885 N. Kelly Rd. Napa, CA 94558
	Contact	Mike Hamilton
	P/F	(707) 258-4000/(707) 226-1001
	Email	Mike_Hamilton@caltestlabs.com; info@caltestlabs.com
	Methods	*Approved for inorganic parameters*
Dept. of Fish & Game - WPCL	**Address**	2005 Nimbus Road Rancho Cordova, CA 95670 USA
	Contact	David B. Crane - Laboratory Director Patty Bucknell - Inorganic Chemist
		Gail Chow - QA Manager + re-analysis requests (916) 358-2840
	P/F	(916) 358-2858 / (916) 985-4301, Sample Receiving: (916) 358-0319 Scott or Mary
	Email	dcrane@ospr.dfg.ca.gov; pbucknell@ospr.dfg.ca.gov; gcho@ospr.dfg.ca.gov
	Methods	*Approved only for metals analysis in tissue, organics pending*
Fruit Growers Laboratory	**Address**	853 Corporation Street Santa Paula, CA 93060 USA
	Contact	David Terz, QA Director
	P/F	(805) 392-2024 / (805) 525-4172
	Email	davidt@fglinc.com
	Methods	*Approved for all inorganic and organic parameters in drinking water and general physical analysis in soils.*

Table 7. Approved Laboratory List for the Mid-Pacific Region Environmental Monitoring Branch

Montgomery Watson/Harza Laboratories	**Address**	750 Royal Oaks Drive Ste. 100 Monrovia, CA 91016 USA
	Contact	Bradley Cahoon and Rita Reeves (Project Managers - Sacramento), Linda Geddes* (Project Manager - Monrovia) *Work with Linda after samples arrive at laboratory
	P/F	(916) 418-8358, (626) 386-1100, Linda - (626) 386-1163, Rita cell 916-996-5929
	Email	Bradley.Cahoon@us.mwhglobal.com, linda.geddes@mwhglobal.com
	CC Info	cc. Rita on all communications to Bradley.
	Methods	*Approved for all inorganic, organic, and radiochemistry parameters in drinking water*
Moore Twining Laboratories, Inc.	**Address**	2527 Fresno Street Fresno, CA 93721 USA
	Contact	Julio Morales (PM), Maria Manuel (QA Officer), Sample Control (Bottle Orders), Juli Adams (Lab Director); Lisa Montijo (Assistant PM)
	P/F	(559) 268-7021 / (559) 268-0740
	Email	juliom@mooretwining.com; mariam@mooretwining.com; julia@mooretwining.com; lisam@mooretwining.com
	Methods	*Approved for COD by SM5220D and general chemistry including boron analysis (not TOC)*
Olson Biochemistry Laboratories	**Address**	SDSU: Box 2170, ACS Rm. 133 Brookings, SD 57007 USA
	Contact	Nancy Thiex, Laboratory Director
	P/F	(605) 688-5466 / (605) 688-6295
	Email	Nancy.Thiex@sdstate.edu
	CC Info	For re-analysis: contact Zelda McGinnis-Schlobohm and Nancy Anderson
		Zelda.Schobohm@SDSTATE.EDU, Nancy.Anderson@SDSTATE.EDU
		For analysis questions only: just CC. Nancy Anderson
	Methods	*Approved for boron, selenium, and molybdenum analyses (except boron in soil; Olson does not have the capability)*
Sierra Foothill Laboratory, Inc.	**Address**	255 Scottsville Blvd, Jackson, CA 95642
	Contact	Sandy Nurse (Owner) or Dale Gimble (QA Officer)
	P/F	(209) 223-2800 / (209) 223-2747
	Email	sandy@sierrafoothilllab.com, CC: dale@sierrafoothilllab.com
	Methods	*Approved for all inorganic parameters, microbiological parameters, acute and chronic toxicity.*
TestAmerica	**Address**	880 Riverside Parkway West Sacramento, CA 95605 USA
	Contact	Linda Laver
	P/F	(916) 374-4362 / (916) 372-1059 fax
	Email	Linda.Laver@TestAmericaInc.com
	Methods	*Approved for all inorganic parameters and hazardous waste organics. Ag analysis in sediment, when known quantity is present, request 6010B*
Western Environmental Testing Laboratories	**Address**	475 East Greg Street # 119 Sparks, NV 89431 USA
	Contact	Erin Pfau (Client Services), Andy Smith (Lab Drctr)
	P/F	(775) 355-0202 / (775) 355-0817
	Email	erinp@wetlaboratory.com, andy@wetlaboratory.com
	Methods	*Approved for inorganic parameters (metals, general chemistry) and coliforms.*

revised: 2/14/2011

Table 8. Summary of Depth to Groundwater in Wells Beside the Delta-Mendota Canal (feet)
May 1995 - Dec 2012

DMC Milepost	Max	Min	Average	Median	Recent	Count
12.37L	327.8	164.2	227.8	222.0	210.7	67
12.69L	244.8	201.4	219.8	218.5	209.0	67
12.75R	295.0	212.0	248.0	249.0	239.7	66
13.31L	275.8	201.4	224.3	221.0	209.9	66
14.26R	268.5	218.4	236.4	232.9	227.2	66
15.11R	264.0	200.0	241.4	241.5	233.5	67
21.25L	169.5	106.0	127.9	126.0	142.3	65
21.86L	130.0	89.6	109.2	109.0	114.0	67
22.77R	170.0	39.2	135.0	135.1	137.6	67
23.41L	254.0	141.0	188.2	184.6	168.1	67
30.43R	169.8	121.8	146.1	147.2	149.8	67
30.43L	191.0	102.0	127.7	124.7	191.0	67
31.60L	277.0	110.1	197.0	229.0	135.6	67
33.71L	198.6	130.9	159.7	157.0	139.2	67
35.73R	287.0	146.8	167.0	168.9	174.5	67
36.01L	290.0	137.2	202.2	181.2	181.2	65
36.80L	204.0	111.0	155.2	154.4	154.3	66
37.10L	277.0	158.0	190.4	189.5	173.7	66
37.32L	200.0	150.8	165.3	162.0	164.0	66
37.58L	170.0	127.8	145.9	144.2	146.0	66
45.78R	127.2	83.0	102.4	100.8	107.8	66
48.97L	130.0	71.0	96.1	94.0	71.0	49
48.96LNEW	96.0	88.0	93.3	96.0	96.0	6
48.97L	101.0	101.0	101.0	101.0	101.0	18
51.66L	150.4	86.4	110.8	109.0	110.8	66
58.28L	69.0	27.0	46.2	47.0	59.9	65
60.06R	95.0	37.6	69.5	73.0	78.2	65
66.71L	54.0	19.8	37.9	39.4	43.5	65
78.31L	49.3	21.9	29.9	28.0	38.8	74
79.13R	111.8	57.8	81.0	83.0	81.7	74
79.13L	132.1	63.3	93.3	93.7	132.1	22
79.60L	83.2	52.9	64.9	62.2	59.6	74
80.03L	80.0	16.0	36.5	36.2	44.5	74
80.03R	143.5	73.0	99.4	94.9	94.9	23
80.62R	100.2	47.8	63.1	61.2	80.0	74
80.62L	69.0	19.4	44.2	44.0	51.1	74
81.08-R	72.5	55.1	60.2	58.7	58.7	22
83.08-R	64.9	37.6	47.1	45.6	46.5	49
83.67-L	71.6	12.0	25.6	24.5	25.6	49
90.18R	201.3	103.9	142.5	136.2	178.4	74
90.19L1	218.5	98.9	146.6	138.3	138.3	74
90.19L2	190.0	72.0	132.3	126.3	144.3	74
90.39R	212.0	105.0	140.3	136.5	145.0	74
90.60L	192.0	28.7	141.2	138.1	167.8	74
90.61R	198.0	104.0	138.9	135.8	142.4	74
90.91L	285.9	93.2	144.2	137.6	137.8	74
91.15L	287.7	97.4	140.6	134.5	140.6	74
91.36L	217.0	10.3	86.9	114.0	13.3	74
91.57R	222.2	91.8	136.4	131.2	143.0	74

Table 8. Summary of Depth to Groundwater in Wells Beside the Delta-Mendota Canal (feet)
May 1995 - Dec 2012

DMC Milepost	Max	Min	Average	Median	Recent	Count
91.68R	219.6	99.2	149.6	141.2	168.9	74
91.77R	172.2	96.0	127.1	124.2	n/a	74
91.80L	195.2	93.1	137.9	134.9	141.7	74
92.00R	172.6	109.0	137.7	131.2	n/a	74
92.14L	215.1	98.8	144.7	140.9	145.0	74
92.20R	220.0	95.8	142.6	142.6	142.0	74
92.72L	218.3	100.2	149.4	143.6	146.6	74
93.20L	296.1	102.2	143.2	134.1	173.2	74
93.27R	228.4	115.0	161.4	158.0	179.6	73
93.27L	218.9	100.8	146.8	142.2	165.6	74
94.26L	228.1	99.7	148.2	141.1	177.2	74
95.62L	213.4	99.6	147.8	141.3	172.1	74
97.28L	159.9	34.0	76.5	60.7	91.1	74
98.74L	114.2	39.2	54.0	46.9	56.9	74
99.24L	158.3	31.5	67.3	62.2	136.7	74
99.82L	190.3	19.5	75.0	57.8	88.1	74
100.24L	144.1	28.1	65.3	53.0	71.1	74
100.65L	137.6	36.5	70.1	66.5	94.4	74
100.85L	133.6	39.0	63.1	59.9	73.7	73
101.27L	131.4	37.4	69.2	60.5	72.1	73
102.04R	130.0	38.0	65.3	60.0	62.8	73
106.20R	138.3	60.7	94.4	88.6	97.1	73
113.72L	29.2	13.2	21.6	21.6	n/a	73
115.32R	82.9	18.5	29.1	28.9	24.6	73
115.62L	42.0	12.2	25.5	24.0	18.2	72
115.84R	39.2	14.9	24.5	22.6	22.6	73
116.40L1	77.0	14.2	28.9	27.5	20.6	73
116.40L2	74.0	11.3	31.2	27.6	31.2	73
Subsidence Wells near Russell Ave						
97.69LH-2	23.1	23.0	23.0	23.0		11
97.69LH-3	17.3	17.3	17.3	17.3		24
97.69LH-4	no data					
97.69LH-5	139.5	131.5	137.1	137.7		24
97.69LH-6	209.9	64.3	134.4	134.3		24

Source: San Luis & Delta-Mendota Water Authority

Appendix L – Exhibit 13 of the James Irrigation District Comment Letter

Fact Sheet

Frequently Asked Questions: The Bay Delta Plan Update and Its Anticipated Impacts to Agriculture, Water Supply, and Wildlife

Following nearly 10 years of scientific review, draft policy development, and responses to public comments, the State Water Resources Control Board adopted the Lower San Joaquin River and Southern Delta piece of the Bay-Delta Plan update on Dec. 12. The following is a frequently asked questions fact sheet intended to respond to common questions and misconceptions about this important update to the Bay Delta plan.

Why is the Bay-Delta Plan being updated?

The two Bay-Delta Plan updates are part of a delicate balancing act -- addressing an ecological crisis in the watershed and preventing further collapse of Bay-Delta fisheries while acknowledging the other vital water uses for millions of Californians. A dramatic decline in the once-thriving populations of native fish species that migrate through and inhabit the Delta has brought some species to the brink of extinction. In 1984, for example, about 70,000 fall-run Chinook salmon adults returned to the San Joaquin Basin. The number of returning adults dropped to 40,000 in 2010 and just 8,000 in 2014. The last time this water quality plan for the Bay Delta was updated was 1995.

FAQ1: *Did the State Water Board consider the most recent and best science?*

Yes. The plan amendments are based on years of study and analysis of the necessary steps to provide greater protection of fish and wildlife while balancing the needs of agriculture, business and residential water users. The overwhelming body of evidence demonstrates that increased flow is the vital piece of the puzzle to restore habitat and improve the survival of native fish and other species.

The science was subject to external peer review – the same kind of scrutiny and rigor conducted at preeminent research facilities. The peer reviewers agreed with the central premise -- -- current diminished flows are harmful to native fish and wildlife, and that a more natural and more robust flow pattern would be beneficial.

Also see the response to the question on peer reviewed studies.

FAQ2: *Haven't salmon been doing better the last couple of years? Why did the State Water Board need to act?*

The science tells us that reductions in flows and alterations to the flow regime in the San Joaquin River (SJR) Basin resulting from water development over the past several decades have hurt native fish and wildlife. In science and policy circles, we call this negatively affecting beneficial uses. But it really means slower and warmer flows are bad for fish and wildlife. Crunching the numbers backs this up. Data collected by the California Department of Fish and Wildlife show returning adult fall-run Chinook salmon have fallen from approximately 70,000 in the mid-1980s to about 10,000 in 2016 and 2017. This is an 85 percent drop.

Yes, there has been some recent good news the past two years. In 2014-2015, however, returning adult numbers were, at about 4,000 returning adults, which is a more than 90 percent drop from the mid-1980s.

FAQ3: *Will higher flows benefit fish populations, or are the plan amendments somehow related to the California WaterFix project?*

Higher flows will definitely help native fish populations and other species. The California WaterFix is a separate project from the plan amendments that will also be subject to flow and other conditions to protect other legal users of water as well as fish and wildlife. The higher flows that are proposed in the plan amendments are intended to benefit native fish populations in the tributaries to the San Joaquin River where those fish are born and grow and return to spawn. Increased flows from the Lower San Joaquin River will reach the Delta. A small percentage of this could be exported under current rules but most of the water that is exported comes from the Sacramento River watershed, not the San Joaquin River. Moreover, increased flows into the Delta are likewise benefitting the fishery and water quality in the Delta for farms and municipalities.

More information on how the State Water Board is updating the Bay-Delta Plan is provided in the response to the question on LSJR Plan Amendments.

FAQ 4: *Why don't the Lower San Joaquin River Plan Amendments include the entire Delta and all of its tributaries, including the Sacramento River?*

The Sacramento River and the San Joaquin River meet in the Delta but native fish populations like salmon in the San Joaquin River have generally been doing worse than in the Sacramento for a prolonged period of time. There are only minimal flow requirements in place on the Lower San Joaquin River tributaries to protect fish, particularly since a prior agreement to provide flows expired in 2011 and nothing has replaced that agreement. The three salmon-bearing tributaries of the Lower San Joaquin River also have fairly similar hydrology with the highest river flows occurring in May and June due to snowmelt from the high elevation mountains.

Sacramento River tributaries experience peak flows earlier in the year due to a higher proportion of water arriving as rain than snowmelt compared to the lower San Joaquin River tributaries. In addition, the southern Delta is heavily influenced by the Lower San Joaquin River, which is why it is included in the Lower San Joaquin River /Southern Delta update. Similarly, the Sacramento River provides the majority of the flow and influence for the Central Delta. Both are critically important to the health and survival of the Bay-Delta ecosystem but they influence them in somewhat different ways.

The State Water Board is addressing the entire Delta and its contributing watersheds through two separate processes. The first effort is focused on Lower San Joaquin River flows and Southern Delta salinity. On July 6, 2018, the State Water Board released the proposed final Lower San Joaquin River and Southern Delta updates to the Bay-Delta Plan, the associated final draft environmental document in support of those changes, and a notice of a board meeting to consider adoption of the changes and finalization of the environmental document. The Board adopted this plan and associated environmental documents on Dec.12, 2018.

The second effort is focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne rivers), Delta outflows, and interior Delta flows. Together, this portion is referred to as the "Sacramento/Delta." On July 6, 2018, the State Water Board released a framework for the Sacramento/Delta update, including the background, purpose, and need for the update, as well as a summary of information that will be included in the forthcoming draft environmental document/Staff Report.

The Sacramento/Delta update has been underway for some time. The State Water Board released a fact sheet and Scientific Basis Report in the fall of 2017, which generally describe recommended Sacramento/Delta updates to the Bay-Delta Plan (Plan amendments). The Scientific Basis Report which documents the science upon which those changes are based, was reviewed by the Delta Independent Science Board and was peer reviewed by an independent panel before release.

FAQ 5: *Can flow alone address the decline of native fish? Did the State Water Board consider actions in lieu of, or in addition to flow measures, so as to avoid or minimize increasing surface water flow requirements?*

Flow is key for fish survival and flow alone can help the species at risk through improving habitat, temperatures, and migration; however, the State Water Board also recognizes the importance of implementing habitat restoration and other non-flow measures to support and maintain the different habitat needs of fish and wildlife. For this reason, the State Water Board incorporates and recommends a range of non-flow actions complementary to the flow objectives for the reasonable protection of fish and wildlife in the plan amendments. Descriptions of these actions and their associated cost and potential environmental impacts

are provided in Chapter 16, Evaluation of Other Indirect and Additional Actions, and in Master Response 5.2, Incorporation of Non-Flow Measures. These recommended non-flow actions should be part of the overall effort to comprehensively address Delta aquatic ecosystem and tributary ecosystem needs, and results from implementation of non-flow actions can be used to inform adaptive implementation decisions under the plan amendments. As noted in the plan and below, the State Water Board is also encouraging voluntary actions that increase non-flow actions that can provide comparable protections at less flow.

FAQ 6: *Is the State Water Board relying only on flows to protect salmon?*

The State Water Board recognizes that non-flow measures serve an important role in river restoration by supporting native fish and wildlife and promoting ecosystem improvements that complement flow for the reasonable protection of fish and wildlife. The Bay-Delta Plan amendments therefore recommend non-flow measures to complement the new flow objectives. Flows alone can help fish populations by improving temperature and oxygen conditions, wetting habitat to generate food and shelter for native fish, and by improving flow conditions to benefit native fish habitat at the expense of predators. Implementing non-flow measures can potentially reduce the need for flows, within the 30 to 50 percent range under the proposal by more actively creating habitat that favors natives over predators, reducing temperatures, and taking other measures. Flow is the tool that the State Water Board can require. It can encourage but not require other non-flow measures. It can, however, accept such measures in a robust, transparent, and well monitored agreement if it demonstrates it can lead to comparable or superior improvements. Non-flow measures alone, however, are unlikely to show improvement without adding additional flows.

FAQ 7: *What can the State Water Board do about non-flow fish stressors?*

The State Water Board can and does recommend to the entities that will be responsible for attainment of flow objectives, and others, to take actions, other than flow, that will complement the LSJR flow objectives. The State Water Board recognizes that non-flow actions could assist in further improving habitat conditions that benefit fish and wildlife beneficial uses or improve related science and management within the Lower San Joaquin River Watershed. Increased flows, however, remain the principal means of implementation of the objective because science shows that additional flow is still needed, at a minimum, to reasonably protect fish and wildlife beneficial uses in the Lower San Joaquin River

The State Water Board's authority to require and enforce the implementation of non-flow actions depends on the proposed non-flow action and whether the facts and circumstances support requiring them. This is discussed in Master Response 5.2, Incorporation of Non-Flow Measures.

FAQ 8: *Are there actions that can be taken to protect fish that are unrelated to flow?*

The following nonflow actions can be taken to address other stressors, in addition to flow:

- Increase and improve in-channel habitat to make it favorable for native fish by providing habitat types that benefit salmon, like riffles, runs, and pools for cold water refugia.
- Increase and improve flood-plain habitat, including lowering the floodplain so that it is wetted at lower flows.
- Provide gravel for salmon nests.
- Reduce predator hot spots created by structures and deep languid pools.
- Improve riparian vegetation to provide shade, cover, and food production.
- Improve reservoir operations and/or physical structures to maintain adequate water temperature conditions.
- Expand fish screening.
- Improve fish passage above dams.
- Improve fish and water barrier programs.
- Improve management and operation of fish hatcheries.
- Evaluate and revise, if needed, fish harvest policies and take actions to reduce illegal harvesting.

The above non-flow actions could work in concert with flows. For example, river channels can be improved for fish by adding spawning gravels and more complex habitat structure. In addition, floodplain habitat, which provides food and refuge for growing fish, can be restored and created in a manner that takes better advantage of flows. Increased flow, however, will amplify the benefits of existing and newly restored habitat available to fish. Ultimately, the right combination of flow and habitat is needed to create suitable conditions for fish survival, it's not one or the other. Fishery benefits will not materialize, for example, if additional habitat is provided by bringing the floodplain down to current water levels and the water temperatures are still high or if flows are further diminished because flow requirements are not in place to maintain those flows.

FAQ 9: *How are other fish species faring in the Delta?*

The 2017 report, *Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows* provides population abundance trends for several species as part of the summary of scientific knowledge assembled in the report to inform fish and wildlife flow recommendations.

FAQ 10: *Is California "wasting" water to the ocean?*

This notion of "wasting" water to the ocean is a common misconception. California has extremely variable weather and climate, with both very dry and very wet times. When it is extremely wet and flooding, a lot of water flows out to the ocean. This happens because no one can use the extra water. During these events, the ground and existing water ways are already saturated. There often is not even room in reservoirs to store this extra water, which can become dangerous if it is coming in faster than it is going out, as we saw with Lake Oroville. The state is exploring opportunities to facilitate more storage above and below ground, including bond funding and other measures, however, as noted below, periodic higher flows are also important to ecosystem function and carry benefits all the way through to San Francisco Bay for people and ecosystems along the way.

During dry times, however, the overall amount of water in the rivers and streams is much less. When that happens, sufficient water must be kept in stream in order to keep the water from being too salty for human uses, not just to protect fish. In the end, water follows gravity and water channels carved from millennia and serve as a conduit – from the highest point of land to sea level – where it enters the ocean.

FAQ 11: *What purpose is there to allowing water to flow out to San Francisco Bay and the ocean?*

Sometimes a lot of water must flow through places like the Delta into the San Francisco Bay and ocean to make sure that the water in the Delta stays fresh enough to use for agriculture and drinking water. This happens often even during dry periods. If all the fresh water was used, and none left to flow into the ocean, then the water in the Delta would be unusable as a drinking water or agricultural supply. Moreover, just like people, fish need water to live. They need habitat, water quality, and flows so that they can live in and migrate through rivers and the Delta. The additional amount of San Joaquin River water proposed to be provided to protect fish is small compared to what people are using.

A recent Public Policy Institute of California report titled *A New Approach to Accounting for Environmental Water*, which analyzed how and when flows were managed in the Sacramento-San Joaquin Delta, concluded: "During the driest hydrologic conditions, the water allocated to fish and other ecological uses is much smaller than the water that must be left instream to protect water quality for in-Delta diversions and export uses."

FAQ 12: *Is the State Water Board favoring fish over people?*

No, the State Water Board is not favoring fish over people. The State Water Board is amending the Bay-Delta Plan to reasonably protect fish and wildlife and address the balance of instream needs and human uses. The new flow objectives require more water to remain instream to reasonably protect fish and wildlife to establish a better balance between human uses and the needs of fish and wildlife.

FAQ 13: *Is the State Water Board doubling or tripling the water left in the river?*

On average, the Lower San Joaquin River flow proposal as adopted will increase instream flows by approximately 26 percent—that's far less than a doubling of flows. And to achieve this increase in instream flows, surface water supplies for human uses will be reduced by approximately 14 percent, on average. However, the proposed Lower San Joaquin River flows will more than double or triple the current extremely low amount of water left in the Merced, Tuolumne, and Stanislaus rivers some of the time. That may seem high, but that is because conditions are now so bad in these rivers -- instream flows are sometimes only six percent of the total available flow. This means at those times that 94 percent of the water is going towards human uses. Fish and wildlife simply cannot survive with so little water. The Lower San Joaquin River flow proposal and its overall effects are summarized in the Final Substitute Environmental Document (SED) Executive Summary.

FAQ 14: *How much extra water in terms of percentage is the State Water Board asking for from tributaries? Is this a 40 percent water supply reduction, as has been reported? Would half as much water be available for human uses?*

The Lower San Joaquin River flow proposal as adopted would provide a range of 30 to 50 percent of unimpaired flow from February through June in the Merced, Tuolumne, and Stanislaus rivers. The starting point is proposed to be 40 percent of unimpaired flow. This is not the same as a 40 percent reduction. The 40 percent unimpaired flow proposal would result, on average, in a 14 percent reduction in surface water supply for human uses like agriculture and drinking water, and an average 26 percent increase in instream flows on the Merced, Tuolumne, and Stanislaus rivers. Also, see the response to the question: Is the SWB doubling or tripling the water left in the river?

FAQ 15: *Does the SWB proposal ignore other salmon stressors?*

No, the Lower San Joaquin River plan amendments and supporting Final Substitute Environmental Document (SED) recognize that other factors, like predation and loss of habitat, affect fish populations, and the Final SED encourages and incentivizes habitat restoration and other "non-flow" actions that are complimentary to flows. Nonetheless, the State Water Board also recognizes that increased flows will have a large positive effect on two big salmon stressors — lack of suitable habitat and high-water temperatures; increased flows will also provide migration clues for salmon and other benefits. The response to the question on what

the SWB can do about non-flow fish stressors describes the other actions that the State Water Board acknowledges are important to salmon.

FAQ 16: *Haven't striped bass co-existed with salmon for many decades before fish populations declined?*

Yes, striped bass have co-existed with salmon for many decades before fish populations declined. This shows that it is important to consider all factors when assessing stressors. Focused efforts to reduce predation opportunities (not necessarily predators) in some locations, however, may make a difference in the survival rates of depleted salmon and other species and provide some assistance to their recovery. Such predator control actions alone would require an ongoing intensive implementation program and would not address the habitat conditions that allow predator populations to thrive. Changing the habitat to benefit natives and disadvantage predators can help. Higher and more variable flows will create habitat conditions that are less suited for predator populations and provide conditions that reduce exposure of salmonids and other native fishes to predators, increasing the overall effectiveness of the predator control measures by allowing salmon to become more resilient by helping them to grow larger and faster, and by providing flow to get past predation hotspots.

FAQ 17: *Does the Bay Delta Plan only save 1,100 fish?*

Multiple commenters on the draft SED suggested that, according to the SalSim life-history population simulation model results presented in the SED, the plan amendments are only expected to produce approximately 1,103 salmon per year. This assertion is inaccurate and mischaracterizes the information presented in the SED. The State Water Board did not rely upon SalSim due to limitations in the model, either for impact determinations in the SED or for its conclusions regarding fish benefits, as explained in *Chapter 19, Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30*, of the SED and in Master Response 3.1, Fish Protection.

FAQ 18: *Why do the "peer reviewed studies" from the State Water Board and the irrigation districts come to different conclusions about flow and salmon?*

As discussed in Master Response 3.1, Fish Protection, a number of commenters on the adopted SED stated that information presented in the SED regarding species life history, distribution, and status was outdated, citing examples of recently published literature, status reports, or other published and unpublished sources. However, in most cases, this new information did not conflict with or contradict the key scientific information used to support the impact determinations or benefits assessments in the SED.

As described in the *Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives*, studies that examine the relationship between fall-run Chinook salmon population abundance and flow in the SJR Basin generally indicate that:

- additional flow is needed to significantly improve production (abundance) of fall-run Chinook salmon; and
- the primary influence on adult abundance is flow 2.5 years earlier during the juvenile rearing and outmigration life stage

To the extent that any new science or studies indicate that different actions would benefit salmon, they can be accommodated through the adaptive implementation elements of the program of implementation as described in the *Revised Water Quality Control Plan (Appendix K)*, *Executive Summary,* and *Master Response 2.2, Adaptive Implementation*.

Additional information regarding specific Lower San Joaquin River fish studies is provided in the response to question: Did the State Water Board consider the most recent and best science?

FAQ 19: *Is the unimpaired flow concept a rigid flow regime ignoring the timing of fish needs?*

The unimpaired flow concept is not rigid. The unimpaired flow requirement is designed to mimic the natural cues that species have evolved to respond to, but is not intended to be a rigid and fixed percent of unimpaired flow. The proposal provides for and encourages collaboration to use the flows as a "water budget" that can provide flows that are "shaped" or shifted in time to better achieve ecological functions such as increased habitat, more optimal temperatures, or migration cues. Adaptive implementation of flows allows a nimble response to changing information and changing conditions while minimizing unintended impacts and can provide more timely and efficient use of flows than an inflexible regime of prescriptive flow rates. This requires coordinated effort between water agencies and fish and wildlife agencies as well as stakeholders to accomplish.

FAQ 20: *Scientists say fish need flows for specific functions. Why doesn't the State Water Board use functional flows instead of unimpaired flows?*

The unimpaired flow approach actually provides a variable budget of water that can be used to provide functional flows. The flows needed to provide certain functions, such as to provide a certain quantity of habit or a specific temperature threshold can often be much higher than the total quantity of water available in some years. Using a percent of unimpaired flow allows the State Board to establish a limited quantity of water, that is a percent of the total available supply, that can be used to provide as much functional flow as possible within a specified

budget. This means the fish and environment have to get by on a budgeted amount of water just like people do now. Determining and providing those functional flows requires voluntary action by local water agencies working with fish agencies as noted above. See also the response to questions on the unimpaired flow concept, peer reviewed studies, and the discussion of Unimpaired Flow as Functional Flow in *Master Response 3.1, Fish Protection*.

FAQ 21: *The San Joaquin River and Delta are no longer in a natural condition. Why does the State Water Board want to impose natural flows on a highly modified unnatural system?*

The unimpaired flow approach will restore some of the natural pattern of flows to which fish are adapted. This approach, however, is not intended to return natural flows to an unnatural system. The unimpaired flow approach is simply intended to keep a portion of the total available supply in the rivers in a pattern that mimics natural patterns because that is what the science shows that fish will benefit from. It is important to note that the State Water Board flow proposals are for percentages of unimpaired flow that are far lower than 100 percent. In addition to providing a simple and correct way to quantify an amount of water that can be used to reasonably protect fish and wildlife, the unimpaired flow approach provides a simple method to share the available water supply for multiple uses-- to balance the competing beneficial uses for water.

FAQ 22: *Does this water "belong" to the users?*

Water is a shared resource that has many different beneficial uses, and all water within California is the property of the people of the state (Cal. Const. art. X, § 5; Wat. Code §102). Water is protected for the use and benefit of all Californians. California's waters cannot be owned by individuals, groups, businesses, or governmental agencies. But riparian, pre-1914 and appropriative water rights (permits, licenses, and registrations) give individuals and others the right to beneficially use reasonable amounts of water according to a priority system and subject to public trust and other regulatory requirements.

FAQ 23: *What does the term "public trust" mean? Do fish and wildlife have water rights?*

Public trust is the principle that certain natural and cultural resources are preserved for public use, and that the government must protect and maintain for the public's use. Public trust values include navigation, commerce, fisheries, recreation, scenic, and ecological values. Fish and wildlife don't have water rights, but as stated above, fisheries are a public trust resource. The State Water Board has also identified fish and wildlife as beneficial uses, to be protected under state and federal law. As beneficial uses, the State Water Board must establish flow and water quality objectives to protect the use.

FAQ 24: *Were the comments submitted opposing the draft plan ignored?*

No comments on the draft plan or supporting documents were ignored. During the 6-month public comment period for the draft SED, the State Water Board received more than 33,000 letters/communications. More than 30,000 of these were form letters that expressed similar themes of support or opposition to the draft SED. The remaining 3,100 were unique communications. The State Water Board reviewed the 3,100 letters/communications and identified that roughly 10,000 comments within those unique communications were received from federal, state, and local agencies; elected officials; stakeholders; and members of the public. A comprehensive Responses to Comments document provides more information on how comments were reviewed and responded to, and general and specific responses to all comments received are provided on the State Board's *Bay-Delta Plan Update: Amendments and Substitute Environmental Document (SED) for Lower San Joaquin River and Southern Delta* website.

FAQ 25: *Is this just a plan to send more water south?*

No, the Bay-Delta Plan Update for Lower San Joaquin River and Southern Delta is not a plan to send more water south. As stated in the Executive Summary for the plan amendment, the underlying fundamental project purpose and goal of the plan amendments are as follows:

- To establish flow objectives for the February–June period and a program of implementation for the reasonable protection of fish and wildlife beneficial uses in the Lower San Joaquin River Watershed, including the three eastside, salmon-bearing tributaries (the Stanislaus, Tuolumne, and Merced Rivers)
- To establish salinity objectives for the reasonable protection of southern Delta agricultural beneficial uses and a program of implementation to achieve the objectives
- Exports are also governed by rules regarding environmental and water quality pertaining to protecting flows for fisheries and water quality purposes.

FAQ 26: *If the WaterFix is built, will it have to comply with the Bay Delta Plan flow requirements?*

Whether to approve water right changes for the WaterFix tunnels, and under what conditions, is the subject of a separate, ongoing State Water Board hearing. Any approval must include conditions to avoid injury to municipal, industrial, agricultural, and fish and wildlife beneficial uses in the Bay-Delta. Pursuant to the Delta Reform Act, any approval of the WaterFix must also include appropriate Delta flow criteria. The flow criteria included in a WaterFix water right approval are subject to modification over time, including via ongoing Delta water management actions, such as the Bay-Delta Plan updates. Once the State Water Board completes updates

for the Lower San Joaquin/Southern Delta and Sacramento River/Delta, the board will commence an implementation phase that requires applicable water right holders to comply with the Bay-Delta Plan requirements. In that phase, the relative seniority of water rights within watersheds is a key consideration in allocating responsibility for meeting plan requirements. During that implementation phase, any water right conditions applicable to WaterFix may be adjusted to implement the Bay-Delta Plan.

FAQ 27: *The estimations of economic harm are vastly different between the estimates included in the SED and estimates by opponents. Why is that?*

Several commenters performed their own economic analyses and arrived at higher regional economic effects by using extreme assumptions compared to those made in the SED. The assumptions used in the economic analyses performed by the commenters, with regard to agricultural economic effects, include the following.

- Restrictions on how much groundwater will be used to supplement reduced surface water supplies and assumptions that the Sustainable Groundwater Management Act (SGMA) will prevent increased groundwater pumping.
- A one-to-one relationship between a reduction in feed crop production and a reduction in dairy and livestock sector production.
- The assumption that the dairy and livestock industries cannot replace reduced grain and pasture production in the plan area with other feed crops or with supplies from outside of the plan area.
- Reductions in crops, such as vegetables, will proportionally reduce production of processed products.

Some of the commenters also apparently assumed in their modeling of economic effects that there would be no reduction in surface water use, even as reservoir levels dropped. This extreme and unreasonable assumption results in frequent emptying of reservoirs. Not only would entirely emptying reservoirs result in enormous economic effects, it would also result in catastrophic temperature effects on salmon. Historical evidence shows that reservoir operators and water districts generally operate to meet multiple objectives of maximizing water delivery to meet demands, saving some water in reservoirs, and providing minimum allocations when water supply is low and do not, as some commenters analyses suggested, drain the reservoirs dry to meet full demands every year. Rather, operators conserve water by allocating the available water based on the projected supply. This is the approach reflected in the SED analysis which provides water as reliably as possible from year to year given system constraints.

There are multiple valid ways to conduct an evaluation of regional economic effects, including the SED's method. The SED presents a more reasonable scenario of what would happen in response to the Lower San Joaquin River alternatives based on actual historical observations,

including strategic use of reduced surface water, reservoir carryover storage, strategic use of groundwater during periods of drought to maintain permanent crops and some feed crop production, substitution of high water use feed crops for feed crops that use less water, import of dry feed from other areas, and maintenance of high revenue producing crops.

FAQ 28: *Will schools lose safe drinking water because of this plan?*

The issue of safe drinking water for schools and others, including disadvantaged communities, has been raised because of concerns that with reduced surface water supplies, water users in the Lower San Joaquin River watershed will rely more heavily on groundwater, and that this could result in degraded water quality. Schools will not lose safe drinking water because SGMA requires that groundwater be managed sustainably to ensure reliable water supplies and to protect against degradation. Currently, all groundwater is managed locally. Consistent with that approach, SGMA entrusts local public agencies to achieve sustainability but places the state in an important oversight and enforcement role. Moreover, the state is working on ways to streamline focused groundwater recharge. In addition, the State Water Board has been actively engaged in helping communities through financial and technical assistance and is continuing to seek even more tools from the legislature to be able to do even more for small disadvantaged communities and schools. Drinking water is also a significantly smaller water use than agriculture.

More information on SGMA is available in *Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act*. More information on the potential impacts of the plan amendments on disadvantaged communities (DACs) and small public water systems is provided in *Master Response 2.7, Disadvantaged Communities*.

FAQ 29: *How are other fish species faring in the Delta? (charts?)*

The 2017 report, Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows provides population abundance trends for the following species as part of the summary of scientific knowledge assembled in the report to inform fish and wildlife flow recommendations:

- Sacramento River and Delta Tributary (Mokelumne, Cosumnes, and Calaveras) Chinook Salmon
- Sacramento River and Delta Tributary Steelhead
- Longfin Smelt
- Green Sturgeon
- Sacramento Splittail
- Delta Smelt
- Starry Flounder
- California Bay Shrimp

- Zooplankton

In summary, these species are also generally in decline and doing poorly, with several species at the verge of extinction, due to reduced flows into and out of the Delta as well as other nonflow stressors like habitat modifications. As discussed above, the State Water Board is considering new and modified flow and water project operational requirements to protect these species as part of the Sacramento/Delta update to the Bay-Delta Plan. That update will also provide for voluntary solutions by water users that reduce the need for flow by addressing nonflow stressors. A draft environmental document for that effort is expected to be released later this year.

For more information please visit the Bay Delta Update page found here.

This fact sheet was last updated on Dec 12, 2018.

Fact Sheet

Proposed Final Amendments and Final Substitute Environmental Document for Lower San Joaquin River Flow Objectives and Southern Delta Salinity Objectives

Overview

The San Francisco Bay/Sacramento-San Joaquin Delta Estuary includes the Sacramento-San Joaquin Delta (Delta), Suisun Marsh, and San Francisco Bay. California's two major rivers, the Sacramento and the San Joaquin, converge in the Delta and meet incoming seawater from the Pacific Ocean in San Francisco Bay. Vast numbers of species live in or migrate through the Delta, including salmon and other at-risk native fish. In addition, water diverted from the Delta helps meet the drinking water needs of more than two thirds of Californians and provides irrigation for millions of acres of productive farmland.

The Delta is in ecological crisis, with precipitous declines in native migratory fish species occurring over the past decades. Under state and federal law, the State Water Resources Control Board (State Water Board) is tasked with protecting the waters of this vital area. The Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary (Bay-Delta Plan) is a key component of this protection. The State Water Board has engaged in a multi-year process to amend the Bay-Delta Plan to revise outdated objectives for the protection of fish and wildlife beneficial uses in the Lower San Joaquin River and agricultural beneficial uses in the southern Delta. That process included extensive public outreach, comment, and revision.

On July 6, 2018 the State Water Board released draft final plan amendments for the Lower San Joaquin River and Southern Delta objectives (Lower San Joaquin River/Southern Delta update) and a draft Final Substitute Environmental Document (draft Final SED), which provided the environmental analysis in support of the plan amendments. The draft final proposal would update water flow objectives in the Lower San Joaquin River and its major tributaries, the Stanislaus, Tuolumne, and Merced Rivers.

Additionally, because the Lower San Joaquin River drains into the southern Delta, the update also amends southern Delta salinity objectives. The new flow objectives recognize the need for flows of an adequate volume and more variable pattern on the three major tributaries to provide habitat and migratory signals and protections for native fish. The refined salinity objectives reflect updated scientific information about salt levels that reasonably protect farming in the southern Delta.

State Water Board Responsibility

The State Water Board holds dual responsibilities of allocating surface water rights and protecting water quality. The State Water Board allocates water through an administrative system that is intended to maximize the beneficial uses of water while protecting the public trust and serving the public interest. This requires an appropriate balancing of interests.

State and federal law requires the protection of the State's water quality and beneficial uses of water. Accordingly, the State Water Board and Regional Water Quality Control Boards develop water quality control plans that identify beneficial uses of waters and establish water quality objectives to protect these uses. The plans also contain implementation, surveillance, and monitoring elements to achieve the water quality objectives. While most water quality control planning is done by the Regional Water Quality Control Boards, the State Water Board has authority to adopt statewide water quality control plans. The State Water Board historically adopted the Bay-Delta Plan because of its importance as a major source of water supply for the state, and to help ensure a coordinated approach across Regional Board boundaries. In addition, because diversions of water within and upstream of the Bay-Delta are a driver of water quality in the Bay-Delta, much implementation of the Bay-Delta Plan relies upon the combined water quality and water right authority of the State Water Board. The Bay-Delta Plan protects water quality in the region and includes water quality objectives to protect municipal and industrial, agricultural, and fish and wildlife beneficial uses.

Updating the Bay-Delta Plan

In addition to Lower San Joaquin River/Southern Delta update, the State Water Board is in the midst of developing a proposal for updating flow requirements for the Sacramento River, its tributaries, and the Delta and its tributaries, including the Calaveras, Cosumnes, and Mokelumne Rivers, Delta outflow objectives, Delta interior flow objectives, and coldwater habitat objectives. The State Water Board is engaging in two watershed-based planning strategies in order to more fully take into account the distinct hydrologic, species, environmental, and water use characteristics of each region. Previously, for administrative convenience, the Lower San Joaquin River/Southern Delta update was referred to as phase 1, while the Sacramento/Delta update was referred to as phase 2.

At the same time that the Lower San Joaquin River/Southern Delta update is being released, the State Water Board released a framework that describes the draft proposal for updating the flow requirements for the Delta and its contributing watersheds, including the Sacramento River and its tributaries. This Framework document is a preview of a forthcoming draft staff report and allows the public to better understand how the two updates relate to one another and how each watershed is being asked to share responsibility for protecting fish and wildlife for the betterment of the entire Bay. This framework provides additional details about the likely proposed flow requirements, how these new requirements could be implemented, and preliminary information on their potential benefits and water supply effects.

Lower San Joaquin River/Southern Delta Plan Amendments

The State Water Board is proposing to update two elements of the 2006 Bay-Delta Plan. A brief description of the proposed amendments to the two elements is provided below followed by more detailed descriptions of important highlights of each:

- Lower San Joaquin River flow objectives for the protection of fish and wildlife: the proposed plan update would increase the required flows to be left in the three main salmon-bearing tributaries to the Lower San Joaquin River, the Stanislaus, Tuolumne, and Merced Rivers, during the critical February through June period, as wells as increasing the variability of those flows and allowing the flows to be adaptively implemented to better achieve successful ecological functions. The update would also add compliance locations on the three tributaries instead of only on the Lower San Joaquin River at Vernalis.

- Southern Delta salinity objectives for the protection of agriculture: this proposal would adjust the salinity requirements to a slightly higher level to reflect updated scientific knowledge of Southern Delta salt levels that reasonably protect agriculture. Monitoring and compliance locations would be changed to better reflect overall salinity levels and protection of agriculture.

Lower San Joaquin River Flow Objectives

- The draft Final SED recommends increasing flow on the San Joaquin River and its tributaries to 40 percent of unimpaired flow within a range of 30 to 50 percent from February through June. Unimpaired flow represents the water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. Historical median February through June flows from 1984–2009 in the Merced, Tuolumne, and Stanislaus Rivers were, respectively, 26, 21, and 40 percent of unimpaired flow. In other words, half of the time more than 60 or 70 percent of each river's flow is diverted out of the river during these months and the proposal seeks to return some portion of that diverted flow to the river.

- Scientific studies show that flow is a major factor in the survival of fish like salmon and that current flows are inadequate to protect many endangered and threatened species, as well as species relied upon by the commercial fisheries. The draft Final SED recognizes that other factors, like predation and loss of habitat, affect fish populations, and the draft Final SED encourages and incentivizes habitat restoration and other "non-flow" actions that are complimentary to the flow objectives.

- The unimpaired flow requirement is designed to mimic the natural cues that species have evolved to respond to, but is not intended to be a rigid and fixed percent of unimpaired flow. The proposal provides for and encourages collaboration to use the flows as a "water budget" that can provide flow that are "shaped" or shifted in time to better achieve ecological functions such as increased habitat, more optimal temperatures, or migration cues. Adaptive implementation of flows allows a nimble

response to changing information and changing conditions while minimizing unintended impacts and can provide more timely and efficient use of flows than an inflexible regime of prescriptive flow rates.

- In addition to increasing instream flow levels, the draft final update differs from the existing Bay-Delta Plan in that it requires flows from each of the three major salmon-bearing tributaries to the lower San Joaquin River. The existing plan measures flows at Vernalis on the San Joaquin River, and puts the burden for maintaining flow entirely on the U.S. Bureau of Reclamation through releases of water from New Melones Reservoir on the Stanislaus River. The draft plan recognizes the importance of balancing the flow requirements among the three tributaries, and the need for flow on all three to restore and protect the populations of migrating fish in those rivers throughout their lifecycles.

- The draft Final SED recognizes that reduced diversions can create financial and operational challenges for local economies. The flow requirement considers the needs for fish and wildlife along with the needs of agriculture and local economies. Some will find the requirement too "high," and others will find it too "low." The proposed flow requirements are designed to provide reasonable protection for fish and wildlife without imposing undue burdens on water users.

- The draft final plan amendments incorporate flexibility so that stakeholders are encouraged to work together to reach voluntary agreements that could implement Bay-Delta Plan objectives for fish and wildlife beneficial uses. Voluntary actions to implement non-flow measures such as habitat restoration, gravel augmentation, and predator suppression can improve conditions for fish and wildlife and may support a change in the flows within the 30 to 50 percent range. While the revised amendments enhance flexibility, the Board remains interested in receiving potential plan amendment language which would authorize, with the affirmative concurrence from the California Department of Wildlife, a coordinated control of flows and other, non-flow factors that would achieve benefits comparable to the unimpaired flow requirements. In this way, people working together can yield comparable or better benefits to fish and wildlife at lower water supply cost. The State Water Board cannot order these collaborative efforts in a regulation, but can accept them if offered.

- The draft final plan amendments also encourage local water agencies, fish and wildlife agencies and other experts to work with State Water Board staff in a working group that will make recommendations on how best to implement the flow objectives within the proposal framework. The Executive Director can approve, on an annual basis, the recommendations of one or more working group members to shape or shift flows or the consensus recommendation of the working group to change the percent of unimpaired flow within the range.

- The draft final plan amendments also give the State Water Board the flexibility to

respond to new information or take longer-term adaptive implementation measures. The Board can approve, on an annual or multi-year basis, flow shaping, shifting or changes in the percent of unimpaired flow within the range. For example, the State Water Board could approve a multi-year voluntary agreement that includes flows within the range and non-flow actions.

- The plan amendments include a robust process for constantly learning and adapting to best available information with monitoring, special studies, coordination, and evaluation. Transparency of both actions and data are a central feature of the proposal with annual reporting and then comprehensive reporting every three to five years that includes peer-review and public meetings.

- Biological goals, including for salmon population growth, distribution, and other factors, will be among the tools that inform future State Water Board decisions on whether to adjust the unimpaired flow percentage. Adaptive implementation can optimize flows and consider improvements in biological conditions that support native fish when making decisions about flow adjustments.

- While carefully considering the comments received, the draft final plan concludes the recommended flow requirements are necessary for recovery of fish populations. Scientific studies indicate a flow closer to 60 percent of unimpaired flow would improve conditions for a healthy fishery. On the other hand, a 60 percent flow requirement would cause more significant economic damage to water users. It is the State Water Board's task to balance competing beneficial uses for water.

Southern Delta Salinity Objectives

- The recommended amendment to the southern Delta salinity objective (southern Delta salinity proposal) would eliminate the seasonal element of the objective by raising the current April through August objective of 0.7 deciSiemens per meter [dS/m] to the same level as the current September through March objective of 1.0 dS/m for an objective of 1.0 dS/m year-round.

- Analysis of southern Delta water quality and crop salinity requirements shows that the existing salinity conditions in the southern Delta are suitable for all crops and that the existing April through August salinity objective is actually lower than what is needed to reasonably protect agriculture.

- The United States Bureau of Reclamation (Reclamation) would be required to continue to comply with the 0.7 dS/m salinity level for the Lower San Joaquin River at Vernalis as a condition of its water rights. Reclamation's activities associated with operating the Central Valley Project in the San Joaquin River basin are a principle cause of salinity exceedances at Vernalis and maintaining a salinity level of 0.7 dS/m at Vernalis is needed to implement the 1.0 dS/m objective downstream in the interior Southern Delta.

- The revised water quality objectives coupled with the implementation measures included in the Bay-Delta Plan update would provide the same or better conditions for agricultural uses in the Delta, as compared to existing conditions through the continuation, or improvement, of existing management actions, including maintenance of water levels.

- The proposal includes requirements that the State Water Project and federal Central Valley Project address the impacts of their export operations on water levels and flow conditions that may affect salinity conditions in the southern Delta.

- The southern Delta salinity proposal would also replace the three current fixed points for monitoring southern Delta salinity compliance, and instead identifies three extended channel segments for monitoring conditions and measuring compliance.

- Increased February through June flows under the San Joaquin River flow element would improve salinity conditions in the southern Delta early in the irrigation season.

Public Comments

- On September 15, 2016 the State Water Board released draft amendments to update the Lower San Joaquin River/Southern Delta objectives (draft plan amendments) and a Recirculated Substitute Environmental Document (Recirculated SED). There was a six-month long comment period on the draft plan amendments and Recirculated SED. This is the longest public comment period the State Water Board has ever held. Initially, the plan was released for a 60-day public review from September 15, 2016 to November 15, 2016. In response to requests from the public, including stakeholders who asked for additional time to negotiate voluntary agreements that would implement the flow objectives, the 60-day review period was extended twice: first from November 15, 2016 to January 17, 2017, and then from January 17, 2017 to March 17, 2017.

- The State Water Board received over 1,400 unique comment letters on the draft plan amendments and Recirculated SED from federal, state, and local agencies; elected officials; stakeholders; and other members of the public. The State Water Board also conducted a public hearing over five days and in four locations (Stockton, Modesto, Merced, and Sacramento) to receive oral comments on the draft plan amendments and Recirculated SED. The public hearing occurred between November 2016 and January 2017.
- The State Water Board appreciates the active engagement of the public and stakeholders in the water quality control planning and environmental review processes, and acknowledges the plan amendments are controversial with some members of the public and stakeholders. Comments were received from both ends of the spectrum—with many in favor, and opposed, including individuals, local, regional

and statewide organizations, and elected officials, expressing strongly held views that the amendments are not strict enough or that they are too strict. Amending the Bay-Delta Plan presents many complex and challenging issues, and the State Water Board appreciates the efforts of all parties that reviewed the draft plan amendments and Recirculated SED and submitted comments. The comments were thoughtful and covered a broad range of policy and environmental issues. Major topic areas that elicited frequent comments included agricultural resources, regional economies, groundwater resources, fish and wildlife ecological health, commercial fishing, drinking water, disadvantaged communities, the water quality control planning process, project alternatives, hydrology, and hydrologic modeling.

- The State Water Board considered all comments, criticisms, and suggestions in determining whether and how to modify the draft plan amendments. The draft Final SED (at Volume 3) provides written responses to all comments received during the comment period. The responses represent the State Water Board's best effort to carefully and objectively review and consider the comments and supporting information provided by commenters.

- The proposed draft Final SED represents the conclusion of an extended public outreach and environmental analysis process. The State Water Board issued a Notice of Preparation for the update in 2009. A Draft SED was released in 2012 and substantial changes were included in the Recirculated SED in response to comments on the 2012 Draft. Examples of these changes include incorporating information from the recent drought, and recognizing the enactment of the 2014 state policy for sustainable groundwater management (Wat. Code, § 113) and passage of the Sustainable Groundwater Management Act (Wat. Code, § 10720 et seq.). In addition, clarifying modifications were made to the plan amendments, after consideration of all comments received on the Recirculated SED. The modifications can be reviewed in the draft Final SED, Appendix K, Revised Water Quality Control Plan, and an explanation of the modifications is provided in Volume 3, Master Response 2.1, *Amendments to the Water Quality Control Plan.*

Next Steps

The draft final amendments can be found in Appendix K of the draft Final SED. After consideration of public input, the text of the proposed amendments was modified. Those revisions are identified in double strikeout and double underline in the draft final amendments. The State Water Board is accepting written comments on the changes contained in Appendix K that are identified in double strikeout/double underline.

Written comment letters on changes to Appendix K must be received by 12 p.m. (noon) on Friday, July 27, 2018. Late written comments will not be accepted. The State Water Board will not accept or consider any written comments on the draft Final SED. The meeting notice and instructions for submitting comments on the revisions can be found here.

This is a draft final staff proposal and draft Final SED for consideration by the State Water Board's members. The State Water Board members will consider the draft Final SED before approving the project, and the SED will become final upon project approval. The State Water Board will begin consideration of whether to adopt the proposed final amendments and proposed Final SED at a public meeting commencing on August 21, 2018. A notice of the meeting has been provided and is available on the Board's website here.

An expanded summary of the proposed updates to the Bay-Delta Plan is available here.

(This fact sheet was last updated on July 6, 2018.)

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2018-0059

ADOPTION OF AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY AND FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENT

WHEREAS:

1. The State Water Resources Control Board (State Water Board) and the nine regional water quality control boards administer the Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.) (Porter-Cologne Act) to achieve an effective water quality control program for the state and are responsible for the regulation of activities and factors that may affect the quality of the waters of the state. (Wat. Code, §§ 13000, 13001.)

2. The State Water Board is authorized to adopt a water quality control plan in accordance with the provisions of Water Code sections 13240 through 13244, insofar as they are applicable. (Wat. Code, § 13170.)

3. The State Water Board has undertaken a proceeding under its water quality authority to amend the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan), adopted in 1978 and amended in 1991, 1995, and in 2006. The Bay-Delta Plan establishes water quality objectives for the protection of beneficial uses in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta) and a program of implementation to achieve the objectives. Diversions of water within and upstream of the Bay-Delta are a driver of water quality in the Bay-Delta. As a result, much of the implementation for the Bay-Delta Plan relies upon the combined water rights and water quality authorities of the State Water Board.

4. The 2006 Bay-Delta Plan identified emerging issues requiring additional action by the State Water Board, including San Joaquin River flows and Delta salinity. In the 2008 Strategic Workplan for Activities in the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary, the State Water Board committed to undertake a review of the southern Delta salinity and San Joaquin River flow objectives and their implementation. The State Water Board further reiterated its commitment in the 2009 Staff Report on the Periodic Review of the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary.

5. Native fish species that migrate through and inhabit the Delta have experienced dramatic population declines in recent years, bringing some species to the brink of extinction. Approximately 70,000 fall-run Chinook salmon adults returned to the San Joaquin Basin in 1985. The number of returning adults dropped to approximately 40,000 in 2000 and dropped again to 8,000 returning adults in 2013. Returning fall-run adults were estimated to be approximately 10,000 in 2017. This is an 85 percent net loss in returning adult fall-run Chinook salmon from 1985 to 2017. While multiple factors are responsible for the decline, the magnitude of diversions out of the Sacramento, San Joaquin, and other rivers feeding into the Bay-Delta is a major factor in the ecosystem decline. The State Water Board has authority over both water quality and water diversion and use.

6. The State Water Board adopted the southern Delta salinity objectives for agriculture in the 1978 Delta Plan. The objectives are based on conditions, crops, and irrigation practices in the southern Delta at the time the objectives were adopted. Recent analysis of southern Delta water quality and crop salinity requirements shows that the existing salinity conditions in the southern Delta are suitable for all crops and that the existing April through August salinity objective is lower than what is needed to reasonably protect agricultural beneficial uses.

7. The State Water Board commenced the process to amend the Bay-Delta Plan to reasonably protect fish and wildlife beneficial uses in the Lower San Joaquin River (LSJR) and its three eastside salmon-bearing tributaries, the Stanislaus, Tuolumne, and Merced Rivers, and agricultural beneficial uses in the southern Delta in 2009 as follows:

    a. On February 13, 2009, the State Water Board issued a Notice of Preparation (NOP) and of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Bay Delta Plan: Southern Delta Salinity and San Joaquin River Flows. The public had an opportunity to submit written comments and to participate in the scoping meeting held on March 30, 2009. On April 1, 2011, the State Water Board issued a revised NOP and notice of additional scoping meeting, which provided for a written comment period and a scoping meeting on June 6, 2011. The notice included potential draft language for the southern Delta salinity objectives, San Joaquin River flow objectives, and the program of implementation.

    b. On April 22, 2009, the State Water Board staff held a public staff workshop to receive information and conduct detailed discussions regarding potential amendments or revisions to the southern Delta salinity and San Joaquin River flow objectives included in the Bay-Delta Plan and their implementation. It held other workshops including two workshops to receive and respond to public comments on a draft study report on the salt tolerance of crops in the southern Delta on August 13, 2009, and November 4, 2009, and a workshop on a draft technical report on the scientific basis for alternative San Joaquin River flow and southern Delta salinity objectives on January 6 and 7, 2011.

    c. On December 31, 2012, the State Water Board released for public review and comment a draft substitute environmental document (2012 Draft SED) in support of proposed changes to the Bay-Delta Plan to adopt new and revised narrative and numeric flow water quality objectives for the LSJR, including the Stanislaus, Tuolumne, and Merced Rivers, a revised salinity water quality objective in the southern Delta, and a program of implementation to achieve the objectives (2012 Draft Amendments). On March 20 and 21, 2013, it held a public hearing on the 2012 Draft SED and 2012 Draft Amendments. The deadline for written comments was March 29, 2013, and the State Water Board received numerous comments.

    d. On September 15, 2016, the State Water Board recirculated for public review and comment a revised draft substitute environmental document (Recirculated SED) in support of revisions to the 2012 Draft Amendments (2016 Draft Amendments). The Recirculated SED and 2016 Draft Amendments made substantial changes to the 2012 Draft SED and 2012 Draft Amendments in consideration of the large number of public comments received concerning those drafts, in light of additional information,

including information learned from the recent drought, and in response to the state's adoption in 2014 of a state policy for sustainable groundwater management (Wat. Code, § 113) and passage of the Sustainable Groundwater Management Act (Wat. Code, §§ 10720 et seq.), which provide a roadmap and directive for sustainable local groundwater management.

e. The State Water Board held a five-day public hearing, commencing in November 2016 and concluding in January 2017, on the Recirculated SED and 2016 Draft Amendments. State Water Board staff also held numerous workshops and outreach meetings. The State Water Board provided a six-month written comment period that closed on March 17, 2017. The State Water Board received thousands of comments.

f. On July 6, 2018, the State Water Board released the proposed final SED (Final SED), which includes proposed final amendments to the Bay-Delta Plan (Plan Amendments) and written responses to comments on the Recirculated SED and the 2016 Draft Amendments. It also provided notice of a public meeting to consider the adoption of the proposed Plan Amendments and Final SED, and solicited comments on the changes to the regulatory language in the proposed Plan Amendments. The Final SED, including the Plan Amendments, includes modifications that clarify, amplify, or refine information, primarily in response to comments. These modifications do not result in new significant environmental effects or a substantial increase in the severity of effects disclosed in the Recirculated SED.

g. At a public meeting on August 21-22, 2018, the State Water Board heard oral comments and considered the adoption of the proposed Plan Amendments and Final SED. The State Water Board continued final action to December 12, 2018. Change Sheets 1 to 3 were released to the public on August 20, 2018, and October 25, 2018, and include modifications to the Plan Amendments and the SED. Neither those changes nor the changes made by the State Water Board to this Resolution at the December 12, 2018, meeting result in new significant environmental effects or a substantial increase in the severity of effects disclosed in the Final SED.

8. The Plan Amendments' new and revised flow water quality objectives for the LSJR and a revised southern Delta salinity water quality objective are based on sound scientific rationale and contain sufficient parameters to protect fish and wildlife and agricultural beneficial uses.

9. Pursuant to Health and Safety Code section 57004, the scientific basis of the Plan Amendments underwent external scientific peer review through an interagency agreement with the University of California. Peer review was solicited on August 12, 2011, and completed on November 21, 2011.

10. In establishing and revising the flow water quality objectives for the LSJR and the salinity water quality objective for the southern Delta, the State Water Board has duly considered the factors set forth in Water Code section 13241. These factors include: (1) past, present, and probable future beneficial uses of water; (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area;

(4) economic considerations; (5) the need for developing housing within the region; and (6) the need to develop and use recycled water. The information supporting the State Water Board's consideration of these factors is in the Final SED, including the comments and responses to comments contained therein.

11. The Plan Amendments include a program of implementation for achieving the LSJR flow water quality objectives and the salinity water quality objective for the southern Delta in accordance with Water Code section 13242. To help ensure transparency and accountability in evaluating compliance with the water quality objectives, to inform ongoing implementation, and to foster and accommodate the development of scientific information, the Plan Amendments require monitoring and reporting on annual and longer-term bases.

12. The water quality control planning program is a regulatory program that has been certified by the State's Secretary for Resources as exempt from the requirements of the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.) to prepare an environmental impact report (EIR) or negative declaration. (Cal. Code of Regs., tit. 14, § 15251, subd. (g); Cal. Code of Regs., tit. 23, § 3775.) The Final SED is in lieu of an EIR and has been completed in compliance with the requirements applicable to the State Water Board's certified exempt regulatory programs. The State Water Board has evaluated the potential environmental effects of reasonably foreseeable methods of compliance with the Plan Amendments in accordance with Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187.

13. The Final SED comprises Volumes I to III (which includes responses to comments), as amended by change sheets; Comment Summary and Responses released in August 2018 to respond to comments solicited on July 6, 2018, on the changes to the language in the proposed Plan Amendments; Comment Responses released in October 2018 to respond to oral comments at the August 21-22, 2018, public meeting; and this resolution and its attachments, as amended by Change Sheet 1. (Cal. Code Regs., tit. 23, § 3779.5, subd. (b).) The Final SED includes sufficient environmental and technical analysis to satisfy the requirements of CEQA and other applicable laws.

14. In accordance with California Code of Regulations, title 23, section 3779.5, subdivision (c), and California Code of Regulations, title 14, section 15091, subdivision (a), Attachment 1 sets forth the CEQA Findings and Statement of Overriding Considerations Prepared for Amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and is incorporated herein. It includes findings for each significant environmental effect that may occur from implementation of the Plan Amendments and describes measures to reduce significant effects. The State Water Board recognizes that despite mitigation measures described in the Final SED and in Attachment 1, implementation of the Plan Amendments would have significant and unavoidable effects on the environment. As explained in the statement of overriding considerations in Attachment 1, the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of the Plan Amendments outweigh the unavoidable significant environmental effects of the Plan Amendments. Attachment 2 is the Mitigation and Monitoring Program that sets forth and ensures implementation of mitigation measures within the State Water Board's authority and is incorporated herein.

15. It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. (Wat. Code, § 106.3 and State Water Board Resolution No. 2016-0010.) The State Water Board has considered this policy and the Plan Amendments include a statement that the State Water Board "will take actions as necessary to ensure that the implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods." The State Water Board will continue to consider this policy through the technical and financial assistance programs it administers for at-risk communities, including disadvantaged communities within the area covered by the Plan Amendments.

16. Adoption of the Plan Amendments is consistent with the state Antidegradation Policy (State Water Board Resolution No. 68-16) and the federal Antidegradation Policy (40 C.F.R. § 131.12).

17. The Bay-Delta Plan, as amended by the Plan Amendments, supplements the other water quality control plans that cover the Bay-Delta Estuary watershed. Together they include all necessary elements of water quality control plans in accordance with the Porter-Cologne Act and federal requirements. The Bay-Delta Plan supersedes any regional water quality control plans for the same waters to the extent of any conflict. (Wat. Code, § 13170.)

18. The Bay-Delta Plan will be reviewed every three years in compliance with Water Code section 13240 and federal Clean Water Act section 303(c) (33 U.S.C. § 1313(c)).

19. The State Water Board has complied with all notice and hearing requirements and carefully considered all timely oral and written comments, responses to comments, the Final SED, and all of the evidence in the administrative record. The Final SED reflects the independent judgment and analysis of the State Water Board.

20. The Plan Amendments will be submitted to the Office of Administrative Law (OAL) and become effective upon OAL approval. The water quality standards, as defined under the federal Clean Water Act, in the plan also will be submitted to the U. S. Environmental Protection Agency (U.S. EPA) in accordance with the federal Clean Water Act (33 U.S.C. § 1251 et seq.). Other portions of the Bay-Delta Plan, such as the program of implementation, are to be submitted to U.S. EPA as part of the continuing planning process, but do not require approval.

21. The State Water Board is aware of ongoing negotiations between interested stakeholders and various other state agencies to achieve voluntary agreements to implement the Plan Amendments. In particular, robust voluntary agreements can help inform and expedite implementation of the LSJR flow objectives and provide durable solutions in the Bay-Delta watershed while also providing reasonable protections for fish and wildlife.

    a. The State Water Board encourages stakeholders to continue to work together to reach voluntary agreements that incorporate a mix of flow and non-flow measures that meet or exceed the new and revised water quality objectives and protect fish and wildlife beneficial uses, and to present those voluntary agreements to the State Water Board for its review as soon as feasible.

b. At the December 12, 2018 meeting, the California Department of Water Resources and California Department of Fish and Wildlife presented updated information on voluntary agreements and the contours of a potential Delta watershed-wide agreement. The Delta watershed-wide voluntary agreement is a discrete project encompassing a larger area than the LSJR flow objectives and within the LSJR project area only includes the Tuolumne River. Additional work is necessary to develop an enforceable agreement, join additional parties, analyze the agreement and how it interacts with the Bay-Delta Plan, and assess what, if any, changes may be necessary to the Bay-Delta Plan for the agreement to serve as an implementation mechanism to reasonably protect beneficial uses in the Tuolumne River and applicable portions of the Bay-Delta watershed, while providing a suitable regulatory backstop. Final incorporation of a voluntary agreement that requires changes to the Bay-Delta Plan, as contemplated by Resolved ¶ 7 below would require additional public process, including compliance with procedures under the Porter-Cologne Water Quality Control Act and environmental review under CEQA.

c. Regardless of whether the current negotiations ultimately result in an agreement, the State Water Board will consider voluntary agreements as part of its proceedings to implement the Plan Amendments, consistent with its obligations under applicable law. In evaluating any proposal, the State Water Board will consider whether the agreement will help achieve the water quality objectives, help protect the beneficial use, and be enforceable through Board action.

d. If a voluntary agreement is reached after the adoption of the Plan Amendments, the State Water Board will consider the voluntary agreement and determine what, if any, actions are necessary to consider the agreement as a means of implementing the Bay-Delta Plan objectives, including a public process.

THEREFORE BE IT RESOLVED THAT:

1. The State Water Board hereby approves and adopts the Final SED, including the Findings and Statement of Overriding Considerations (Attachment 1), and the Mitigation and Monitoring Program (Attachment 2) and the mitigation measures set forth therein.

2. The State Water Board hereby adopts the Plan Amendments, which are set forth in Appendix K to the Final SED.

3. The State Water Board authorizes the Executive Director or designee to submit the Plan Amendments and the administrative record to OAL for review and approval.

4. The State Water Board authorizes the Executive Director or designee to make minor, non-substantive modifications to the language of the Plan Amendments or the supporting documentation, if the State Water Board, State Water Board staff, or OAL determines that such changes are needed for clarity or consistency, and to inform the State Water Board of any such changes.

5. The State Water Board directs staff, upon approval by OAL, to file a Notice of Decision with the Secretary for Natural Resources and transmit payment of the applicable fee as may be required to the Department of Fish and Wildlife pursuant to Fish and Game Code section 711.4.

6. The State Water Board directs the Executive Director or designee to submit the Plan Amendments to the U.S. EPA for approval in accordance with requirements of the federal Clean Water Act (33 U.S.C. § 1251 et seq.).

7. The State Water Board directs staff to provide appropriate technical and regulatory information to assist the California Natural Resources Agency in completing a Delta watershed-wide agreement, including potential flow and non-flow measures for the Tuolumne River, and associated analyses no later than March 1, 2019. State Water Board staff shall incorporate the Delta watershed-wide agreement, including potential amendments to implement agreements related to the Tuolumne River, as an alternative for a future, comprehensive Bay-Delta Plan update that addresses the reasonable protection of beneficial uses across the Delta watershed, with the goal that comprehensive amendments to the Bay-Delta Plan across the Delta watershed may be presented to the State Water Board for consideration as early as possible after December 1, 2019.

8. The Plan Amendments adopted by this resolution are not self-implementing. Subsequent regulatory actions are required to implement the objectives and make them enforceable. The December 1, 2019 date of Resolved ¶ 7 provides a path for acceptance and approval of a voluntary agreement before regulatory actions to amend the water rights of water users on the Tuolumne River would occur and with sufficient time to complete any additional planning actions well in advance of the date that the LSJR flow objectives will be fully implemented.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on December 12, 2018.

AYE:	Chair Felicia Marcus Board Member Tam M. Doduc Board Member E. Joaquin Esquivel Board Member Sean Maguire
NAY:	Board Member Dorene D'Adamo
ABSENT:	None
ABSTAIN:	None

Jeanine Townsend
Clerk to the Board

Appendix K

Revised Water Quality Control Plan

Appendix K
Revised Water Quality Control Plan

This appendix shows the State Water Resources Control Board's (State Water Board's) revisions to proposed changes to the December 13, 2006 *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (2006 Bay-Delta Plan). Proposed changes to the plan are shown in underline and ~~strikeout~~ and revisions to the proposed changes are shown in double underline and ~~double strikeout~~. Some headings from the original 2006 Bay-Delta Plan were originally styled using underlining, and such headings remain underlined in this version.

The 2006 Bay-Delta Plan designates beneficial uses of water within the Bay-Delta, water quality objectives for the reasonable protection of those beneficial uses, and a program of implementation for achieving the water quality objectives.

The San Joaquin River and South Delta Water Quality (SJR and SDWQ) Bay-Delta plan amendments would establish the following updates to the 2006 Bay-Delta Plan.

- New flow objectives on the Lower San Joaquin River (LSJR) and its three eastside tributaries for the protection of fish and wildlife beneficial uses.
- Revised water quality objectives for the protection of agricultural beneficial uses in the southern Delta.
- A program of implementation to achieve these objectives.
- Monitoring and special studies necessary to fill information needs and determine the effectiveness of, and compliance with, the new objectives.

The new LSJR flow objectives and revised southern Delta water quality (SDWQ) objective and associated program of implementation would replace the existing San Joaquin River (SJR) flow and southern Delta salinity objectives and associated program of implementation in the 2006 Bay-Delta Plan. These objectives are analyzed in the recirculated substitute environmental document (SED) as the LSJR and SDWQ alternatives.

The Bay-Delta plan is periodically amended. The most recent amendments of the Bay-Delta Plan were completed in 2006. The 2006 amendments summarized issues requiring further development in future updates but were not substantive changes. The most recent substantive changes to water quality objectives, program of implementation, and monitoring and special studies in the Bay-Delta Plan were completed in 1995.

The SJR and SDWQ Bay-Delta Plan amendments focus on specific sections of the Bay-Delta Plan; other parts of the plan are not affected. The majority of the Bay-Delta Plan was written and organized in 1995 and some non-regulatory text and information have yet to be updated. In a separate process, the State Water Board is reviewing and considering updates to other elements of the Bay-Delta Plan, including requirements for flows and cold water habitat in the Sacramento River, its tributaries, and tributaries to the Delta (the Mokelumne, Cosumnes, and Calaveras Rivers); Delta outflows; and water project operations in the interior Delta (State Water Board 2017a). Changes that improve organization, update and streamline information, and provide a consistent format are likely to occur in that process.

The 2006 Bay-Delta Plan is available at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/2006wqcp/docs/2006_plan_final.pdf.

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ACRONYMS AND ABBREVIATIONS

AFRP	Anadromous Fish Restoration Program
Board	State Water Resources Control Board
BOD	Biochemical Oxygen Demand
BPA	Basin Plan Amendment
CALFED	aka California Bay Delta Authority
CALFED OPS	CALFED Water Operations Management Team
CBDA	California Bay Delta Authority
CEQA	California Environmental Quality Act
cfs	cubic feet per second
COP	Comprehensive Operations Plan
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DBP	Disinfection by-product
DCC	Delta Cross Channel
DFG or DFW	California Department of Fish ~~&~~ and Wildlife (formerly California Department of Fish and Game)
DO	Dissolved Oxygen
DWR	California Department of Water Resources
DWSC	Deep Water Ship Channel
EC	electrical conductivity
EMP	Environmental Monitoring Program
FERC	Federal Energy Regulatory Commission
IEP	Interagency Ecological Program
LSJR	Lower San Joaquin River
MAF	million acre-feet
mg/L	milligram(s) per liter
mmhos/cm	millimhos per centimeter
NDOI	Net Delta Outflow Index
NOAA Fisheries or NMFS	National Marine Fisheries Service
NPDES Permit	National Pollutant Discharge Elimination System Permit
OAL	California Office of Administrative Law
POD	Pelagic Organism Decline
ppt	parts per thousand
Regional Water Board	Regional Water Quality Control Board
ROD	Record of Decision
SDIP	South Delta Improvements Program
SDWA	South Delta Water Agency
SFSU	San Francisco State University
~~SJRA~~	~~San Joaquin River Agreement~~
~~SJRGA~~	~~San Joaquin River Group Authority~~
SJRMEP	San Joaquin River Monitoring and Evaluation Program
SLDMWA	San Luis Delta-Mendota Water Authority

SMCG	Suisun Marsh Charter Group
SMPA	Suisun Marsh Preservation Agreement
SMSCP	Suisun Marsh Salinity Control Project
SRCD	Suisun Resource Conservation District
STM Working Group	Stanislaus, Tuolumne and Merced Working Group
SWC	State Water Contractors
SWP	State Water Project
State Water Board	State Water Resources Control Board
TAF	thousand acre-feet
TMDL	Total Maximum Daily Load
UC DAVIS	University of California Davis
UDWA	Urban Drinking Water Agency
USBR	United States Bureau of Reclamation
USCOE	United States Army Corps of Engineers
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
~~VAMP~~	~~Vernalis Adaptive Management Plan~~
WDR	Waste Discharge Requirements
WQCP	Water Quality Control Plan

References within the text use the above acronyms and abbreviations.

BAY-DELTA PLAN

Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary

Chapter I. Introduction

A. Background

The San Francisco Bay/Sacramento-San Joaquin River Delta Estuary (Bay-Delta Estuary or Estuary) (Figure 1) is important to the natural environment and economy of California. The watershed of the Bay-Delta Estuary provides drinking water to two-thirds of the State's population and water for a multitude of other urban uses, and it supplies some of the State's most productive agricultural areas, both inside and outside of the Estuary. The Bay-Delta Estuary itself is one of the largest ecosystems for fish and wildlife habitat and production in the United States. Historical and current human activities (e.g., water development, land use, wastewater discharges, introduced species, and harvesting), ~~exacerbated~~ amplified by variations in natural conditions, have degraded the beneficial uses of the Bay-Delta Estuary, as evidenced by the declines in populations of many biological resources of the Estuary. Most recently, populations of Delta smelt and other pelagic organisms have exhibited significant declines, leading to investigations as to the possible causes of the degradation of the health of the Delta.

The State Water Resources Control Board (State Water Board) has previously adopted water quality control plans and policies to protect ~~the~~ water quality and ~~to~~ control the water resources that affect the beneficial uses of the Bay-Delta Estuary. These plans and policies were adopted consistent with section 13000 et seq. of the California Water Code and pursuant to the authority contained in section 13170. This Water Quality Control Plan covers the Bay-Delta Estuary and tributary watersheds (Bay-Delta Plan or Plan). ~~This plan supersedes the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary adopted in May 1995 (1995 Bay-Delta Plan or 1995 Plan) as well as the preceding plans that the 1995 Plan superseded.~~ The State Water Board periodically will review this Plan pursuant to Water Code section 13240 to ensure that it provides reasonable protection for the designated beneficial uses.[1] The State Water Board's measures to implement this Plan will consist of the regulation of existing water rights, regulatory measures to protect water quality, and recommendations to other entities. Current and previous versions of the Bay-Delta Plan[2] and supporting documents are available at:

[1] The federal Clean Water Act, at section 303 (c), also requires a review of federal "standards," as defined in the Act, contained in state water quality control plans. (33 U.S.C. § 1313 (c).) The review under section 13240 ordinarily is combined with a review of any federal standards in a state water quality control plan.

[2] References herein to the 1995 Plan refer to the 1995 Bay-Delta Plan. References to the 2006 update refer to the update of the 2006 Bay-Delta Plan.

http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/wq_control_plans/index.shtml
A summary description of the most recent updates to the Plan and issues of concern are provided in Section D: Key Issues and Plan Updates.

~~Appendix 1 of this plan, titled "Plan Amendment Report," explains the State Water Board's considerations in developing this Water Quality Control Plan. Appendix 1 provides the reasoning for any changes to the 1995 Plan, as well the environmental~~

FIGURE 1
BAY-DELTA ESTUARY

~~analysis for those changes. Documents used to develop this amendment of the 1995 Plan are listed in Appendix 2, titled "Referenced Documents". Appendix 3, titled "Responses to Comments," contains the State Water Board's responses to comments received in conjunction with the public hearing held to solicit feedback on this plan.~~

B. Purpose and ~~Applicability~~ Application of the Water Quality Control Plan

~~This plan establishes water quality objectives for which implementation can be fully accomplished only if the State Water Board assigns some measure of responsibility to water right holders and water users to mitigate for the effects on the designated beneficial uses of their diversions and use of water. Like all~~ A water quality control plan~~s, this plan~~ consists of: (1) beneficial uses to be protected; (2) water quality objectives for the reasonable protection of beneficial uses; and (3) a program of implementation for achieving the water quality objectives. This plan establishes water quality objectives for which implementation can be fully accomplished only if the State Water Board assigns some measure of responsibility to water rights holders and water users to mitigate for the effects on the designated beneficial uses of their diversions and use of water. Together, the beneficial uses and the water quality objectives established to reasonably protect the beneficial uses are called water quality standards under the terminology of the federal Clean Water Act.

~~For the geographic area of the Bay-Delta Estuary, t~~This plan is complementary to the other water quality control plans adopted by the State and Regional Water Quality Control Boards (Regional Water Boards) and State policies for water quality control adopted by the State Water Board. This plan provides reasonable protection for the Estuary's beneficial uses that require control of salinity (caused by saltwater intrusion, municipal discharges, and agricultural drainage) and water project operations (flows and diversions). This plan protects the beneficial uses of the Bay-Delta Estuary and tributary watersheds. This plan supersedes the regional water quality control plans to the extent of any conflict between this plan and the regional water quality control plans. The other plans and policies establish water quality objectives and requirements for parameters such as toxic chemicals, bacterial contamination, and other parameters which have the potential to impair beneficial uses or cause nuisance.

Most of the objectives in this ongoing plan are being, and will continue to be, implemented by assigning responsibilities to water right holders because the parameters to be controlled are primarily impacted by flows and diversions. This plan, however, is not to be construed as establishing the responsibilities of water right holders. Nor is this plan to be construed as establishing the quantities of water that any particular water right holder or group of water right holders may be required to release or forego to meet the objectives in this plan. The State Water Board will consider, in a future water rights proceeding or proceedings, the nature and extent of water right holders' responsibilities to meet these objectives. If necessary after a

water rights proceeding, this plan will be amended to reflect any changes that may be needed to ensure consistency between the plan and the water right decision.

C. Legal Authority

The State Water Board has prepared this Water Quality Control Plan under the Porter-Cologne Water Quality Control Act. The Regional Water Boards have primary responsibility for formulating and adopting water quality control plans for their respective regions (Wat. Code § 13240), but the State Water Board also is authorized, under Water Code section 13170, to adopt water quality control plans in accordance with the provisions of section 13240 *et seq*[3]. When the State Water Board adopts a water quality control plan, it supersedes regional water quality control plans for the same waters to the extent of any conflict. (Wat. Code § 13170.)

This plan ~~includes an~~ was informed by an environmental report prepared in compliance with Public Resources Code section 21080.5. The Secretary for Resources has certified the State Water Board's basin planning program as meeting the requirements of Public Resources Code section 21080.5. (Cal. Code Regs. tit. 14, § 15251(g).) Section 21080.5 authorizes state agencies acting under a certified program to assess the environmental effects of their actions within the decision-making document instead of in a separate environmental impact report or negative declaration.

a. Program of Implementation. A program of implementation for achieving water quality objectives shall include, but not be limited to: (1) a description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private; (2) a time schedule for the actions to be taken; and (3) a description of surveillance to be undertaken to determine compliance with the objectives. (Wat. Code, § 13242.)

b. U.S. Environmental Protection Agency Approval of This Plan. After adopting this Water Quality Control Plan, the State Water Board will submit this plan to the U.S. Environmental Protection Agency (USEPA) for approval under the federal Clean Water Act. (33 U.S.C. section 1251 et seq.) To the extent that this plan addresses matters outside the scope of the Clean Water Act, this plan will be provided to the USEPA for its consideration as a matter of State/federal comity. The State Water Board does not concede that it is required under the Clean Water Act to submit all parts of this plan to the USEPA. Assuming the USEPA has authority under the Clean Water Act to approve the objectives for flow and operations, the State Water Board believes that the USEPA could not adopt standards for these parameters under the Clean Water Act.[4] If the USEPA attempted to adopt such

[3] The State Water Board also has authority to adopt State policy for water quality control under Water Code section 13140.
[4] The State Water Board reserves its arguments regarding the USEPA's authority to adopt standards for flow and operations, including standards for salinity intrusion. The State Water Board's legal comments regarding the USEPA's authority are set forth in the State Water Board's comments on the USEPA's January 6, 1994 draft standards, which were provided to the USEPA on March 11, 1994.

standards, it could fundamentally interfere with the State's water allocation authority under section 101(g) of the Clean Water Act.[5]

D. ~~Emerging~~ Key Issues and Plan Updates

This ~~Water Quality Control~~ Plan is periodically updated. The most recent update of the Plan was completed in ~~2016~~2018, at which time the following elements were updated:

- San Joaquin River flow objectives to protect fish and wildlife beneficial uses and southern Delta salinity objective to protect agricultural beneficial uses;
- Programs of implementation to achieve and determine compliance with the above objectives; and
- Monitoring and special studies to fill information needs and inform future updates to the objectives.

This ~~2016~~ 2018 update of the San Joaquin River flow objectives implements the Delta Stewardship Council's Delta Plan recommendation for the State Water Board to adopt, and as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals.[6]

The ~~2016~~ 2018 amendments to this Plan primarily address portions of the Plan concerning the San Joaquin River flow objectives and southern Delta salinity objective~~s~~. In addition, updates without regulatory effect were made to descriptions of non-State Water Board programs related to salinity, key Bay-Delta issues and the State Water Board's planning efforts. Not all elements of the Bay-Delta Plan were updated in 2018~~6~~. Some of the information in the Plan may therefore be out of date. This information will be updated as part of the State Water Board's process of reviewing and updating other elements of the Plan, including water quality objectives and programs of implementation for:

- Delta outflows
- Sacramento and other tributary inflows other than San Joaquin River
- Interior Delta flows
- Suisun Marsh and Suisun Bay salinity

[5] The Supreme Court, in *PUD No. 1 of Jefferson County v. Washington Dep't of Ecology* (1994) 114 S.Ct. 1900, upheld a state's ability to impose an instream flow requirement under Clean Water Act section 401 to protect fish habitat which had been designated as a beneficial use in a water quality standard under Clean Water Act section 303. In reaching this result, the Supreme Court rejected arguments based on Clean Water Act section 101(g) that water quantities could not be regulated under the Clean Water Act. The Supreme Court pointed out that insufficient flows can cause water quality violations, and that reduced habitat caused by low flows may constitute pollution. The Court's narrow interpretation of section 101(g) allows regulation of water users by a state to prevent their having an adverse effect on water quality, but does not go so far as to allow a fundamental interference by the USEPA with a state's water allocation authority.

[6] The 2009 Delta Reform Act declared that State policy for the Delta must serve two "coequal goals": providing a more reliable water supply for California, and protecting, restoring, and enhancing the Delta ecosystem; and to do so in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

This ~~subsequent~~ review will ~~also~~ continue to address two key issues identified in the 2006 update of the Plan: ecosystem regime shift and climate change.

~~primarily a planning document that serves to identify the water quality objectives and the beneficial uses to be protected. At the time of this 2006 update to the Plan there are a number of emerging issues that this Plan either does not currently regulate or may not fully regulate because circumstances and scientific knowledge are changing. Those emerging issues are identified here. In addition to the activities described in the *Program of Implementation Chapter*, the State Water Board will immediately begin a process to evaluate and prioritize water quality control planning activities to address the following emerging issues:~~

~~1. Ecosystem Regime Shift~~Pelagic Organism Decline ~~(POD)~~
~~2. Climate Change~~
~~3. Delta and Central Valley Salinity~~
~~4. San Joaquin River Flows~~

~~The State Water Board will conduct these planning activities in conjunction with the Delta Vision Process to develop a sustainable use and protection plan for the Delta, Suisun Bay, and Suisun Marsh. The Delta Vision Process, an interagency effort and outgrowth of the Little Hoover Commission's review of CALFED, was just commencing at the time of this Bay-Delta Plan update. Consistent with this process,~~ The State Water Board will conduct these planning activities with the support of the Delta Stewardship Council's Delta Science Program and the Independent Science Board to assure that Plan updates are based on the best available science. ~~t~~The State Water Board recognizes that planning for and management of the Delta's multiple uses, resources, and ecosystem should occur in cooperation with elected officials, government agencies, stakeholders, academia, and affected Delta and California communities.

~~1. Ecosystem Regime Shift~~ Pelagic Organism Decline

There was a rapid decline in the populations of numerous pelagic fishes in the Sacramento-San Joaquin Delta Estuary and Suisun Bay starting in 2002. This decline became known as the Pelagic Organism Decline (POD), and was studied intensely by the Interagency Ecological Program (IEP) POD work team and numerous other researchers. The POD studies largely concluded that the decline resulted from multiple adverse conditions, with no single explanatory factor. Ongoing research is largely focused on the working hypothesis that the Bay-Delta has undergone an ecosystem regime shift from highly variable environmental conditions that favored native and other estuarine-dependent species to less variable conditions that favor invasive species. Work to better understand the influence that these and other factors have in relation to POD is ongoing. ~~There is a marked decline in numerous pelagic fishes in the Sacramento-San Joaquin Delta Estuary and Suisun Bay. Currently, the Interagency Ecological Program (IEP), through its POD work team, is conducting studies to evaluate the potential causes of these declines. Some of the possible causes that are being considered include~~

~~invasive species, water project operations, and toxins. The results of the POD studies will be available in 2007. At that time, the State Water Board will review the study results and may amend portions of this Plan to improve habitat conditions in the Estuary.~~

~~2. Climate Change~~

A growing body of information suggests that climate change could result in: (1) sea level rise that would adversely impact levees, water quality, and conveyance of water supplies through the Delta; (2) decreased snowmelt in the Sierra Nevada that would reduce effectiveness of existing water storage facilities; (3) increased rainfall that could exacerbate flooding; and (4) adverse biological effects from changes in flow and water quality. Water quality control planning must begin to address these possible effects. Future State Water Board activities therefore should be responsive to the impacts of climate change and provide timely response and guidance to water resources agencies, consistent with the Water Quality Control Plan, as they submit plans and requests to process applications for water conveyance facilities and flow control structures. ~~such as the current South Delta Improvements Project or potential future conveyance structures such as a Delta peripheral canal.~~

~~3. Delta and Central Valley Salinity~~

~~A joint State and Regional Board Workshop on Central Valley salinity issues held in January 2006 resulted in broad stakeholder support for development of a Salinity Management Plan for the Central Valley and Delta (Salinity Management Plan) to protect beneficial uses of both surface waters and ground waters. Development and full implementation of the Salinity Management Plan is expected to take 40 to 50 years and to reduce economic hardship related to managing salinity. The State Water Board will develop regulations and provide regulatory encouragement to ensure that infrastructure is developed that improves and maintains Central Valley and Delta salinity while providing certainty to local and regional planners, municipalities, agriculture, water suppliers, food processors, and others.~~

~~The State Water Board will continue to coordinate updates of the Bay-Delta Plan with on-going development of this comprehensive Salinity Management Plan. As part of this larger planning effort, the State Water Board has issued a public notice of a workshop to be held in January 2007 to review: (1) the salinity requirements of the beneficial uses of water in the southern Delta; (2) the causes of salt loading in the southern Delta; (3) practices that could reduce salt loading from Delta sources; (4) flow and salt load reduction measures to implement the salinity objectives; and (5) the timeline for implementation of these measures. The State Water Board intends to develop and manage a study of salinity in the southern Delta as part of this effort. This process could result in amendments to the Bay-Delta Plan, further changes in water rights, or changes in both the Bay-Delta Plan and water rights.~~

~~4. San Joaquin River Flows~~

~~Data submitted by fisheries agencies suggest that various fish species within the Delta and San Joaquin River basin have not shown significant signs of recovery~~

since adoption of the San Joaquin River Spring Flow and Pulse Flow objectives in the 1995 Plan and the implementation of the Spring Flow objectives in D-1641. Some species have shown significant declines. The San Joaquin River flow objectives are not changed in the 2006 Plan due to a lack of scientific information on which to base any changes.[7] While the Department of Fish and Game (DFG) recommended changes to the objectives, those recommendations were based on modeling that had not yet been completed. In addition, other parties also recommended changes to the objectives that were not substantiated by sufficient scientific information. In recognition of the species recovery concerns within the San Joaquin River basin and the Delta, the State Water Board will schedule a workshop after revisions are completed to DFG's San Joaquin River salmon escapement model in response to peer review (anticipated for summer of 2007) to receive additional information concerning the model and its findings and other scientific information concerning the San Joaquin River flow objectives. The State Water Board may receive additional information concerning implementation of the objectives in response to concerns raised by the Department of Interior (DOI) and others. Based on information received during the workshop, the State Water Board may amend the Bay-Delta Plan objectives, the Program of Implementation for those objectives, and/or make changes in water rights. If adequate information is not available to support changes to the objectives, the State Water Board may direct the completion of additional studies and analyses.

In response to concerns raised by DFG and others concerning the interim San Joaquin River Pulse Flow objectives being implemented as part of the Vernalis Adaptive Management Plan (VAMP) experiments, prior to the workshop, the State Water Board recommends that parties to the San Joaquin River Agreement (SJRA) conduct a peer review of the VAMP study design. The State Water Board requests that the peer review analyze whether the experimental flows are providing adequate protection for San Joaquin River and Delta species and whether changes should be made to the experimental design to ensure that adequate information is obtained from the experiment on which to base long term objectives. The State Water Board requests that the parties to the SJRA present the findings of the peer review to the State Water Board during its workshop.

[6] The Program of Implementation for the Pulse Flow Objectives is amended in the 2006 Plan to allow for staged implementation of the objectives by conducting the Vernalis Adaptive Management Plan (VAMP) until 2011. These changes are consistent with the current implementation of the objectives since 2000 pursuant to D-1641.

Chapter II. Beneficial Uses

A water quality control plan must establish beneficial uses. (Wat. Code § 13050(j).) Beneficial uses serve as a basis for establishing water quality objectives. The beneficial uses to be protected were established in the 1978 Delta Plan and the 1991 Bay-Delta Plan. ~~Since all of the beneficial uses exist and there were no requests for changes in the beneficial uses, these~~ These uses are carried over in this plan from earlier plans, including the 1995 Plan. The fish and wildlife beneficial uses designated in the "Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin" for the Stanislaus River, Tuolumne River, Merced River, and the San Joaquin River from the mouth of the Merced River to Vernalis remain in effect and this plan includes measures to protect those uses. The beneficial uses protected by this plan are presented below.

Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Industrial Process Supply (PRO) – Uses of water for industrial activities that depend primarily on water quality.

Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Ground Water Recharge (GWR) – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Navigation (NAV) – Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion is reasonably possible. These include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and

marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Shellfish Harvesting (SHELL) – Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial or sports purposes.

Commercial and Sport Fishing (COMM) – Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) – Uses of water that support warm water ecosystems including, but not limited to, preservation of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancements of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Estuarine Habitat (EST) – Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Wildlife Habitat (WILD) – Uses of water that support estuarine ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal law as being rare, threatened, or endangered.

Chapter III. Water Quality Objectives

A water quality control plan must contain such water quality objectives as are needed to ensure the reasonable protection of beneficial uses and the prevention of nuisance. (Wat. Code, § 13241.) The State Water Board must consider, in establishing water quality objectives:

- The past, present, and probable future beneficial uses of water;
- The environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- The water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area;
- Economic considerations;
- The need for developing housing within the region;
- The need to develop and use recycled water. (Wat. Code, § 13241.)

Flow and water project operations are within the scope of objectives that can be adopted in a water quality control plan under the Porter-Cologne Water Quality Control Act.

This chapter establishes water quality objectives which, in conjunction with the water quality objectives for the Bay-Delta Estuary watershed that are included in other State Water Board adopted water quality control plans and in water quality control plans for the Central Valley and San Francisco Bay Basins, when implemented, will: (1) provide for reasonable protection of municipal, industrial, and agricultural beneficial uses;
(2) provide reasonable protection of fish and wildlife beneficial uses at a level which stabilizes or enhances the conditions of aquatic resources; and (3) prevent nuisance. These water quality objectives are established to attain the highest quality of water that is reasonable, considering all the demands being made on waters in the Estuary watershed.

The water quality objectives in this plan apply to waters of the San Francisco Bay system and the legal Sacramento-San Joaquin Delta and tributary watersheds, as specified in the objectives. Unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives. Tables 1, 2, and 3 contain the water quality objectives for the protection of municipal and industrial, agricultural, and fish and wildlife beneficial uses, respectively.

A. Water Quality Objectives for Municipal and Industrial Beneficial Uses

The water quality objectives in Table 1 provide reasonable protection of the beneficial uses MUN, IND, and PRO, from the effects of salinity intrusion. These municipal and industrial objectives also provide protection for the beneficial uses of

REC-1, REC-2, and GWR. ~~These objectives are unchanged from the 1995 Bay-Delta Plan.~~

B. Water Quality Objectives for Agricultural Beneficial Uses

The water quality objectives in Table 2 provide reasonable protection of the beneficial use AGR, from the effects of salinity intrusion and agricultural drainage in the western, interior, and southern Delta. ~~These objectives are unchanged from the 1991 Bay-Delta Plan~~.

C. Water Quality Objectives for Fish and Wildlife Beneficial Uses

The water quality objectives in Table 3 provide reasonable protection of fish and wildlife beneficial uses in the Bay-Delta Estuary including EST, COLD, WARM, MIGR, SPWN, WILD, and RARE. They also provide reasonable protection of fish and wildlife beneficial uses designated in the "Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin" for the Stanislaus River, Tuolumne River, Merced River, and the San Joaquin River from the mouth of the Merced River to Vernalis, as well as those presumed to exist under the Clean Water Act.[8] Protection of these fish and wildlife beneficial uses also provides protection for the beneficial uses of SHELL, COMM, and NAV. The parameters to be regulated under Table 3 are dissolved oxygen, salinity (expressed as electrical conductivity), Delta outflow, river flows, export limits, and Delta Cross Channel gate operation. Information available in 1995 indicated that, unlike water quality objectives for parameters such as dissolved oxygen, temperature, and toxic chemicals, which have threshold levels beyond which adverse impacts to the beneficial uses occur, there were no defined threshold conditions that could be used to set objectives for flows and project operations. Instead, available information indicated that a continuum of protection exists. Based on that information, higher flows and lower exports provided greater protection for the bulk of estuarine resources up to the limit of unimpaired conditions. Therefore, these objectives were set based on a subjective determination of the reasonable needs of all the consumptive and nonconsumptive demands on the waters of the Estuary. ~~After completion of the POD studies, the State Board will review the study results and may consider amending this Plan to improve water quality protections for fish and wildlife in the Estuary.~~

[8] See 40 C.F.R. § 131.10(j).

Table 1
Water Quality Objectives For Municipal and Industrial Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT)	WATER YEAR TYPE [2]	TIME PERIOD	VALUE
Contra Costa Canal at Pumping Plant #1	*C-5 (CHCCC06)*	*Chloride (Cl^-)*	*Maximum mean daily 150 mg/L Cl^- for at least the number of days shown during the calendar year. Must be provided in intervals of not less than two weeks duration. (Percentage of calendar year shown in parenthesis)*			*No. of days each calendar year ≤150 mg/L Cl^-*
-or-						
San Joaquin River at Antioch Water Works Intake	*D12 (near) (RSAN007)*			*W*		*240 (66%)*
				AN		*190 (52%)*
				BN		*175 (48%)*
				D		*165 (45%)*
				C		*155 (42%)*
Contra Costa Canal at Pumping Plant #1	*C-5 (CHCCC06)*	*Chloride (Cl^-)*	*Maximum mean daily (mg/L)*	*All*	*Oct-Sep*	*250*
-and-						
West Canal at mouth of Clifton Court Forebay	*C-9 (CHWST0)*					
-and-						
Delta-Mendota Canal at Tracy Pumping Plant	*DMC-1 CHDMC004*					
-and-						
Barker Slough at North Bay Aqueduct Intake	*--- (SLSAR3)*					
-and-						
Cache Slough at City of Vallejo Intake [3]	*C-19 (SLCCH16)*					

Table 1 Footnotes:

[1] River Kilometer Index station number.
[2] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.
[3] Cache Slough objective to be effective only when water is being diverted from this location.

Table 2
Water Quality Objectives For Agricultural Beneficial Uses

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
WESTERN DELTA						
Sacramento River at Emmaton	*D-22 (RSAC092)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Jul 1*	*0.63*
				BN	*Jun 20*	*1.14*
				D	*Jun 15*	*1.67*
				C	*----*	*2.78*
San Joaquin River at Jersey Point	*D-15 (RSAN018)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Jun 20*	*0.74*
				D	*Jun 15*	*1.35*
				C	*----*	*2.20*
INTERIOR DELTA						
South Fork Mokelumne River at Terminous	*C-13 (RSMKL08)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Aug 15*	*----*
				C	*----*	*0.54*
San Joaquin River at San Andreas Landing	*C-4 (RSAN032)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC (mmhos/cm)*		*0.45 EC April 1 to date shown*	*EC from date shown to Aug 15 [4]*
				W	*Aug 15*	*----*
				AN	*Aug 15*	*----*
				BN	*Aug 15*	*----*
				D	*Jun 25*	*0.58*
				C	*----*	*0.87*
SOUTHERN DELTA						
San Joaquin River at Airport Way Bridge, Vernalis ***-and-*** *San Joaquin River from Vernalis to~~at~~ Brandt Bridge ~~site~~* ***-and-*** *~~Old~~ Middle River ~~near~~from ~~Middle~~ Old River to Victoria Canal* ***-and-*** *Old River/Grant Line Canal from Head of Old River to ~~at Tracy Road Bridge~~West Canal*	*C-10 [5] (RSAN112)* *C-6 [5] (RSAN073)* *C-8 [5] (ROLD69)* *P-12 [5] (ROLD59)*	*Electrical Conductivity (EC)*	*Maximum 30-day running average of mean daily EC (~~mmhos~~dS/m/~~cm~~ [6])*	*All*	*Year-round~~Apr-Aug Sep-Mar~~*	*~~0.7~~1.0 ~~1.0~~*
EXPORT AREA						
West Canal at mouth of Clifton Court Forebay ***-and-*** *Delta-Mendota Canal at Tracy Pumping Plant*	*C-9 (CHWST0)* *DMC-1 (CHDMC004)*	*Electrical Conductivity (EC)*	*Maximum monthly average of mean daily EC (mmhos/cm)*	*All*	*Oct-Sep*	*1.0*

Table 2 Footnotes:

[1] River Kilometer Index station number.

[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period for the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

[3] The Sacramento Valley 40-30-30 water year hydrologic classification index (see Figure 2) applies for determinations of water year type.

[4] When no date is shown, EC limit continues from April 1.

[5] Salinity objectives are subject to the Variance Policy, Salinity Variance Program and Salinity Exception Program adopted in Central Valley Regional Water Board Resolution No. R5-2014-0074.

[6] 1 mmhos/cm = 1 dS/m. The International System of Units for EC is dS/m. As other portions of Table 2 are updated in future amendments to the Bay-Delta Plan, the units of measurement for EC will be updated to the international system.

Table 3
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DISSOLVED OXYGEN						
San Joaquin River between Turner Cut & Stockton	*(RSAN050-RSAN061)*	*Dissolved Oxygen (DO)*	*Minimum DO (mg/L)*	*All*	*Sep-Nov*	*6.0*
SALMON PROTECTION						
			narrative	*Water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967-1991, consistent with the provisions of State and federal law.*		
SAN JOAQUIN RIVER SALINITY						
San Joaquin River at and between Jersey Point and Prisoners Point [4]	*D-15 (RSAN018)* ***-and-*** *D-29 (RSAN038)*	*Electrical Conductivity (EC)*	*Maximum 14-day running average of mean daily EC(mmhos/cm)*	*W,AN,BN, D*	*Apr-May*	*0.44 [5]*
EASTERN SUISUN MARSH SALINITY[6]						
Sacramento River at Collinsville ***-and-*** *Montezuma Slough at National Steel* ***-and-*** *Montezuma Slough near Beldon Landing*	*C-2 (RSAC081)* *S-64 (SLMZU25)* *S-49 (SLMZU11)*	*Electrical Conductivity (EC)*	*Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location*	*All*	*Oct* *Nov-Dec* *Jan* *Feb-Mar* *Apr-May*	*19.0* *15.5* *12.5* *8.0* *11.0*
WESTERN SUISUN MARSH SALINITY[6]						
Chadbourne Slough at Sunrise Duck Club ***-and-*** *Suisun Slough, 300 feet south of Volanti Slough* ***-and-*** *Cordelia Slough at Ibis Club* ***-and-*** *Goodyear Slough at Morrow Island Clubhouse* ***-and-*** *Water supply intakes for waterfowl management areas on Van Sickle and Chipps islands*	*S-21 (SLCBN1)* *S-42 (SLSUS12)* *S-97 (SLCRD06)* *S-35 (SLGYR03)* *No locations Specified*	*Electrical Conductivity (EC)*	*Maximum monthly average of both daily high tide EC values (mmhos/cm), or demonstrate that equivalent or better protection will be provided at the location*	*All but deficiency period* *Deficiency period [7]*	*Oct* *Nov* *Dec* *Jan* *Feb-Mar* *Apr-May* *Oct* *Nov* *Dec-Mar* *Apr* *May*	*19.0* *16.5* *15.5* *12.5* *8.0* *11.0* *19.0* *16.5* *15.6* *14.0* *12.5*
BRACKISH TIDAL MARSHES OF SUISUN BAY						
			narrative	*Water quality conditions sufficient to support a natural gradient in species composition and wildlife habitat characteristic of a brackish marsh throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Water quality conditions shall be maintained so that none of the following occurs: (a) loss of diversity; (b) conversion of brackish marsh to salt marsh; (c) for animals, decreased population abundance of those species vulnerable to increased mortality and loss of habitat from increased water salinity; or (d) for plants, significant reduction in stature or percent cover from increased water or soil salinity or other water quality parameters.*		

Table 3 (continued)
WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES

COMPLIANCE LOCATIONS	INTERAGENCY STATION NUMBER (RKI [1])	PARAMETER	DESCRIPTION (UNIT) [2]	WATER YEAR TYPE [3]	TIME PERIOD	VALUE
DELTA OUTFLOW						
		Net Delta Outflow Index (NDOI) [8]	*Minimum monthly average [9] NDOI(cfs)*	*All*	*Jan*	*4,500 [10]*
				All	*Feb-Jun*	*[11]*
				W,AN	*Jul*	*8,000*
				BN		*6,500*
				D		*5,000*
				C		*4,000*
				W,AN,BN	*Aug*	*4,000*
				D		*3,500*
				C		*3,000*
				All	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nov-Dec*	*4,500*
				C		*3,500*
RIVER FLOWS						
Sacramento River at Rio Vista	*D-24 (RSAC101)*	*Flow rate*	*Minimum monthly average [12] flow rate (cfs)*	*All*	*Sep*	*3,000*
				W,AN,BN,D	*Oct*	*4,000*
				C		*3,000*
				W,AN,BN,D	*Nov-Dec*	*4,500*
				C		*3,500*
LOWER SAN JOAQUIN RIVER FLOWS						
San Joaquin River at Airport Way Bridge, Vernalis	*C-10 (RSAN112)*	*Flow rate*	*Minimum monthly average ~~[13]~~ flow rate (cfs) ~~[14]~~*	*~~W,AN~~*	*~~Feb-Apr 14~~*	*~~2,130 or 3,420~~*
				~~BN,D~~	*~~and~~*	*~~1,420 or 2,280~~*
				~~C~~	*~~May 16-Jun~~*	*~~710 or 1,140~~*
				~~W~~	*~~Apr 15-~~*	*~~7,330 or 8,620~~*
				~~AN~~	*~~May 15 [15]~~*	*~~5,730 or 7,020~~*
				~~BN~~		*~~4,620 or 5,480~~*
				~~D~~		*~~4,020 or 4,880~~*
				~~C~~		*~~3,110 or 3,540~~*
				All	*Oct*	*1,000 [13][16]*
San Joaquin River at Airport Way Bridge, Vernalis	*C-10*	*Flow Rate*	*Narrative & Minimum 7-day running average flow rate (cfs) for February through June*	*Maintain inflow conditions from the San Joaquin River watershed to the Delta at Vernalis sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta. Inflow conditions that reasonably contribute toward maintaining viable native migratory San Joaquin River fish populations include, but may not be limited to, flows that more closely mimic the natural hydrographic conditions to which native fish species are adapted, including the relative magnitude, duration, timing, and spatial extent of flows as they would naturally occur. Indicators of viability include population abundance, spatial extent, distribution, structure, genetic and life history diversity, and productivity.*		
Stanislaus River at Koetitz	*DWR Gage KOT*					
Tuolumne River at Modesto	*USGS Gage 1129000*					
Merced River near Stevenson	*DWR Gage MST*			*Maintain 40% ~~A percent~~ of unimpaired flow, with an allowed adaptive range between 30% - 50%, inclusive, from each of the Stanislaus, Tuolumne, and Merced Rivers ~~shall be maintained~~ from February through June. [14]*		
	C-10			*~~Notwithstanding the above unimpaired flow requirement,~~ At all times during February through June, the flow at Vernalis, as provided by the percent of unimpaired flow objective, shall be no lower than the ~~a minimum~~ base flow value of 1,000 cfs with an allowed adaptive management range between 800 – 1,200 cfs, inclusive~~, at Vernalis shall be maintained at all times during February through June~~.*		
				Flows provided to meet these numeric objectives shall be managed in a manner to avoid causing significant adverse impacts to fish and wildlife beneficial uses at other times of the year.		

EXPORT LIMITS						
		Combined export rate [~~17~~15]	*Maximum 3-day running average (cfs)*	*All*	*Apr 15-May 15 [~~18~~16]*	*[~~19~~17]*
				All	*Feb-Jun*	*35% Delta inflow [~~22~~20]*
			Maximum percent of Delta inflow diverted [~~20~~18] [~~21~~19]	*All*	*Jul-Jan*	*65% Delta inflow*
DELTA CROSS CHANNEL GATES CLOSURE						
Delta Cross Channel at Walnut Grove	—	*Closure of gates*	*Closed gates*	*All*	*Nov-Jan* *Feb-May 20* *May 21-Jun 15*	*[~~23~~21]* *----* *[~~24~~22]*

Table 3 Footnotes:

[1] River Kilometer Index station number.

[2] Determination of compliance with an objective expressed as a running average begins on the last day of the averaging period. The averaging period commences with the first day of the time period of the applicable objective. If the objective is not met on the last day of the averaging period, all days in the averaging period are considered out of compliance.

[3] The Sacramento Valley 40-30-30 Water Year Hydrologic Classification Index (see Figure 2) applies unless otherwise specified.

[4] Compliance will be determined at Jersey Point (station D15) and Prisoners Point (station D29).

[5] This standard does not apply in May when the best available May estimate of the Sacramento River Index for the water year is less than 8.1 MAF at the 90% exceedance level. [Note: The Sacramento River Index refers to the sum of the unimpaired runoff in the water year as published in the California Department of Water Resources' (DWR) Bulletin 120 for the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total unimpaired inflow to Oroville Reservoir; Yuba River at Smartville; and American River, total unimpaired inflow to Folsom Reservoir.]

[6] An exceedance of any of these objectives at a time when it is established through certification by the entity operating the Suisun Marsh Salinity Control Gates that the Gates are being operated to the maximum extent shall not be considered a violation of the objective.

[7] A deficiency period is: (1) the second consecutive dry water year following a critical year; (2) a dry water year following a year in which the Sacramento River Index (described in footnote 5) was less than 11.35; or (3) a critical water year following a dry or critical water year. The determination of a deficiency period is made using the prior year's final Water Year Type determination and a forecast of the current year's Water Year Type; and remains in effect until a subsequent water year is other than a Dry or Critical water year as announced on May 31 by DWR and U.S. Bureau of Reclamation (USBR) as the final water year determination.

[8] Net Delta Outflow Index (NDOI) is defined in Figure 4.

[9] For the May-January objectives, if the value is less than or equal to 5,000 cfs, the 7-day running average shall not be less than 1,000 cfs below the value; if the value is greater than 5,000 cfs, the 7-day running average shall not be less than 80% of the value.

[10] The objective is increased to 6,000 cfs if the best available estimate of the Eight River Index for December is greater than 800 TAF. [Note: The Eight River Index refers to the sum of the unimpaired runoff as published in the DWR Bulletin 120 for the following locations: Sacramento River flow at Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River flow at Smartville; American River, total inflow to Folsom Reservoir; Stanislaus River, total inflow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total inflow to Exchequer Reservoir; and San Joaquin River, total inflow to Millerton Lake.]

[11] The minimum daily Delta outflow shall be 7,100 cfs for this period, calculated as a 3-day running average. This requirement is also met if either the daily average or 14-day running average EC at the confluence of the Sacramento and the San Joaquin rivers is less than or equal to 2.64 mmhos/cm (Collinsville station C2). If the best available estimate of the Eight River Index (described in footnote 10) for January is more than 900 TAF, the daily average or 14-day running average EC at station C2 shall be less than or equal to 2.64 mmhos/cm for at least one day between February 1 and February 14; however, if the best available estimate of the Eight River Index for January is between 650 TAF and 900 TAF, the Executive Director of the State Water Board shall decide whether this requirement applies. If the best available estimate of the Eight River Index for February is less than 500 TAF, the standard may be further relaxed in March upon the request of the DWR and the USBR, subject to the approval of the Executive Director of the State Water Board. The standard does not apply in May and June if the best available May estimate of the Sacramento River Index (described in footnote 5) for the water year is less than 8.1 MAF at the 90% exceedance level. Under this circumstance, a minimum

14-day running average flow of 4,000 cfs is required in May and June. Additional Delta outflow objectives are contained in Table 4.

[12] The 7-day running average shall not be less than 1,000 cfs below the monthly objective.

~~[13] Partial months are averaged for that period. For example, the flow rate for April 1-14 would be averaged over 14 days. The 7-day running average shall not be less than 20% below the flow rate objective, with the exception of the April 15-May 15 pulse flow period when this restriction does not apply.~~

~~[14] The water year classification will be established using the best available estimate of the 60-20-20 San Joaquin Valley Water Year Hydrologic Classification (see Figure 3) at the 75% exceedance level. The higher flow objective applies when the 2-ppt isohaline (measured as 2.64 mmhos/cm surface salinity) is required to be at or west of Chipps Island.~~

~~[15] This time period may be varied based on real-time monitoring. One pulse, or two separate pulses of combined duration equal to the single pulse, should be scheduled to coincide with fish migration in San Joaquin River tributaries and the Delta. The USBR will schedule the time period of the pulse or pulses in consultation with the USFWS, the NOAA Fisheries, and the DFG. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement. The schedule is subject to the approval of the Executive Director of the State Water Board.~~

[16~~3~~] Plus up to an additional 28 TAF pulse/attraction flow during all water year types. The amount of additional water will be limited to that amount necessary to ~~provide~~ achieve a monthly average flow of 2,000 cfs. The additional 28 TAF pulse flow is not required in a critical year following a critical year. The pulse flow will be scheduled ~~by the DWR and the USBR~~ in consultation with the USFWS, the NOAA Fisheries and the DF~~G~~W. ~~Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.~~

[14] Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds. Compliance with the percent of unimpaired flow from February through June in each river is determined by dividing the 7-day average observed flow at the compliance stations by the 7-day average calculated Full-Natural-Flow (FNF) at the FNF stations. Refinements to methods and measurements used to estimate FNF can be used for compliance if refinements improve accuracy and precision of FNF estimates. The total volume of water established by the percent of unimpaired flow requirement may be managed using an averaging period consistent with approved adaptive methods outlined in the program of implementation.

[17~~5~~] Combined export rate for this objective is defined as the Clifton Court Forebay inflow rate (minus actual Byron-Bethany Irrigation District diversions from Clifton Court Forebay) and the export rate of the Tracy pumping plant.

[18~~6~~] This time period may be varied based on real-time monitoring. ~~and will coincide with the San Joaquin River pulse flow described in footnote 15.~~ The DWR and the USBR, in consultation with the USFWS, the NOAA Fisheries and the DF~~G~~W, will determine the time period for this 31-day export limit. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[19~~7~~] Maximum export rate is 1,500 cfs or 100% of the 3-day running average of San Joaquin River flow at Vernalis, whichever is greater. Variations to this maximum export rate may be authorized if agreed to by the USFWS, the NOAA Fisheries and the DF~~G~~W. This flexibility is intended to result in no net water supply cost annually within the limits of the water quality and operational requirements of this plan. Variations may result from recommendations of agencies for protection of fish resources, including actions taken pursuant to the State and federal Endangered Species Act. Any variations will be effective immediately upon notice to the Executive Director of the State Water Board. If the Executive Director does not object to the variations within 10 days, the variations will remain in effect. The Executive Director of the State Water Board is also authorized to grant short-term exemptions to export limits for the purpose of facilitating a study of the feasibility of recirculating export water into the San Joaquin River to meet flow objectives.

[~~20~~18] Percent of Delta inflow diverted is defined in Figure 4. For the calculation of maximum percent Delta inflow diverted, the export rate is a 3-day running average and the Delta inflow is a 14-day running average, except when the Central Valley Project or the State Water Project (SWP) is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3-day running averages.

[~~21~~19] The percent Delta inflow diverted values can be varied either up or down. Variations are authorized subject to the process described in footnote 19~~7~~.

[~~22~~0] If the best available estimate of the Eight River Index (described in footnote 10) for January is less than or equal to 1.0 MAF, the export limit for February is 45% of Delta inflow. If the best available estimate of the Eight River Index for January is greater than 1.5 MAF, the February export limit is 35% of Delta inflow. If the best available estimate of the Eight River Index for January is between 1.0 MAF and 1.5 MAF, the DWR and the USBR will set the export limit for February within the range of 35% to 45%, after consultation with the USFWS, the NOAA Fisheries and the DF~~G~~W. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[23~~1~~] For the November-January period, close Delta Cross Channel gates for a total of up to 45 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NOAA Fisheries and the

DF~~G~~W. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement.

[24~~2~~]For the May 21-June 15 period, close the Delta Cross Channel gates for a total of 14 days. The USBR will determine the timing and duration of the gate closure after consultation with the USFWS, the NOAA Fisheries and the DF~~G~~W. Consultation with the CALFED Operations Group established under the Framework Agreement will satisfy the consultation requirement. Gate closures shall be based on the need for the protection of fish. The process for approval of variations shall be similar to that described in footnote 1~~9~~7.

FIGURE 2

Sacramento Valley Water Year Hydrologic Classification

Year classification shall be determined by computation of the following equation:

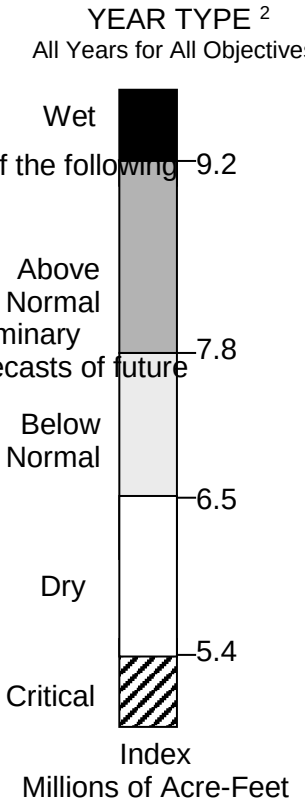
INDEX = 0.4 * X + 0.3 * Y + 0.3 * Z

Where:
X = Current year's April – July Sacramento Valley unimpaired runoff

Y = Current October – March Sacramento Valley unimpaired runoff

Z = Previous year's index[1]

The Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.



Classification	Index Millions of Acre-Feet (MAF)
Wet…….	Equal to or greater than 9.2
Above Normal…..	Greater than 7.8 and less than 9.2
Below Normal…..	Equal to or less than 7.8 and greater than 6.5
Dry……....	Equal to or less than 6.5 and greater than 5.4
Critical……..…	Equal to or less than 5.4

1 A cap of 10.0 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available. The San Joaquin Valley Water Year Hydrologic Classification may be used to inform adaptive implementation of the LSJR flow objectives.

FIGURE 3

San Joaquin Valley Water Year Hydrologic Classification

Year classification shall be determined by computation of the following equation:

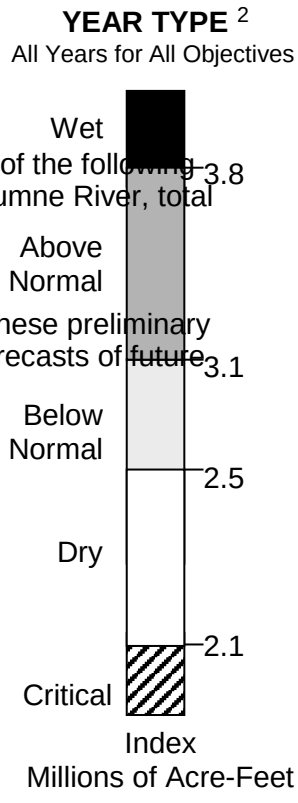
INDEX = 0.6 * X + 0.2 * Y + 0.2 * Z

Where: X = Current year's April – July San Joaquin Valley unimpaired runoff

Y = Current October – March San Joaquin Valley unimpaired runoff

Z = Previous year's index[1]

The San Joaquin Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year), as published in California Department of Water Resources Bulletin 120, is a forecast of the sum of the following locations: Stanislaus River, total flow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total flow to Exchequer Reservoir; San Joaquin River, total inflow to Millerton Lake. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.



Classification	Index Millions of Acre-Feet (MAF)
Wet……	Equal to or greater than 3.8
Above Normal…..	Greater than 3.1 and less than 3.8
Below Normal…..	Equal to or less than 3.1 and greater than 2.5
Dry…….	Equal to or less than 2.5 and greater than 2.1
Critical……..	Equal to or less than 2.1

1 A cap of 4.5 MAF is put on the previous year's index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available. The San Joaquin Valley Water Year Hydrologic Classification may be used to inform adaptive implementation of the LSJR flow objectives.

FIGURE 4

NDOI and PERCENT INFLOW DIVERTED [1]

The NDOI and the percent inflow diverted, as described in this figure, shall be computed daily by the DWR and the USBR using the following formulas (all flows are in cfs):

NDOI = DELTA INFLOW - NET DELTA CONSUMPTIVE USE - DELTA EXPORTS

PERCENT INFLOW DIVERTED = (CCF + TPP) ÷ DELTA INFLOW

where *DELTA INFLOW = SAC + SRTP + YOLO + EAST + MISC + SJR*

SAC = Sacramento River at Freeport mean daily flow for the previous day; the 25-hour tidal cycle measurements from 12:00 midnight to 1:00 a.m. may be used instead.

SRTP = Sacramento Regional Treatment Plant average daily discharge for the previous week.

YOLO = Yolo Bypass mean daily flow for the previous day, which is equal to the flows from the Sacramento Weir, Fremont Weir, Cache Creek at Rumsey, and the South Fork of Putah Creek.

EAST = Eastside Streams mean daily flow for the previous day from the Mokelumne River at Woodbridge, Cosumnes River at Michigan Bar, and Calaveras River at Bellota.

MISC = Combined mean daily flow for the previous day of Bear Creek, Dry Creek, Stockton Diverting Canal, French Camp Slough, Marsh Creek, and Morrison Creek.

SJR = San Joaquin River flow at Vernalis, mean daily flow for the previous day.

where *NET DELTA CONSUMPTIVE USE = GDEPL - PREC*

GDEPL = Delta gross channel depletion for the previous day based on water year type using the DWR's latest Delta land use study.[2]

PREC = Real-time Delta precipitation runoff for the previous day estimated from stations within the Delta.

and where *DELTA EXPORTS* [3] *= CCF + TPP + CCC + NBA*

CCF = Clifton Court Forebay inflow for the current day.[4]

TPP = Tracy Pumping Plant pumping for the current day.

CCC = Contra Costa Canal pumping for the current day.

NBA = North Bay Aqueduct pumping for the current day.

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1 Not all of the Delta tributary streams are gaged and telemetered. When appropriate, other methods of estimating stream flows, such as correlations with precipitation or runoff from nearby streams, may be used instead.

2 If up to date channel depletion estimates are available they shall be used. If these estimates are not available, DAYFLOW channel depletion estimates shall be used.

3 The term "Delta Exports" is used only to calculate the NDOI. It is not intended to distinguish among the listed diversions with respect to eligibility for protection under the area of origin provisions of the California Water Code.

4 Actual Byron-Bethany Irrigation District withdrawals from Clifton Court Forebay shall be subtracted from Clifton Court Forebay inflow. (Byron-Bethany Irrigation District water use is incorporated into the GDEPL term.)

Table 4. Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location

Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location [a]																	
PMI[b] (TAF)	Chipps Island (Chipps Island Station D10)					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14) [d]					PMI[b] (TAF)	Port Chicago (Port Chicago Station C14)[d]				
	FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN		FEB	MAR	APR	MAY	JUN
≤ 500	0	0	0	0	0	**0**	0	0	0	0	0	**5250**	27	29	25	26	6
750	0	0	0	0	0	**250**	1	0	0	0	0	**5500**	27	29	26	28	9
1000	28[c]	12	2	0	0	**500**	4	1	0	0	0	**5750**	27	29	27	28	13
1250	28	31	6	0	0	**750**	8	2	0	0	0	**6000**	27	29	27	29	16
1500	28	31	13	0	0	**1000**	12	4	0	0	0	**6250**	27	30	27	29	19
1750	28	31	20	0	0	**1250**	15	6	1	0	0	**6500**	27	30	28	30	22
2000	28	31	25	1	0	**1500**	18	9	1	0	0	**6750**	27	30	28	30	24
2250	28	31	27	3	0	**1750**	20	12	2	0	0	**7000**	27	30	28	30	26
2500	28	31	29	11	1	**2000**	21	15	4	0	0	**7250**	27	30	28	30	27
2750	28	31	29	20	2	**2250**	22	17	5	1	0	**7500**	27	30	29	30	28
3000	28	31	30	27	4	**2500**	23	19	8	1	0	**7750**	27	30	29	31	28
3250	28	31	30	29	8	**2750**	24	21	10	2	0	**8000**	27	30	29	31	29
3500	28	31	30	30	13	**3000**	25	23	12	4	0	**8250**	28	30	29	31	29
3750	28	31	30	31	18	**3250**	25	24	14	6	0	**8500**	28	30	29	31	29
4000	28	31	30	31	23	**3500**	25	25	16	9	0	**8750**	28	30	29	31	30
4250	28	31	30	31	25	**3750**	26	26	18	12	0	**9000**	28	30	29	31	30
4500	28	31	30	31	27	**4000**	26	27	20	15	0	**9250**	28	30	29	31	30
4750	28	31	30	31	28	**4250**	26	27	21	18	1	**9500**	28	31	29	31	30
5000	28	31	30	31	29	**4500**	26	28	23	21	2	**9750**	28	31	29	31	30
5250	28	31	30	31	29	**4750**	27	28	24	23	3	**10000**	28	31	30	31	30
≤ 5500	28	31	30	31	30	**5000**	27	28	25	25	4	**>10000**	28	31	30	31	30

[a] The requirement for number of days the maximum daily average EC (EC) of 2.64 mmhos per centimeter (mmhos/cm) must be maintained at Chipps Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOIs of 11,400 cfs and 29,200 cfs, respectively. If salinity/flow objectives are met for a greater number of days than the requirements for any month, the excess days shall be applied to meeting the requirements for the following month. The number of days for values of the PMI between those specified in this table shall be determined by linear interpolation.

[b] PMI is the best available estimate of the previous month's Eight River Index. (Refer to Footnote 10 for Table 3 for a description of the Eight River Index.)

[c] When the PMI is between 800 TAF and 1000 TAF, the number of days the maximum daily average EC of 2.64 mmhos/cm (or maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOI of 11,400 cfs) must be maintained at Chipps Island in February is determined by linear interpolation between 0 and 28 days.

[d] This standard applies only in months when the average EC at Port Chicago during the 14 days immediately prior to the first day of the month is less than or equal to 2.64 mmhos/cm.

Chapter IV. Program of Implementation

The Porter-Cologne Water Quality Control Act states that a water quality control plan consists of a designation or establishment of beneficial uses to be protected, water quality objectives, and program of implementation needed for achieving water quality objectives. (Wat. Code, § 13050(j).) The implementation program shall include, but not be limited to:

1. A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private;
2. A time schedule for the actions to be taken; and
3. A description of surveillance to be undertaken to determine compliance with the objectives. (Wat. Code, § 13242.)

This program of implementation for the Water Quality Control Plan for the Bay Delta Estuary consists of five general components: (1) implementation measures within State Water Board authority; (2) measures requiring a combination of State Water Board authorities and actions by other agencies; (3) recommendations to other agencies; (4) a monitoring and special studies program; and (5) other studies that are being conducted by other entities but may provide information relevant to future proceedings. The specific actions identified within these components include time schedules for implementation, if appropriate. No time schedule is included for actions that have already been implemented.

The State Water Board will exercise its quasi-legislative or adjudicative powers involving water rights and water quality to require implementation of the water quality objectives. Water quality actions include water quality certifications, regulations, waste discharge requirements, and water quality permitting. ~~Currently, the water right permits of the DWR and USBR include terms and conditions that define their responsibilities to implement the municipal and industrial, agricultural, and fish and wildlife objectives.~~ In the future, the State Water Board may amend this program of implementation, take action in a water right proceeding or proceedings to change the water right responsibilities of ~~the DWR, the USBR, and other~~ water right holders to implement these objectives, or take other actions that implement the objectives.

A. Implementation Measures within State Water Board Authority

Under its water rights and water quality authority, the State Water Board will take actions to require implementation of ~~continue, as necessary and appropriate, to determine the contributions from water right permit and license holders needed to implement~~ the objectives in this Plan. The State Water Board may implement the objectives by conducting water right proceedings, which may include adopting regulations, conducting adjudicative proceedings, or both, that ~~Water right responsibilities may be assigned by conducting a water right proceeding at which the Board will~~ take into consideration the requirements of the Public Trust Doctrine

and the California Constitution, article X, section 2. The State Water Board will also continue, as necessary and appropriate, to use its Clean Water Act section 401 water quality certification authority to implement objectives in this Plan, and may take other actions under its water quality authority to implement objectives in this Plan. The following water quality objectives are currently, or may in the future be, primarily implemented ~~in whole or in part~~ using water rights authority, but may also be implemented through water quality actions:

1. Delta Outflow
2. River Flows: Sacramento River at Rio Vista
3. River Flows: Lower San Joaquin River ~~at Airport Way Bridge, Vernalis~~
4. Export Limits
5. Delta Cross Channel Gates Operation
6. Salinity

~~The first five are flow-based objectives that rely upon water rights authorities to implement. Salinity, though a water quality objective, is still implemented, in part, through the State Water Board's water rights authority.~~

The State Water Board may require compliance with these objectives in stages or may shift responsibility for meeting an objective among water right holders and other entities based on evidence it receives in a water right proceeding or in a water quality proceeding.

1. Delta Outflow Objective

The Delta Outflow Objective is to be implemented through water right actions. It requires a minimum amount of outflow, measured in cubic feet per second (cfs) as defined in footnote 11 of Table 3. The permits and license of the DWR and the USBR are conditioned to establish responsibilities to ensure that the Delta Outflow Objective is met on an interim basis until the State Water Board adopts a water right decision or order that assigns permanent responsibility for meeting the Delta Outflow Objective. This water right decision or order would follow a water right proceeding after a request for such a proceeding by the DWR or USBR.

2. River Flows: Sacramento River at Rio Vista

This objective is to be implemented through water right actions. The permits and license of the DWR and the USBR are conditioned to establish responsibilities to ensure that the flow objectives at Rio Vista on the Sacramento River are met on an interim basis until the State Water Board adopts a decision that assigns permanent responsibility for meeting the Sacramento River at Rio Vista flow objectives. This water right decision would follow a water right proceeding after a request for such a proceeding by the DWR or USBR.

3. River Flows: Lower San Joaquin River at Airport Way Bridge, Vernalis

The Lower San Joaquin River (LSJR) water quality objectives for the reasonable protection of fish and wildlife beneficial uses, referred to as the LSJR flow objectives,

include all of the LSJR flow objectives for February through June, the LSJR base flow objective for February through June at Vernalis, and the October pulse flow objective, as set forth in Table 3.

This program of implementation focuses on flow-related actions on the Stanislaus, Tuolumne, and Merced Rivers (collectively, "LSJR Tributaries") that are necessary to achieve the LSJR flow objectives. The State Water Board also recognizes that Recommended Actions, including non-flow measures, such as habitat restoration, must also be part of efforts to comprehensively address Delta aquatic ecosystem needs as a whole. The State Water Board encourages voluntary agreements that will assist in implementing the LSJR flow objectives, and will consider such agreements as part of its proceedings to implement this Plan, consistent with its obligations under applicable law.

Implementation of February through June LSJR Flow Objectives

By 2022, the State Water Board will fully implement the February through June LSJR flow objectives through water right actions or water quality actions, such as Federal Energy Regulatory Commission (FERC) hydropower licensing processes.[9]

The State Water Board will exercise its water right and water quality authority to help ensure that the flows required to meet the LSJR flow objectives are used for their intended purpose and are not diverted for other purposes. In order to help ensure that actions taken in response to implementation of the LSJR flow objectives do not result in unreasonable redirected impacts to groundwater resources, the State Water Board will take actions as necessary pursuant to its authorities, including its authorities to prevent the waste, unreasonable use, unreasonable method of use, and unreasonable method of diversion of water (Cal. Const., art. X, § 2; Wat. Code, §§ 100, 275) and to enforce the Sustainable Groundwater Management Act (SGMA) (Wat. Code, § 10720 et seq.).

When implementing the LSJR flow objectives, the State Water Board will include minimum reservoir carryover storage targets or other requirements to help ensure that providing flows to meet the flow objectives will not have significant adverse temperature or other impacts on fish and wildlife or, if feasible, on other beneficial uses. The State Water Board will also take actions as necessary to ensure that implementation of the flow objectives does not impact supplies of water for minimum health and safety needs, particularly during drought periods. Actions may include, but are not limited to, assistance with funding and development of water conservation efforts and regional water supply reliability projects and regulation of public drinking water systems and water rights.

[9] To refine the implementation actions and provide for coordination with ongoing FERC proceedings in the LSJR watershed, the February through June LSJR flow objective may be phased in over time, but must be fully implemented by 2022.

Although the lowest downstream compliance location for the LSJR flow objectives is at Vernalis, the objectives are intended to protect migratory LSJR fish in a larger area, including within the Delta, where fish that migrate to or from the LSJR watershed depend on adequate flows from the LSJR and its salmon-bearing tributaries.

It is the State Water Board's intention that an entity's implementation of the LSJR flow objectives, including implementation through flow requirements imposed in a FERC process, will meet any responsibility to contribute to the LSJR inflow component of the Delta outflow objective in this Plan. The State Water Board, however, may further consider and reallocate responsibility for implementing the Delta outflow objective in any subsequent proceeding, including a water right proceeding.

Flow Requirements for February through June

The LSJR flow objectives for February through June shall be implemented by requiring 40 percent of unimpaired flow, based on a minimum 7-day running average, from each of the Stanislaus, Tuolumne, and Merced Rivers. This required percentage of unimpaired flow, however, may be adjusted within the range allowed by the LSJR flow objectives through adaptive methods detailed below. ~~The required percentage of unimpaired flow is in addition to flows in the LSJR from sources other than the LSJR Tributaries.~~ The required percentage of unimpaired flow does not apply to an individual tributary during periods when flows from that tributary could cause or contribute to flooding or other related public safety concerns, as determined by the State Water Board or Executive Director through consultation with federal, state, and local agencies and other persons or entities with expertise in flood management.

In addition, the LSJR base flow objective for February through June shall be implemented by requiring a minimum base flow of 1,000 cfs, based on a minimum 7-day running average, at Vernalis at all times. This minimum base flow, however, may be adjusted within the range allowed by the LSJR base flow objective through adaptive methods detailed below. When the percentage of unimpaired flow requirement is insufficient to meet the minimum base flow requirement, the Stanislaus River shall provide 29 percent, the Tuolumne River 47 percent and the Merced River 24 percent of the additional total outflow needed to achieve and maintain the required base flow at Vernalis.

The Executive Director may approve changes to the compliance locations and gage station numbers set forth in Table 3 if information shows that another location and gage station more accurately represent the flows of the LSJR tributary at its confluence with the LSJR.

Adaptive Methods for February through June Flows

Adjustments to the February through June unimpaired flow requirements allowed by the LSJR flow objectives should be implemented in a coordinated and adaptive manner, taking into account current information. Specifically, FERC licensing proceedings on the Merced and Tuolumne Rivers, other scientific review processes initiated to develop potential management strategies on a tributary basis, and the establishment of the San Joaquin River Monitoring and Evaluation Program (SJRMEP) described below are expected to yield additional scientific information that will inform future management of flows for the protection of fish and wildlife beneficial uses.

Adaptive implementation could also optimize flows to achieve the objectives while allowing for consideration of other beneficial uses, provided that these other considerations do not reduce intended benefits to fish and wildlife.

The State Water Board may approve ~~A~~adaptive adjustments to the flow requirements as set forth in (a) – (d) below ~~may be approved by the State Water Board~~ on an annual or long-term basis~~, or by the Executive Director as provided below,~~ if information produced through the monitoring and review processes described in this program of implementation, or other best available scientific information, indicates that the change for the period at issue will satisfy the following criteria for adaptive adjustments: (1) it will be sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta; and (2) it will meet any existing biological goals approved by the State Water Board. The Executive Director may approve adaptive adjustments that satisfy the criteria above and as provided below:

a) The required percent of unimpaired flow may be adjusted to any value between 30 percent and 50 percent, inclusive. The Executive Director may approve changes within this range on an annual basis if all members of the Stanislaus, Tuolumne, and Merced Working Group (STM Working Group), described below, agree to the changes.

b) The required percent of unimpaired flow for February through June may be managed as a total volume of water and released on an adaptive schedule during that period where scientific information indicates a flow pattern different from that which would occur by tracking the unimpaired flow percentage would better protect fish and wildlife beneficial uses. The total volume of water must be at least equal to the volume of water that would be released by tracking the unimpaired flow percentage from February through June. The Executive Director may approve such changes on an annual basis if the change is recommended by one or more members of the STM Working Group.

c) The release of a portion of the February through June unimpaired flow may be delayed until after June to prevent adverse effects to fisheries, including temperature, that would otherwise result from implementation of the February through June flow requirements. The ability to delay release of flow until after June is only allowed when the unimpaired flow requirement is greater than 30 percent. If the requirement is greater than 30 percent but less than 40 percent under (a) above, the amount of flow that may be released after June is limited to the portion of the unimpaired flow requirement over 30 percent. (For example, if the flow requirement is 35 percent, 5 percent may be released after June.) If the requirement is 40 percent or greater under (a) above, then 25 percent of the total volume of the flow requirement may be released after June. (For example, if the requirement is 50 percent, at least 37.5 percent unimpaired flow must be released in February through June and up to 12.5 percent unimpaired flow may be released after June.) ~~If after June the STM Working Group determines that conditions have changed such that water held for release after June should not be released by the fall of that year, the water may be held until the following year.~~ The Executive Director may approve changes on an annual basis if the change is recommended by one or more members of the STM Working Group.

d) The required base flow for February through June may be adjusted to any value between 800 and 1,200 cfs, inclusive. The Executive Director may approve changes within this range on an annual basis if all members of the STM Working Group agree to the changes.

Any of the adjustments in (a)-(d) above may be made independently of each other or combined. The adjustments in (a), (b), and (c) may also be made independently on each of the Stanislaus, Tuolumne, and Merced Rivers, so long as the flows are coordinated to achieve beneficial results in the LSJR related to the protection of fish and wildlife beneficial uses. Experiments may also be conducted within the adaptive adjustments in (a)-(d), subject to the approvals provided therein, in order to improve scientific understanding of needed measures for the protection of fish and wildlife beneficial uses, such as the optimal timing of required flows. Any experiment shall be coordinated with the SJRMEP and identify the scientific uncertainties to be addressed and the actions that will be taken to reduce those uncertainties, including monitoring and evaluation.

Stanislaus, Tuolumne and Merced Working Group

The State Water Board will establish a STM Working Group to assist with the implementation, monitoring and effectiveness assessment of the February through June LSJR flow requirements. Specifically, the State Water Board will seek recommendations from the STM Working Group on biological goals; procedures for implementing the adaptive methods described above; annual adaptive operations plans; and the SJRMEP, including special studies and reporting requirements. Each of these activities is described in more detail below.

The State Water Board will seek participation in the STM Working Group by the following entities who have expertise in LSJR, Stanislaus, Tuolumne, and Merced Rivers fisheries management, hydrology, operations, and monitoring and assessment needs: the DFW; NMFS; USFWS; and water users on the Stanislaus, Tuolumne, and Merced Rivers. The STM Working Group will also include State Water Board staff and may include any other persons or entities the Executive Director determines to have appropriate expertise. Subgroups of the STM Working Group may be formed as appropriate and State Water Board staff may also initiate activities in coordination with members of the STM Working Group.

Biological Goals

Biological goals will be used to inform the adaptive methods, evaluate the effectiveness of this program of implementation, the SJRMEP, and future changes to the Bay-Delta Plan. The State Water Board will seek recommendations on the biological goals from the STM Working Group, State Water Board staff, and other interested persons, in consultation with the Delta Science Program. The State Water Board will consider approval of the biological goals within 180 days from the date of the Office of Administrative Law's (OAL) approval of this amendment to the Bay-Delta Plan and may modify them based on new information developed through the monitoring and evaluation activities described below or other pertinent sources of scientific information. Biological goals will specifically be developed for LSJR salmonids, as salmonids are among the fish species most sensitive to LSJR flow modifications. The State Water Board may seek recommendations on biological goals for other LSJR species as appropriate.

Biological goals for salmonids will specifically be developed for:

- ~~-~~abundance~~;~~
- productivity as measured by population growth rate~~;~~
- genetic and life history diversity~~;~~ ~~and~~
- population spatial extent, distribution, and structure~~.~~

~~Within a given tributary, r~~Reasonable contributions to ~~productivity~~ these biological goals may include meeting temperature targets and other measures of quality and quantity of spawning, ~~and~~ rearing, and migration habitat, fry production, and juvenile outmigrant survival to the confluence of each tributary to the LSJR.

The salmonid biological goals for this program of implementation will be specific to the LSJR and its tributaries and will contribute to meeting the overall goals for each population, including the salmon doubling objective established in state and federal law. Biological goals should be specific, measurable, achievable, result-focused, and include a time frame for when they will be achieved. Biological goals for salmonid populations will be consistent with best available scientific information, including information regarding viable salmonid populations, recovery plans for listed salmonids, or other appropriate information.

Unimpaired Flow Compliance

Implementation of the unimpaired flow requirement for February through June will require the development of information and specific measures to achieve the flow objectives and to monitor and evaluate compliance. The STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop and recommend such proposed measures. The State Water Board or Executive Director will consider approving the measures within 180 days from the date of OAL's approval of this amendment to the Bay-Delta Plan. The approved measures will inform State Water Board water right proceedings, FERC licensing proceedings, or other implementation actions to achieve the February through June flows. As information and methods improve, specific measures to achieve the flow objectives and to monitor and evaluate compliance may be modified and submitted for approval.

Procedures for Implementation of Adaptive Methods

The STM Working Group, or State Water Board staff as necessary, will, in consultation with the Delta Science Program, develop proposed procedures for allowing the adaptive adjustments to the February through June flow requirements discussed above. The State Water Board or Executive Director will consider approving procedures for allowing those adaptive adjustments within one year following the date of OAL's approval of this amendment to the Bay-Delta Plan.

Annual Adaptive Operations Plan

The STM Working Group or members or subsets of the STM Working Group, as appropriate, will be required to submit proposed annual plans for adaptive implementation actions (annual operations plans) for the coming season by January 10 of each year for approval by the State Water Board or Executive Director. The State Water Board recognizes that an annual operations plan is based on a forecast from the best available information and may not accurately reflect actual conditions that occur during the February through June period. Accordingly, the State Water Board will consider this factor and whether the hydrologic condition could have been planned for in evaluating deviations from approved operations plans. An annual operations plan shall include actions and operations that consider

and will work under a reasonable range of hydrological conditions. It shall also identify how unimpaired flows are calculated and adjustments to be made as updated information becomes available, such as DWR's Bulletin 120.[10] An annual operations plan shall be informed by the review activities described below and may be modified with the approval of the State Water Board or Executive Director. A multi-year operations plan meeting these requirements may be submitted at any time.

Implementation of October Pulse Flow Objective

The October pulse flow objective is currently implemented through water right actions. The State Water Board will reevaluate the assignment of responsibility for meeting the October pulse flow objective during a water right proceeding, FERC licensing proceeding, or other proceeding.

Through water right, FERC licensing, or other processes, the State Water Board will require monitoring and special studies to determine what, if any, changes should be made to the October pulse flow objective and its implementation. The State Water Board may require such monitoring and special studies to be part of the SJRMEP. The State Water Board will evaluate the need to modify the October pulse flow objective in a future update of the Bay-Delta Plan based on information developed through these processes.

State of Emergency

At its discretion, or at the request of any affected responsible agency or person, the State Water Board may authorize a temporary change in the implementation of the LSJR flow objectives in a water right proceeding if the State Water Board determines that either (i) there is an emergency as defined in the California Environmental Quality Act (Pub. Resources Code, § 21060.3) or (ii) the Governor of the State of California ~~or a local governing body~~ has declared an ~~state or local~~ emergency pursuant to the California Emergency Services Act (Gov. Code, § 8550 et seq.) and LSJR flow requirements affect or are affected by the conditions of such emergency. Before authorizing any temporary change, the State Water Board must find that measures will be taken to reasonably protect the fish and wildlife beneficial use in light of the circumstances of the emergency.

San Joaquin River Monitoring and Evaluation Program

In order to determine compliance with the LSJR flow objectives, inform adaptive implementation, investigate the technical factors involved in water quality control, and potential needed future changes to the LSJR flow objectives, including flows for

[10] Bulletin 120 is a publication issued four times a year, in the second week of February, March, April, and May by the California Department of Water Resources. It contains forecasts of the volume of seasonal runoff from the state's major watersheds, and summaries of precipitation, snowpack, reservoir storage, and runoff in various regions of the State.

other times of the year, a comprehensive monitoring, special studies, evaluation, and reporting program is necessary. The State Water Board will require ~~in water right permits, and water quality certifications , as appropriate,~~ annual and comprehensive monitoring, evaluation, and reporting through water rights and water quality actions. Pursuant to its authorities, including Water Code section 13165, comprehensive monitoring will be required to address both the individual and cumulative impacts of diversions and discharges to fish and wildlife beneficial uses. The following requirements, at a minimum, shall be imposed:

1) Monitoring, special studies, and evaluations of the effects of flow and other factors on the viability of native LSJR watershed fish populations throughout the year, including assessment of abundance, spatial extent (or distribution), diversity (both genetic and life history), and productivity.
2) Consideration of recommendations from entities with relevant Central Valley monitoring plans to improve standardization of methods, including the quantification of bias and precision of population estimates.
3) Regular external scientific review of monitoring, evaluation, and reporting.

Monitoring should be integrated and coordinated with new and ongoing monitoring and special studies programs in the LSJR, including pursuant to federal biological opinion requirements, FERC licensing proceedings for the Tuolumne and Merced Rivers, Central Valley Regional Water Board requirements, and the Delta Science Program. At least every five years, the State Water Board will request the Delta Science Program to conduct a review of the San Joaquin River Monitoring and Evaluation Program.

Annual reporting

To inform the next year's operations and other activities, the State Water Board will require preparation and submittal of an annual report to the State Water Board by December 31 of each year. The annual report shall describe implementation of flows, including any flow shifting done pursuant to the annual adaptive operations plan, monitoring and special studies activities, and implementation of other measures to protect fish and wildlife during the previous water year, including the actions by other entities identified in this program of implementation. The annual report shall also identify any deviations from the annual adaptive operations plan and describe future special studies. The State Water Board ~~may~~ will hold public meetings to receive and discuss the annual report.

Comprehensive Reporting

Additionally, every three to five years following implementation of this update to the Bay-Delta Plan, the State Water Board will require preparation and submittal of a

comprehensive report that, in addition to the requirements of annual reporting, reviews the progress toward meeting the biological goals and identifies any recommended changes to the implementation of the flow objectives. The comprehensive report and any recommendations shall be peer-reviewed by an appropriate independent science panel, which will make its own conclusions and recommendations. The State Water Board will hold public meetings to consider the comprehensive report, technical information, and conclusions or recommendations developed through the peer review process. This information will be used to inform potential adaptive changes to the implementation of the flow objectives and, as appropriate, future potential changes to the Bay-Delta Plan.

In order to leverage expertise and limited resources (financial and otherwise), parties are encouraged to work collaboratively in one or more groups and in consultation with the STM Working Group, USBR and DWR, in meeting the above monitoring and reporting requirements. The State Water Board may streamline monitoring and reporting obligations of parties working collaboratively with each other, the STM Working Group, USBR, DWR, the Delta Science Program or other appropriate parties.

Voluntary Agreements

The State Water Board recognizes that voluntary agreements can help inform and expedite implementation of the water quality objectives and can provide durable solutions in the Delta watershed.

Subject to acceptance by the State Water Board, a voluntary agreement may serve as an implementation mechanism for the LSJR flow objectives for the LSJR Tributaries as a whole, an individual tributary, or some combination thereof. Voluntary agreements may include commitments to meet the flow requirements and to undertake non-flow actions. If the voluntary agreements include non-flow actions recommended in this Plan or by DFW, the non-flow measures may support a change in the required percent of unimpaired flow, within the range prescribed by the flow objectives, or other adaptive adjustments otherwise allowed in this program of implementation. Any such changes must be supported by DFW and satisfy the criteria for adaptive adjustments contained within this program of implementation. At a minimum, to be considered by the State Water Board, voluntary agreements must include provisions for transparency and accountability, monitoring and reporting, and for planning, adaptive adjustments, and periodic evaluation, that are comparable to similar elements contained in the program of implementation for the LSJR flow objectives.

The State Water Board encourages parties to present any executed voluntary agreement to the State Water Board for its review as soon as feasible to improve conditions in the watershed.

~~This objective is to be implemented through water right actions. This plan includes a time schedule for completing implementation. Flow objectives for the San Joaquin~~

River at the Airport Way Bridge near Vernalis have been established for three time periods:

- Spring flow objectives, February through April 14 and May 16 through June;
- Spring pulse flow objectives, April 15 through May 15; and
- Fall pulse flow objectives in October

The USBR is assigned responsibility under its water right permits, on an interim basis until the Board assigns permanent responsibility, to ensure that all of these objectives are met. During the Spring pulse flow period in April and May while the SJRA[11] is in effect, however, the experimental target flows in the VAMP will be implemented in lieu of the Spring flow objectives for the April-May period. After the SJRA terminates or adequate information is otherwise received, the State Water Board may review or consider amending the objectives in a water quality proceeding or may immediately conduct a water right proceeding to decide how to assign responsibility for implementing these objectives.

Additional data and scientific analyses are needed to either support or modify the current spring flow objectives. These data and analyses are described in the 'Recommendations to Other Agencies' section of this chapter. In addition, as indicated in the Emerging Issues section of Chapter 1, the State Water Board will conduct a workshop after revisions are made in response to peer review of DFG's San Joaquin River salmon escapement model (anticipated for summer of 2007) to receive information and conduct detailed discussions regarding the various San Joaquin River flow objectives. Following the workshop, the State Water Board may make changes to the objectives, the program of implementation for the objectives, and/or water rights. The State Water Board may also direct additional studies to determine flow needs on the San Joaquin River.

The staged implementation of the Spring pulse flow objectives, with the first stage consisting of variations on the objectives, allows additional scientific investigation into flow needs on the San Joaquin River during the pulse flow period. In the first stage of implementation, the USBR and other parties are conducting a 12-year study referred to as the Vernalis Adaptive Management Plan (VAMP). The VAMP is designed to protect juvenile chinook salmon migrating down the San Joaquin River and to evaluate the effects of varying the San Joaquin River flow and the State Water Project (SWP) and Central Valley Project (CVP) water exports at times when the head of Old River flow barrier[12] is restricting the flow of water into Old River, on the survival of marked juvenile chinook salmon migrating through the Sacramento-San Joaquin Delta.

The VAMP study has been ongoing for seven years, but the study has not yet yielded conclusive results regarding needed changes to the Spring pulse flow

[11] The SJRA is a settlement agreement among numerous parties to the water rights hearing resulting in D-1641 to meet the San Joaquin River portions of various flow-dependent water quality objectives in the 1995 Plan.

[12] The purpose of the head of Old River barrier is to reduce the downstream movement of juvenile San Joaquin River chinook salmon into the southern Delta via Old River where fish mortality increases due to predation and higher levels of exposure to export facilities and agricultural diversions.

objectives. The completed study will provide critical data about flow needs on the San Joaquin River during the Spring pulse flow period.

Until no later than December 31, 2011, or until the SJRA is terminated or adequate information is otherwise received, if earlier, the following interim Spring pulse flows may be implemented on the San Joaquin River at Vernalis during the 31-day April and May[13] pulse period in order to obtain additional scientific information concerning flow needs on the San Joaquin River during the pulse flow period. The target flow should be based on the existing flow, as defined in table 5.

Table 5. Interim San Joaquin River Pulse Flows

Existing Flow[14](cfs)	Target Flow (cfs)
0-1999	2,000
2,000-3,199	3,200
3,200-4,449	4,450
4,450-5,699	5,700
5,700-6,999	7,000
7,000 or greater	Existing Flow

Table 6 contains the numeric indicators for the San Joaquin Valley 60-20-20 Water Year Hydrologic Classification.[15] During years when the sum of the current year's 60-20-20 numeric indicator and the previous year's 60-20-20 numeric indicator is seven (7) or greater, target flows should be one step higher than those required in table 5. The licensee is not required to meet the target flow during years when the sum of the numeric indicators for the current year and the previous two years is four (4) or less.

Table 6. San Joaquin Valley 60-20-20 Water Year Hydrologic Classification Numeric Indicators

SJR Basin 60-20-20 Classification	60-20-20 Indicator
Wet	5
Above Normal	4
Below Normal	3

[13] The timing of the 31-day pulse flow is to be determined by the San Joaquin River Technical Committee (SJRTC). The SJRTC is composed of technical experts appointed by the parties to the SJRA to implement the VAMP experiment and other technical activities that its members deem appropriate to meet the goals of the SJRA.

[14] "Existing flows" will be determined by the SJRTC. Existing flow is defined as the forecasted flows in the San Joaquin River at Vernalis during the pulse flow period that would exist absent the SJRA or water acquisitions, including but not limited to the following:

- Tributary minimum instream flows pursuant to Davis-Grunsky, Federal Energy Regulatory Commission, or other regulatory agency orders existing on the date of this agreement;
- Water quality or scheduled fishery releases from New Melones Reservoir;
- Flood control releases from any non-federal storage facility required to be made during the pulse flow period pursuant to its operating protocol with the U.S. Army Corps of Engineers in effect when the SJRA is executed;
- Uncontrolled spills not otherwise recaptured pursuant to water right accretions (less natural depletions) to the system; and/or
- Local runoff.

[15] The classification method for the 60-20-20 San Joaquin Valley Water Year Classification Index is provided in Figure 3.

~~Dry~~	~~2~~
~~Critical~~	~~1~~

~~Certain water right holders in the San Joaquin Basin are authorized under their water right licenses to provide the experimental flows specified in the SJRA until December 31, 2011, or until the SJRA is terminated, whichever occurs first. After the SJRA terminates or adequate information is otherwise received to support changes, the State Water Board will use the information gained from the VAMP study and other pertinent information to determine what, if any, changes are needed to the pulse flow objectives. The State Water Board will then make any appropriate changes to the Water Quality Control Plan and after a water right proceeding will assign, as appropriate, long-term responsibility for meeting the pulse flow objectives to water right holders whose water diversions impact the flow of water.~~

4. Export Limits

These objectives are to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR are conditioned upon meeting the objectives for export pumping.

5. Delta Cross Channel Gates Operation

This objective is to be implemented through water right actions. The USBR, as the owner and operator of the Gates, is solely responsible under its water right permits and licenses for implementing the Delta Cross Channel Gates Closure objective~~s~~.

6. Salinity Control

Salinity objectives are implemented through a mix of water right actions (flow) and salinity control measures depending on the location and beneficial use affected. Salinity objectives and their implementation fall into the following broad categories:

i. Municipal and Industrial Uses: These~~is~~ objectives are ~~is~~ to be implemented through a combination of water right actions and other actions, depending on the location at which the objective applies. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of chloride objectives to protect municipal and industrial uses. The salinity objectives at Contra Costa Water District's Pumping Plant No. 1 on Rock Slough, however, are being implemented in part through flows provided by the DWR and the USBR on Old River at the head of Rock Slough and in part through infrastructure improvements that reduce water quality degradation caused by localized drainage into Rock Slough.

ii. Fish and Wildlife in Suisun Marsh: These~~is~~ objectives are ~~is~~ to be implemented through water right actions because the salinity levels are determined by flows and control structure operations. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the numeric salinity objectives for Suisun Marsh at stations S-21, and S-42 (Figure 5). Due to evidence showing a potential for the

objectives at stations S-97 and S-35 to cause harm to the beneficial uses they are intended to protect, the State Water Board in Decision 1641 (D-1641) did not require that DWR and USBR attain the objectives at stations S-97 and S-35. Implementation of the salinity objectives at these two stations is discussed in section B.5.

iii. Fish and Wildlife in the San Joaquin River: Thesei~~s~~ objectives are ~~is~~ to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the San Joaquin River salinity objective to protect fish and wildlife uses.

iv. Agriculture in the Western Delta, Interior Delta, and Export Area: These objectives are to be implemented through water right actions. The water right permits and licenses of the DWR and the USBR currently are conditioned upon implementation of the Western Delta, Interior Delta, and Export Area salinity objectives to protect agricultural uses.

v. Agriculture in the Southern Delta: The water rights of the DWR and the USBR are conditioned upon implementation of the southern Delta salinity objective~~s~~ to protect agricultural beneficial uses. Implementation of salinity objective~~s~~ in the southern Delta requires a mix of salt load control and flow related measures. It is therefore discussed in section B of the Program of Implementation: 'Measures Requiring a Combination of State Water Board Authorities and Actions by Other Agencies.'

B. Measures Requiring a Combination of State Water Board Authorities and Actions by Other Agencies

Implementation of the following water quality objectives will require water rights and water quality measures by the State Water Board, in concert with actions taken by other agencies:

Implementation of these objectives can be accomplished through a combination of the following: dilution flows, regulation of water diversions, pollutant discharge controls, best management practices to control the amount of waste produced, and improvements in water circulation. In addition to describing the actions taken, or to be taken, by the State Water Board, this section describes the actions taken, and that should be taken, by other agencies to implement these objectives. The State Water Board will use its authority, as needed and appropriate, under section 13165 of the California Water Code to require that studies are conducted.

1. Southern Delta Agricultural Salinity Objectives

The program of implementation for the southern Delta salinity objective describes the actions necessary to achieve the objective and the monitoring, special studies, and reporting requirements that the State Water Board will require to evaluate

compliance with the objective and to obtain additional information to inform implementation of the objective and understanding of salinity conditions in the southern Delta. The southern Delta salinity objective will be achieved primarily through water right and water quality control actions that affect flow.~~, including through the~~ R~~r~~egulation of municipal and other discharges ~~by municipal and other dischargers~~ will also be required.

~~Elevated salinity in the southern Delta is caused by various factors, including low flows; salts imported to the San Joaquin Basin in irrigation water; municipal discharges; subsurface accretions from groundwater; tidal actions; diversions of water by the SWP, CVP, and local water users; channel capacity; and discharges from land-derived salts, primarily from agricultural drainage. These salinity objectives currently are implemented through a mix of water right actions and salinity control. The water rights of the USBR are conditioned upon implementation of the salinity objectives on the San Joaquin River at Vernalis and the water rights of DWR and USBR are conditioned upon implementation of the salinity objectives at the other three southern Delta stations (San Joaquin River at Brandt Bridge, Old River at Middle River and Old River at Tracy Road Bridge (interior southern Delta stations)). Salinity objectives on the San Joaquin River at Vernalis are also being implemented through non-water right actions, including the San Joaquin River Salinity Control Program in the Central Valley Regional Water Quality Control Board's (Regional Water Board) Water Quality Control Plan for the Sacramento and San Joaquin River Basins. In October of 2005, the State Water Board approved an Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. The amendment consists of a Control Program for Salt and Boron Discharges into the Lower San Joaquin River and other actions to implement salinity objectives in the SJR at Vernalis. The salt and boron basin plan amendment includes implementation measures and a timeline for implementation of salt load allocations.~~

~~The salinity objectives at Vernalis can be attained by releasing dilution water from New Melones and other sources, completing a drain to remove the salts generated by agricultural drainage and municipal discharges from the San Joaquin Valley, and conducting measures in the San Joaquin Valley such as the measures discussed below for controlling salinity in the interior southern Delta. The salinity objectives for the interior southern Delta can be implemented by measures that include state regulatory actions, state funding of projects and studies, regulation of water diversions, pollutant discharge controls, improvements in water circulation, and long-term implementation of best management practices to control saline discharges.~~

State Regulatory Actions

San Joaquin River at Airport Way Near Vernalis

i. In D-1641 the State Water Board concluded that USBR, through its activities associated with operating the CVP in the San Joaquin River

basin, has caused reduced water quality of the San Joaquin River at Vernalis. For the San Joaquin River at Airport Way near Vernalis, ~~Revised Water Right Decision.~~ D-1641 imposes conditions on USBR's water rights requiring implementation of EC levels of 0.7 mmhos/cm from April through August and 1.0 mmhos/cm from September through March (units of mmhos/cm are equal to units of dS/m). As part of implementing the salinity water quality objective for the interior southern Delta, USBR shall be required to continue to comply with these salinity levels, as a condition of its water rights. Implementation of the southern Delta salinity objective at Vernalis may be modified by the State Water Board in a future Bay-Delta Plan update and a subsequent water right proceeding, if necessary, after adoption of a Total Maximum Daily Load (TMDL) or other salinity management plan by the State Water Board or Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) that identifies more appropriate salinity management measures. ~~The State Water Board has conditioned the water rights of some water right holders on the presence of dilution flows. Currently, the water rights of USBR are conditioned upon implementation of the Vernalis objectives, and the water rights of USBR and DWR are conditioned upon implementation of the interior southern Delta objectives. The State Water Board could also require releases from other non-SWP/CVP reservoirs after notice and an opportunity for a hearing. In lieu of some water releases, water right holders such as USBR and DWR could use measures that affect circulation of water in the southern Delta (including permanent operational gates).~~

Interior Southern Delta Compliance Locations

ii. ~~Revised Water Right Decision.~~ In D-1641 the State Water Board concluded that DWR and USBR are partially responsible for salinity problems in the southern Delta due to hydrologic changes caused by export pumping. D-1641 imposes conditions on DWR's and USBR's water rights requiring implementation of EC levels of 0.7 mmhos/cm from April through August and 1.0 mmhos/cm from September through March at the three compliance stations in the interior southern Delta (Interagency Stations No. C-6, C-8, and P-12). As part of implementing the salinity water quality objective for the interior southern Delta, the State Water Board will amend DWR's and USBR's water rights to continue to require implementation of the interior southern Delta salinity water quality objectives consistent with this plan. ~~shall be required to comply with the 1.0 dS/m water quality objective year-round as a condition of their water rights.~~ The State Water Board may also consider the responsibility of others for implementing the interior southern Delta salinity objective based on implementation or completion of the Comprehensive Operations Plan,

Monitoring Special Study, modeling, or Monitoring and Reporting Plan described below, or development of other information.

The interior southern Delta salinity compliance locations are comprised of three river segments rather than three specific point locations so that compliance with the southern Delta salinity objective can be better determined in a Delta environment subject to alternating tidal flows. DWR's and USBR's water rights shall be conditioned to require development of information that will be used to determine the appropriate locations and methods to assess attainment of the salinity objective in the interior southern Delta, including through ~~completion of~~ the Comprehensive Operations Plan, Monitoring Special Study, Modeling, and Monitoring and Reporting Plan described below. ~~Information from these activities will be used to determine the appropriate locations and methods to assess attainment of the salinity objective in the interior southern Delta.~~ Prior to State Water Board approval of the Monitoring and Reporting Plan, ~~attainment~~ compliance of the salinity objective for the interior southern Delta will be assessed at stations C-6, C-8, and P-12, which USBR and DWR shall be required to continue to operate as a condition of their water rights. Chapter III of this plan provides the general rule that unless otherwise provided, water quality objectives cited for a general area are applicable for all locations in that general area. Consistent with this, the use of compliance locations and gage stations to determine compliance by DWR and USBR shall not be interpreted as a limitation on the applicability of the southern Delta salinity objective, which applies throughout the southern Delta.

iii. Comprehensive Operations Plan: The State Water Board will continue to require DWR and USBR to address the impacts of their operations on interior southern Delta salinity levels. Specifically, the State Water Board will require the development and implementation of a Comprehensive Operations Plan (COP). The COP must:

- describe the actions that will fully address the impacts of SWP and CVP export operations on water levels and flow conditions that may affect salinity conditions in the southern Delta, including the availability of assimilative capacity for local sources of salinity;
- include detailed information regarding the configuration and operations of any facilities relied upon in the plan; and
- identify specific performance goals (i.e., water levels, flows, or other similar measures) for these facilities.

Monitoring requirements needed to measure compliance with the specific performance goals in the COP must be included in the

Monitoring and Reporting Plan, discussed below. DWR and USBR shall be required to consult with the South Delta Water Agency (SDWA), Contra Costa Water District (CCWD), State Water Board staff, other state and federal resource agencies, and local stakeholders to develop the COP, and will be required to hold periodic coordination meetings, no less than quarterly, throughout implementation of the plan.

DWR and USBR shall submit the COP to the Executive Director for approval within six months from the date of the OAL's approval of this amendment to the Bay-Delta Plan. Once approved, the COP shall be reviewed annually, and updated as needed, with a corresponding report submitted by ~~October 3~~February 1 each year to the Executive Director for approval. The State Water Board will require compliance with this measure pursuant to its Porter-Cologne Water Quality Control Act authority to require technical and monitoring requirements, or as a requirement of a water right order.

iv. Special Studies, Modeling and Monitoring and Reporting: To implement and determine compliance with the salinity objective in these river segments, and to inform the COP, the State Water Board will require DWR and USBR to complete the following activities. The State Water Board will require compliance with these activities pursuant to its Porter-Cologne Water Quality Control Act authority to require technical and monitoring requirements, or as a requirement of a water right order:

a. Monitoring Special Study: Prior to development of the long-term Monitoring and Reporting Plan, described below, DWR and USBR shall work with State Water Board staff and solicit stakeholder input to develop and implement a special study to characterize the spatial and temporal distribution and associated dynamics of water level, flow, and salinity conditions in the southern Delta waterways. The study shall identify the extent of low or null flow conditions and any associated concentration of local salt discharges. The State Water Board will request local agricultural water users and municipal dischargers to provide data regarding local diversions and return flows or discharges. DWR and USBR shall submit a plan for this special study to the Executive Director for approval within six months from the date of OAL's approval of this amendment to the Bay-Delta Plan. Once approved, the monitoring contained in this plan shall be conducted until superseded by the long-term Monitoring and Reporting Plan, described below, is approved.

b. Modeling: DWR and USBR shall provide modeling and other technical assistance necessary to prepare and update the COP, and otherwise assist in implementing the southern Delta agricultural salinity objective. DWR and USBR will be required to continue to provide this assistance as required by State Water Board Order WR 2010-0002, which modifies paragraph A.3 of Order WR 2006-0006.

c. Monitoring and Reporting Plan: DWR and USBR shall develop long-term monitoring protocols to measure compliance with the performance goals of the COP, and to assess attainment of the salinity objective in the interior southern Delta. These monitoring and reporting protocols shall be based on the information obtained in the Monitoring Special Study, and shall include specific ~~alternative~~ compliance monitoring locations in, or monitoring protocols for, the three river segments that comprise the interior southern delta salinity compliance locations. The Executive Director may approve changes to the gage stations at which compliance is determined, except monitoring station C-10, in Table 2, if information shows that other gage stations more accurately represent salinity conditions in the interior southern Delta.

The Monitoring and Reporting Plan will be required to be integrated and coordinated with existing monitoring and special studies programs in the Delta. DWR and USBR shall submit the Monitoring and Reporting Plan to the Executive Director for approval within 18 months from the date of OAL's approval of this amendment to the Bay-Delta Plan.

v. DWR's and USBR's water rights shall be conditioned to require continued operations of the agricultural barriers at Grant Line Canal, Middle River, and Old River at Tracy, or other reasonable measures, to address the impacts of SWP and CVP export operations on water levels and flow conditions that might affect southern Delta salinity conditions, including the assimilative capacity for local sources of salinity in the southern Delta. The water right conditions shall require any necessary modifications to the design and operations of the barriers or other measures as determined by the COP.

vi. In addition to the above requirements, the salinity water quality objective for the southern Delta will be implemented through the Lower San Joaquin River flow objectives, which will increase inflow of low salinity water into the southern Delta during February through June and thereafter under adaptive implementation to prevent adverse

effects to fisheries. This will assist in achieving the southern Delta water quality objective.

~~ii.~~vii. Salinity problems in the southern Delta primarily result from low flows, tidal action, diversions by the CVP, SWP and local water users, agricultural return flows, poor circulation, and channel capacity. As early as the 1991 Bay-Delta Plan, the State Water Board recognized the need to meet the salinity objectives largely through regulation of water flow. This Bay-Delta Plan continues Revised Decision 1641's obligations on the CVP and SWP to meet the salinity water quality objectives. Overall, discharges from publicly owned treatment works (POTWs) in the southern Delta have only a small effect on southern Delta salinity. Studies show the de minimis influence of POTW discharges on downstream ambient EC levels, both in low and high CVP and SWP export scenarios. The extent to which a POTW can meet salinity water quality objectives in the southern Delta is in part controlled by factors beyond its control, namely flows and circulation patterns, which are largely controlled by tidal action and water diversions. POTW discharges also reflect the EC levels of their source water, which is high in the southern Delta. POTWs are subject to the Clean Water Act and must control their salt discharges. It is reasonable to view the extent to which they must control their discharges in light of the constraints they face, the de minimis effect of their discharge on water quality related to salinity, and this implementation program's focus on water levels and flows to achieve the salinity water quality objectives. Desalination through reverse-osmosis processes can reduce salinity in POTW effluent, but is energy intensive, may be cost-prohibitive to construct and operate, and may also create brine waste disposal issues in an area that is already challenged by high salts. The State Water Board, therefore, finds that reverse-osmosis treatment for POTW wastewater discharges into the southern Delta is currently not a feasible technology for the purpose of controlling salinity in the southern Delta.

The Central Valley Regional Water Board shall regulate ~~impose discharge controls on~~ in-Delta discharges of salts by agricultural, municipal POTW, and other dischargers consistent with applicable state and federal law, including, but not limited to, establishing water-quality based effluent limitations and compliance, monitoring and reporting requirements as part of the reissuance of National Pollutant Discharge Elimination System (NPDES) permits under the Clean Water Act and the regulations thereunder. In most, if not all, cases, it may be infeasible for POTWs discharging to the southern Delta to comply with traditional numeric water-quality based effluent

limitations for salts in NPDES permits. In cases where it is infeasible, the Central Valley Regional Water Board shall include in NPDES permits the following types of enforceable effluent limitations:

(a) A performance-based effluent limitation derived using, at a minimum, the past three years of effluent data and one that considers the potential for drought conditions, changing water sources, and water conservation.
(b) Best management practices, including but not limited to: (A) an industrial pretreatment program, implemented through local ordinances, that minimizes salinity inputs from all industrial sources of salinity within the POTW's collection system; (B) source control measures, such as reducing salinity concentrations in source water supplies; (C) actions to limit or ban the use of residential self-generating water softeners or imposing salt efficiency standards on such water softeners; (D) a salinity education and outreach program; and (E) ongoing participation in the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS).

In addition, where it is infeasible for POTWs discharging to the southern Delta to comply with traditional numeric water-quality based effluent limitations for salts, the Central Valley Regional Water Board shall require POTWs to submit the following information, which shall be submitted with a POTW's application for a renewal of its NPDES permit, except for (e) and (f), which shall be submitted in annual reports:

(a) An evaluation of whether technological or economic changes have made previously deemed infeasible upgrades to control salinity in the POTW's effluent feasible.
(b) A survey of industrial sources of salinity regulated by the industrial pretreatment program, along with all annual reports submitted pursuant to that program documenting the implementation of salinity management strategies at the industrial facility within the collection system area.
(c) Documentation of source control measures taken. If alternative lower-salinity source water supplies were available but not utilized, a justification for not using such supplies shall be provided.
(d) An evaluation of the efficacy of actions taken to limit or ban the use of residential self-generating water softeners or to impose efficiency standards on water softeners within the POTW's collection system area. This evaluation shall include the estimated number of such water softeners in the POTW's collection system area. If a ban

against the use of self-generating water softeners is not instituted, a justification why a ban is not feasible.

(e) Materials developed and disseminated in support of the salinity education and outreach program.

(f) Documented proof of participation in CV-SALTS.

Where it is or becomes feasible for a POTW to comply with numeric water quality based effluent limitations for salts, the Central Valley Regional Water Board shall require them in the applicable NPDES permit. In such cases, POTW compliance actions include, without limitation, source control, such as reducing salinity concentrations in source water supplies; pretreatment programs, such as reducing water softener use among water users; and desalination. Where appropriate, the Central Valley Regional Water Board may also grant variances in accordance with applicable state and federal law.

~~The Central Valley Regional Water Board shall regulate impose discharge controls on in-Delta discharges of salts by agricultural, domestic, and municipal dischargers consistent with applicable state and federal law, including, but not limited to, establishing water quality based effluent limitations and compliance, monitoring and reporting requirements as part of the reissuance of National Pollutant Discharge Elimination System (NPDES) permits under the Clean Water Act and the regulations thereunder. Publicly owned treatment works (POTWs) regulated by NPDES permits that discharge salinity constituents above water quality objectives for EC may qualify for a variance of up to ten years pursuant to the Central Valley Regional Water Board Resolution R5-2014-0074. Actions by POTWs to comply with water quality objectives for EC include, without limitation, source control, such as reducing salinity concentrations in source water supplies; pretreatment programs, such as reducing water softener use among water users; and desalination.~~

~~iii.~~viii. The Central Valley Regional Water Board shall implement the ~~Total Maximum Daily Load (~~TMDL~~)~~ for the San Joaquin River at Vernalis, develop ~~and adopt a basin plan amendment and TMDL~~ a salinity control program for areas upstream of Vernalis, and implement the ~~TMDL and Water Quality C~~control ~~Plan~~ program to reduce salinity and other pollutants reaching the southern Delta.

~~iv. The State Water Board will conduct a workshop in January 2007 to commence proceedings to receive information and conduct detailed discussions regarding the southern Delta salinity objectives, the causes of salinity in the southern Delta, measures to implement salinity objectives for southern Delta agriculture, and other factors. The proceedings following the workshop may result in water right and/or water quality actions.~~

Central Valley Regional Water Board Actions

The Central Valley Regional Water Board is undertaking the following efforts, which will assist in implementing the southern Delta salinity objective:

i. Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS): CV-SALTS is a stakeholder-led effort initiated by the State Water Board and the Central Valley Regional Water Board in 2006 to develop comprehensive long-term measures to address salinity and nitrate problems in California's Central Valley, including formulation of a basin plan amendment and implementation actions. The State Water Board may consider modifications to the southern Delta salinity objective and program of implementation in a future Bay-Delta Plan update, as well as requirements imposed through water right actions, based on information and recommendations generated from the CV-SALTS initiative.

ii. San Joaquin River at Vernalis Salt and Boron TMDL: The Central Valley Regional Water Board is implementing the salinity and boron TMDL at Vernalis. Actions described in the program of implementation for the TMDL include execution of a Management Agency Agreement with USBR addressing salt imported into the San Joaquin River basin via the Delta-Mendota Canal, development of new numeric salinity objectives, and establishment of the Real Time Management Program for the control of salinity discharges to the San Joaquin River.

iii. Upstream of Vernalis San Joaquin River Salinity Objectives: CV-SALTS ~~has~~ established a subcommittee that ~~has~~ developed a proposal for, and the Central Valley Regional Water Board approved, a basin plan amendment to the Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin to establish numerical salinity objectives and a program of implementation for the Lower San Joaquin River upstream of Vernalis.

iv. Irrigated Lands Regulatory Program: Under the Irrigated Lands Regulatory Program, the Central Valley Regional Water Board issues waste discharge requirements (WDRs) to coalition groups and individual dischargers requiring surface water quality monitoring and the preparation and implementation of management plans to address identified water quality problems, including those associated with salinity. The most recent WDRs require third parties to develop regional water quality management plans for areas where irrigated agriculture is contributing to water quality problems. It requires growers to implement practices consistent with those plans to address the identified problems.

v. Variances from Surface Water Quality Standards for Point Source Dischargers, Variance Program for Salinity, and Exception from

Implementation of Water Quality Objectives for Salinity: The Central Valley Regional Water Board adopted Resolution R5-2014-0074 to amend water quality control plans for the Sacramento River and San Joaquin River basins and the Tulare Lake basin to add policies for *Variances from Surface Water Quality Standards for Point Source Dischargers (Variance Policy)*, a *Variance Program for Salinity (Salinity Variance Program)* and an *Exception from Implementation of Water Quality Objectives for Salinity (Salinity Exception Program)*. The amendments were approved by the State Water Board on March 17, 2015, (Resolution No. 2015-0010), ~~and~~ by OAL on June 19, 2015, and~~,~~ ~~-~~by USEPA on July 8, 2016~~approval of the amendments is anticipated in 2016~~.

- The *Variance Policy* will allow the Central Valley Regional Water Board the authority to grant short-term exceptions from meeting water quality based effluent limitations to dischargers subject to NPDES permits. The policy will only apply to non-priority pollutants, which include~~s -~~salinity.
- The *Salinity Variance Program* will allow the Central Valley Regional Water Board the authority to grant multiple discharger variances from meeting water quality based effluent limitations for salinity constituents to publicly owned treatment works. A multiple discharger variance provides a streamlined approval procedure in which an individual discharger variance application, which is consistent with the multiple discharger variance, does not require separate review and approval from the USEPA once the multiple discharger variance is approved by USEPA.
- The *Salinity Exception Program* establishes procedures for dischargers that are subject to WDRs and conditional waivers to obtain a short-term exception from meeting effluent or groundwater limitations for salinity constituents.

The above programs will support the development and initial implementation of the comprehensive salt and nitrate management plans in the Central Valley by requiring dischargers to participate in the CV-SALTS effort.

State Funding of Programs

i. The State Water Board has various financial assistance programs under which it can contribute funding for programs that will help meet the salinity objectives or to improving understanding about salinity conditions in the southern Delta (primarily the San Joaquin River upstream of Vernalis). To date, it has funded tens of millions of dollars worth of projects and studies for such programs. The State Water Board provides funds through the State Revolving Fund Loan Program, the Agricultural Drainage Loan Program, the Agricultural Drainage Management Loan Program, Proposition 13, 40, and 50 grant funding through the Nonpoint Source Pollution Control Programs and Watershed Protection Programs.

Current Projects and Actions by Other Agencies

The following projects may assist in meeting the southern Delta salinity objectives by reducing high salinity drainage to the San Joaquin River; improving circulation in the southern Delta; and supplementing flows through recirculation. All or a portion of these projects are being funded through the above referenced programs. Each of these projects, described below, should be pursued by the identified agencies. If successful, these projects and the actions they contain could make additional regulatory measures by the State Water Board and the Central Valley Regional Water Board unnecessary.

i. Grasslands Bypass Project: The Grasslands Bypass Project manages discharges of agricultural drainage water from 97,000 acres in the Grasslands Watershed. The purpose of the project is to prevent discharges of water containing high levels of selenium to wildlife refuges and wetlands in the San Joaquin Valley. Recent monitoring data shows that from 1995-2015 the discharge of salts was reduced by 83% compared to, but it has reduced the load of salts by 39 percent (from 187,300 tons to 113,600 tons) from pre-project conditions through various management measures including sump management, recycled tail and tile water programs, on-farm tile and tail water management, and various source control measures. The Grassland Areas farmers, USBR, the Central Valley Regional Water Board, and other agencies should continue to evaluate the various management measures in the Grasslands Bypass Project and should continue to implement those measures that are effective in reducing salinity and selenium discharges to the San Joaquin River to meet the goal of zero discharges to the San Joaquin River from the Grasslands area by 2019.

ii. West Side Regional Drainage Plan: The West Side Regional Drainage Plan evolved from the Grasslands Bypass Project as a long-term solution to eliminate discharges to the San Joaquin River of drainage water from irrigated agriculture containing high amounts of selenium, salt and other constituents. The plan uses the following practices:
    a) Reduction of drainage volumes by using source control/efficient water management techniques such as replacing furrow irrigation with micro-irrigation technology and lining unlined delivery canals;
    b) Recirculation of tailwater on primary irrigation lands;
    c) Collection and reuse of tile drainage water on halophytic croplands to concentrate drainage;
    d) Installation and pumping of groundwater wells in strategic locations to eliminate groundwater infiltration into tile drains; and
    e) Treatment and disposal of remaining drainage water through reverse osmosis, evaporation and disposal or reuse of salts.

    When fully implemented, the parties implementing the plan expect to assure achievement of the salinity objectives at Vernalis and reduce the frequency of exceedances of the salinity objectives at Brandt Bridge by 71 percent over a

73-year hydrology. ~~They expect to complete the plan by 2010.~~ Stakeholder parties to the Westside Regional Drainage Plan should continue work to implement the various practices discussed above to achieve the goal of zero discharges to the San Joaquin River from the Grasslands area by ~~2010~~2019.

iii. San Luis Unit Feature Reevaluation Project: USBR ~~currently is~~ evaluat~~ing~~ed seven alternatives as part of the San Luis Unit Feature Reevaluation Project to provide drainage service to the San Luis Unit of the CVP. This project would reduce discharges to the San Joaquin River and sustain long-term agricultural production on drainage-impacted lands. The alternatives ~~under~~ consider~~ation~~ed included: on-farm, in-district drainage reduction actions; federal facilities to collect and convey drain water to regional reuse facilities; and some level of land retirement. Additional options ~~under~~ consider~~ation~~ed included options for in-valley disposal of drain water, ocean disposal, and Delta disposal. USBR's preferred alternative is an in-valley/land retirement alternative~~, and would~~that involves treatment of drain water through reverse osmosis and selenium biotreatment before disposal in evaporation basins. USBR expects implementation to help reduce saline discharges to the lower San Joaquin River. A desalination demonstration project is currently being implemented as part of this effort.

iv. Central Valley Project Improvement Act (CVPIA) Land Retirement Program: USBR and Westland's Water District are implementing land retirement projects under the CVPIA Land Retirement Program and under settlement agreements in drainage-impacted areas of the San Luis Unit of the Joaquin Valley. ~~The projects will reduce the volume of subsurface drain water discharged to the San Joaquin River.~~

v. San Joaquin River Real-time ~~Water Quality~~ Salinity Management Program: The San Joaquin River Real-time ~~Water Quality~~ Salinity Management Program is a ~~project by~~partnership effort between agricultural dischargers within the Lower San Joaquin River Basin, DWR, USBR, USFWS and United States Geological Survey (USGS) that uses telemetered stream stage and salinity data and computer models to simulate and forecast water quality conditions along the lower San Joaquin River. The main objective of the project is to control and time the releases of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet the Vernalis salinity objective~~s~~. The Central Valley Regional Water Board adopted a resolution in 2014 approving the proposed framework to establish the program (R5-2014-0151). The framework document describes completed pilot studies that establish the feasibility of the program and describes the steps to be taken to implement the program.

~~DWR, DFG, University of California Davis (UC Davis), and other parties are undertaking various projects to determine whether there are wetlands management practices that can improve water quality in the San Joaquin~~

~~River and conditions for wildlife. Wetlands discharges may account for more than nine percent of the total salt load in the San Joaquin River at Vernalis. The research is focused on coordinating the release of high salinity wetlands discharges to the river at times when assimilative capacity is available. DFG, USFWS, and USBR in coordination with CALFED, DWR, UC Davis, and other appropriate parties should diligently pursue completion of research to determine opportunities for improving wetlands management for the benefit of wildlife and water quality. Any cost effective and reasonable opportunities to improve water quality through improved wetlands management without adversely impacting fish and wildlife should be implemented as soon as practicable.~~

vi. South Delta Improvements Program: DWR and USBR propose to construct permanent tidal gates in the southern Delta as part of the South Delta Improvements Program (SDIP) to replace the temporary barriers that are currently constructed on an annual basis. DWR and USBR expect that the gates project will assist in achieving the salinity objective~~s~~ at the two Old River compliance measurement locations by improving water circulation in the southern Delta. Due to concern regarding the impact the gates project may have on migratory fish, additional studies are being conducted prior to the re-initiation of consultation for Endangered Species Act permits required for this project. Consequently, implementation of this project has been postponed indefinitely.

~~Currently, DWR and USBR expect the project to be operational in the spring f 2009.~~

~~Delta-Mendota Canal Recirculation: Several agencies and water districts are considering releasing water from the Delta-Mendota Canal to the San Joaquin River to meet water quality objectives at Vernalis. Water Right D-1641 requires USBR to conduct such a study. However, other agencies including DWR have also been involved in assessing this alternative. USBR in coordination with other agencies should complete the recirculation analyses and assess the feasibility of using recirculation to meet southern Delta salinity objectives. If recirculation is cost effective and does not have significant unavoidable impacts to water quality, fish and wildlife, water supplies, and other beneficial uses of water, USBR and/or other agencies should implement a recirculation project to meet and/or supplement the southern Delta salinity objectives.~~

~~Recommended Projects, Studies, and Actions:~~

~~The following recommended projects, studies, and actions will provide information that can be used during subsequent updates of the Water Quality Control Plan and water rights proceedings to implement the Plan:~~

i. Central Valley Salinity Committee and Salinity Study Task Force: At a January of 2006 joint workshop, the State Water Board and Central Valley Regional Water Board established a Salinity Committee to address salinity issues in the Central Valley. The Committee will establish a Salinity Study Task Force to evaluate the impact of salinity on water resources and develop a viable salinity management plan; sponsor a follow-up joint State Water Board/Regional Water Board salinity workshop to receive comments on the salinity management plan; conduct meetings to gather additional public input; contract for preparation of an economic study of salinity impacts and the social and economic consequences of not implementing a viable salinity management program; and sponsor a conference that will highlight the major salinity-related issues and their statewide impacts.

ii. Southern Delta Salinity Objectives: There is a need for an updated independent scientific investigation of irrigation salinity needs in the southern Delta (similar to the investigation on which the current objectives are based). The scientific investigation should address whether the agricultural beneficial uses in the southern Delta would be reasonably protected at different salinity levels, whether management practices are available that would allow for protection of the beneficial uses at a higher salinity level in the channels of the southern Delta, and whether such management practices are technically and financially feasible. The investigation could address the feasibility of providing an alternative method of delivering fresh water to agricultural water users in the southern Delta. The scientific investigation must be specific to the southern Delta. The State Water Board will conduct a workshop to discuss this subject in January 2007.

2. San Joaquin River Dissolved Oxygen Objective

D-1641 directs the Central Valley Regional Water Board to establish a TMDL to address the dissolved oxygen (DO) impairment in the San Joaquin River. In November of 2005, the State Water Board approved an Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. The amendment, approved by the Office of Administrative Law in August 2006, consists of a Control Program for Factors Contributing to the DO impairment in the Stockton Deep Water Ship Channel (DWSC) and other actions to implement DO objectives in the DWSC portion of the San Joaquin River. The DO basin plan amendment includes implementation measures and a timeline for implementation for both the 1995 Plan DO objective and the DO objective in the Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin.

The Central Valley Regional Water Board should continue to implement the recently adopted DO TMDL. Further, the United States Army Corps of Engineers (USCOE) and other agencies and parties that contribute to the DO impairment should complete the measures recommended by the Central Valley Regional Water Board in the basin plan amendment. In addition, the responsible entities should complete their investigations into the feasibility of operating an aeration facility in the Stockton

DWSC to assist in achieving the objectives. If the pilot project and other information demonstrates that permanent installation and operation of aeration devices is feasible and would not have immitigable adverse impacts on fish, wildlife, water quality and other resources, DWR, CALFED, and the other implementing agencies should pursue operation of such a facility with operating assistance from the State Water Contractors (SWC), the Port of Stockton, San Luis Delta-Mendota Water Authority (SLDMWA), the San Joaquin River Group Authority ~~(SJRGA)~~, and other appropriate agencies.

DWR and USBR should continue to expeditiously pursue installation of a permanent operable gate (barrier) at the head of Old River or equivalent measures to assist in achieving the DO objective.

3. Narrative Objective for Salmon Protection

D-1641 assigned responsibility to the USBR and DWR to comply with the river flow and operational objectives for fish and wildlife. These objectives help protect salmon migration through the Bay-Delta Estuary. D-1641 did not require separate actions to implement the narrative objective for salmon because the State Water Board expects that implementation of the numeric flow-dependent objectives and other non-flow measures will implement this objective.

The narrative objective for salmon protection in the Delta is consistent with the anadromous fish doubling goals of the CVPIA. Under the Anadromous Fish Restoration Program (AFRP), State, federal and local entities are continuing to implement programs within and outside the Delta geared towards achieving the CVPIA anadromous fish doubling goals.

The State Water Board intends to invite DFG, NOAA Fisheries, and other agencies monitoring the progress of the salmon doubling effort to present to the Board the results from ongoing studies, fishery improvement programs, and any recommendations for a specific numeric objective at subsequent workshops every two years starting from the date of the adoption of this Plan. The State Water Board will consider monitoring results when determining whether numeric objectives either should replace or augment the narrative objective. The Board may use the information it receives to modify the objective in future proceedings.

Actions by parties other than the State Water Board are required to implement the narrative objective for salmon protection if implementation of the flow-dependent objectives does not achieve the objective. Other agencies are implementing the following actions. These actions not only benefit the salmonids while they are in the Estuary, but also help improve habitat for other species.

i. Through the CVPIA, Section 3406 (b) 21, Anadromous Fish Screen Program, the USBR, USFWS, and other participating agencies should continue to work towards the implementation of new screening facilities on diversions in the Bay-Delta Estuary to reduce losses of fish in all life stages to unscreened

water diversions. In evaluating Delta diversions, these agencies should: (1) decide where screens are needed; (2) consider whether diversion points should be relocated or consolidated; and (3) provide their recommendations on changes in points of diversion to the State Water Board for consideration in a water rights proceeding.

ii. The DWR and the USBR, in consultation with the DFG, USFWS, and NOAA Fisheries, should continue to evaluate and implement all feasible measures and programs to reduce entrainment and mortality of fish salvaged at the Skinner Fish Protection Facility (Banks Pumping Plant) and the Tracy Fish Collection Facility (Tracy Pumping Plant). These measures should include: (1) monitoring entrainment on a real-time basis to identify periods of peak susceptibility of various species; (2) coordinating operations of the two diversions, including interchangeable pumping, to reduce combined losses; (3) increasing screening efficiency; (4) improving fish salvage and handling; and (5) controlling predators at the SWP and CVP intakes.

4. Narrative Objective for Brackish Tidal Marshes of Suisun Bay

In the 1995 Plan, the State Water Board recommended that DWR convene a Suisun Marsh Ecological Work group (SEW) consisting of representatives from various State, federal and private agencies and other interested parties. The SEW was assigned eight tasks, one of which was to determine a numeric objective to replace the narrative objective for tidal brackish marshes of Suisun Bay. However, the SEW was unable to determine a single numeric objective for the tidal marshes. In 2001 the Suisun Marsh Charter Group (SMCG[16]) was formed to develop a plan to balance the competing needs in Suisun Marsh. The SMCG is currently preparing a Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/EIR) for the Habitat Management, Preservation, and Restoration Plan for the Suisun Marsh (Suisun Marsh Plan). In the preparation of the Suisun Marsh Plan, the principal Suisun Marsh agencies are evaluating Plan alternatives with a tidal wetland habitat restoration component ranging from 3,000 to 36,000 acres.

State Water Board staff will use the results of the final PEIS/EIR and the resulting Suisun Marsh Plan during the next Water Quality Control Plan update to determine whether and how to convert the narrative objective to a numeric objective for the Brackish Tidal Marshes.

5. Numeric Objectives for Suisun Marsh

State Water Board staff will use the results of the final PEIS/EIR and the resulting Suisun Marsh Plan currently being prepared by the Suisun Marsh Charter Group (SMCG), to determine in a future plan amendment whether the objectives at stations S-97 and S-35 should be amended or deleted. The objectives at stations S-97 and S-35 may be amended and/or implemented in stages, as appropriate, and shall be

[16] The SMCG Principle Agencies include Suisun Resource Conservation District, DFG, DWR, USBR, CBDA, NMFS and USFWS.

implemented no later than either January 1, 2015, or an earlier date, if a further review of these objectives does not determine that they are not needed.

The objectives for water supply intakes for waterfowl management areas on Van Sickle and Chipps islands, which have no locations specified, may be amended and/or implemented in stages, and shall be implemented no later than January 1, 2015 if a further review of these objectives does not determine that they are not needed. Other measures to control Suisun Marsh soil and channel water salinities are discussed in section C9.

C. Recommendations to Other Agencies

Consistent with the Porter-Cologne Water Quality Control Act, this Water Quality Control Plan identifies control actions recommended for implementation by agencies other than the State Water Board. Actions are recommended both for the attainment of water quality objectives and to obtain additional information on the effects of flow and water quality on beneficial uses.

Numerous actions can be taken, in addition to establishing and implementing water quality objectives for the Bay-Delta Estuary, to improve fish and wildlife beneficial uses in the Estuary. These actions involve improvements to habitat conditions both inside and outside of the Estuary, many of which are under the authorities of other agencies, as well as studies needed to better understand the effects of flow and water quality on beneficial uses.

There is an ongoing effort by State agencies, the federal government, and agricultural, urban, and environmental interests to identify, fund, and implement, as warranted, measures to address the broader non-flow-related range of factors potentially affecting water quality and habitat in the Bay-Delta Estuary. Potential measures under consideration by these entities include those that would be implemented outside of the Estuary itself. These efforts, in connection with the other measures to implement the objectives in this plan, are among the ongoing programs to provide better protection for the beneficial uses that depend on the Bay-Delta Estuary.

The State Water Board will use its authority, as needed and appropriate, under section 13165 of the California Water Code to require that the following actions and studies be conducted.

1. Review and modify, if necessary, existing commercial and sport fishing regulations

Current levels of sport and commercial fishing may be contributing to reduced fish populations in the Bay-Delta Estuary. Since the implementation of the 1995 Plan, the Fish and Game Commission was granted authority over all state managed bottom trawl fisheries not managed under a federal fishery management plan or state fishery management plan. (Fish & Game Code, § 8841.) This authority

ensures the sustainable management of resources, protects the health of ecosystems, and assists in the orderly transition to sustainable gear types when bottom trawling is incompatible with these goals.

The DFG, California Fish and Game Commission, Pacific Fisheries Management Council, and NOAA Fisheries should take the following actions within their respective authorities: (1) develop and implement a fisheries management program to provide short-term protection for aquatic species of concern through seasonal and area closures, gear restrictions to reduce capture and mortality of sub-legal fish, and other appropriate means; and (2) review immediately, and then at least every two years, and modify, if necessary, existing harvest regulations to ensure that they adequately protect aquatic species.

2. Reduce illegal harvesting

Illegal harvesting has a certain but un-quantified impact on fisheries of the Bay-Delta Estuary. The DWR and the DFG should expand the current illegal harvest enforcement program. Additionally, the DFG should continue to develop and implement educational programs to curb poaching of fishery resources.

3. Reduce the impacts of introduced species on native species in the Estuary

The intentional and accidental introduction of non-native species has caused major changes in the composition of aquatic resources in the Bay-Delta Estuary; however, the exact impacts of existing introduced species on native species in the Estuary are not clear. The impact of introduced species is being investigated as a potential cause of the POD. The results of the ongoing POD studies may provide insight into the reasons for the decline, and provide the scientific basis for actions that can be taken to reverse the trend.

Until the results from the POD studies are made available, other programs are being implemented by other agencies to lessen the propagation of invasive species. The National Invasive Species Act of 1996 established various programs intended to decrease the propagation of invasive species into waters of the U.S. and to prevent the spread of aquatic nuisance species. These programs include the Ballast Water Management Demonstration Program and the Aquatic Nuisance Species Program and allows for State Invasive Species Management Plans to be created independent of federal action. Under the National invasive Species Act of 1996, the DFG, USFWS, and NOAA Fisheries should continue to pursue programs to determine the impacts of introduced species, including striped bass, on the native aquatic resources of the Estuary, and the potential benefits of control measures. The DFG should also continue its efforts under the Fish and Game Code sections 6430-6439, enacted in 1992, concerning introduced species. Additionally, the California Fish and Game Commission should deny all requests for the introduction of new aquatic species into the watershed of the Bay-Delta Estuary unless it finds, based on strong, reliable evidence, that an introduction will not have deleterious effects on native species.

4. Improve hatchery programs for species of concern

Existing fish hatcheries are operated in order to provide mitigation for the loss of stream spawning and rearing habitat due to the construction of large dams. As noted by NOAA Fisheries in the Biological Opinion on the Long-Term Central Valley Project and State Water Project Operations Criteria and Plan (OCAP), the viability of natural fish populations has been compromised due to the operation of hatcheries, as the hatchery fish are not isolated from the natural systems. Hatchery fish, while increasing the abundance of fish numbers, often result in increased harvesting pressure on natural fish stocks. Additionally the hybridization between hatchery and natural fish stocks has caused deterioration of the natural population.

To assist in the management of natural fish stocks, Congress has mandated that all federal and federally funded salmon and steelhead hatcheries implement a marking program on the fish they release to visually distinguish between hatchery and natural stock. DFG, NOAA Fisheries, and USFWS should continue to: (1) carefully examine and periodically re-examine the role and contribution of existing hatchery production for various fish species (e.g., chinook salmon, steelhead trout), including a consideration of the need for genetic diversity and maintaining the integrity of different salmon runs and (2) evaluate strategies for improving the survival of hatchery fish, before and after release, including diet and pre-release conditioning, selection of the life stage and size of fish to be released, timing releases relative to the presence or absence of other species, and using multiple release locations.

5. Expand the gravel replacement and maintenance programs for salmonid spawning habitat

The presence of dams on the major tributaries of the Delta blocks the movement of gravel eroding from upstream areas and causes fine sediments to infiltrate the remaining gravels. Reduction in the riverbed gravels required for salmonid spawning limits the success of chinook salmon and steelhead trout reproduction in the watershed of the Bay-Delta Estuary.

Under the AFRP, and other gravel replacement and maintenance programs, the DWR, the USBR, and other agencies that currently conduct gravel replacement and spawning habitat improvement programs on the Sacramento and San Joaquin River systems should continue and, where possible, increase their efforts in the reaches where salmonids are likely to spawn.

6. Evaluate alternative water conveyance and storage facilities of the SWP and CVP in the Delta

The current water diversion facilities of the CVP and the SWP in the southern Delta adversely impact fish populations. These facilities or alternative facilities are needed to meet water supply demands in areas south and west of the Delta. Various alternatives have been identified to minimize impacts to fish while meeting water supply demands. The proposed alternatives include construction of a water diversion intake on the Sacramento River equipped with state-of-the-art fish screens, isolated and through-Delta water conveyance facilities, and new water

storage facilities within and south of the Delta. The DWR and USBR should continue their efforts to develop alternative water conveyance and storage facilities in the Delta, and should evaluate these alternatives and their feasibility and take action as necessary to minimize impacts to fish.

7. Develop an experimental study program on the effects of pulse flows on fish eggs and larvae in the Delta

The magnitude of freshwater outflow passing through the Delta affects the geographic distribution of many planktonic fish eggs and larvae. The egg and larval stages of many fish species occur in the Delta during a relatively short period of time in the spring (April-June). When there is high freshwater outflow, the planktonic eggs and larvae are moved downstream into Suisun Bay where they are less susceptible to entrainment at the SWP and CVP diversions and at other diversion points within the Delta. Absent high freshwater flows, pulse flows can be used to move the eggs and larvae downstream into Suisun Bay. To improve the efficiency of water used for this purpose, it would be helpful to experimentally quantify the magnitude and duration of pulse flows needed to move a substantial proportion of fish eggs and larvae into Suisun Bay.

DWR and USBR should conduct experiments to investigate and evaluate the biological benefits of pulse flows to move planktonic fish eggs and larvae into Suisun Bay. These experiments, which should be conducted as soon as feasible, should: (1) include flows from both the Sacramento and San Joaquin Rivers; (2) include real-time biological monitoring to determine the most favorable times for the pulse flows and the effects of the pulse flows on the eggs and larvae; (3) determine whether short-term pulse flows have a lasting benefit or whether, when outflows are reduced after a pulse flow, the larval fish are drawn back into interior Delta areas; and (4) take into account base flows and availability of water supplies. The experiments should be designed so that they can be used to refine potential pulse flow requirements in the future.

8. Implement actions needed to restore and preserve marsh, riparian, and upland habitat in the Delta

Most of the historical fish and wildlife habitat in the Delta has been eliminated or disturbed. In the Delta, less than 100,000 acres of the total 738,000 acres remains as marsh, riparian, and upland habitat. The remainder of the area is highly altered due to conversion to agricultural land, industrial and urban development, and actions for flood control and navigation, such as dredging channels and riprapping banks. Furthermore, many of the alterations that have already occurred require extensive ongoing maintenance, which also disrupts fish and wildlife habitat. Restoration of fish and wildlife habitat in the Delta would benefit many species of the Bay-Delta Estuary.

State and federal agencies should require, to the extent of their authorities, habitat restoration in the Delta as a condition of approving projects. For example, the Delta Protection Commission, in all of its actions under the Delta Protection Act of 1992

(Pub. Resources Code § 29700 *et seq*.) that provide for the coordination of local land use decisions in the Delta, should continue to implement and support programs such as the Delta Mercury TMDL Collaborative (AB 2901), the Lower Bypass Collaborative/Management Plan and the Delta-wide Conservation Easement Concept. The DFG, when it considers approving stream alterations, and the DFG, USFWS, and NOAA Fisheries, when they consider projects that affect endangered species, should consider habitat requirements. The USCOE should consider habitat requirements in connection with applications for permits under Clean Water Act section 404. Within their authorities, these agencies should provide for: (1) levee setback requirements; (2) reductions in the depth of selected Delta channels, by using either dredge material from navigational channels or natural infill, to restore more productive shallows and shoals; (3) conversion of low-lying Delta islands to habitat areas; and (4) other habitat enhancement measures. The State Water Board will consider habitat requirements where needed to meet water quality standards under the Clean Water Act when approving section 401 certifications.

9. Suisun Marsh soil and channel water salinity objectives

In addition to the formation of the SEW discussed above, the 1995 Plan recommended three measures to be implemented to control Suisun Marsh soil and channel water salinities. The first measure, calling for continuation of the actions identified for implementation in the Suisun Marsh Preservation Agreement (SMPA), is included in the Revised Suisun Marsh Preservation Agreement executed on June 25, 2005. The Suisun Marsh Charter Group is evaluating two additional actions that may be added to the SMPA in a future amendment. The second measure, calling for a study to determine the relationship between channel water salinity and soil water salinity under alternative management practices, was completed in 2001 by DWR as part of the Comprehensive Review of Suisun Marsh Monitoring Data, 1985-1995. The third measure, requiring that DWR, USBR, DFG, and Suisun Resource Conservation District (SRCD), together with the property owners in Suisun Marsh, to employ a watermaster, has been accomplished through implementation of the Water Manager Program under the Revised SMPA.

In June of 2005, SRCD, DWR, USBR, and DFG signed the Revised SMPA. This agreement funded the Water Manager Program to help coordinate and improve water management practices on individual private managed wetlands throughout the Marsh. The duties of the Water Managers include:

- promote and encourage wetland management activities, including flooding, draining and circulation, so that they occur at the appropriate critical times of the year to produce desired wildlife habitats.

- provide technical support in the field to answer questions and educate landowners on beneficial management techniques.

- protect and enhance endangered species habitat, manage water application, and provide new scientific information pertaining to common management activities.

- supervise and coordinate the portable pump program to ensure proper maintenance and operation of the pumps.

- assist landowners in planning yearly maintenance and enhancement projects.

- additional activities may include assisting DFG on water management of State owned property, assisting in yearly salt marsh harvest mouse monitoring, California clapper rail surveys, and inspections of levees during storms to identify damages and assist in flood fight coordination.

10. San Joaquin River ~~Spring Flow Objectives~~ Non-Flow Actions

In addition to the recommendations in the preceding sections, the following recommendations apply specifically to the San Joaquin River. The recommendations are for non-flow actions that are complementary to the LSJR flow objectives for the protection of fish and wildlife. These recommended actions, together with the coordinated monitoring and adaptive implementation of the LSJR flow objectives, are expected to improve habitat conditions that benefit native fish and wildlife, or are expected to improve related science and management within the LSJR watershed.

Additionally, educational outreach programs should be developed and conducted with interested stakeholders or watershed groups to promote collaborative development, funding, and implementation of habitat enhancement and protection projects, and to promote resource stewardship among stakeholders. In many cases, the recommended actions will require authorizations by the appropriate agencies, which should consider this Plan when acting on them.

i. Restore, Enhance, and Protect Floodplain and Riparian Habitat: The USCOE, USBR, DFW, USFWS, FERC licensees, water districts, local landowners, and other appropriate entities should undertake, participate in, fund or authorize riparian and floodplain habitat corridor restoration, enhancement and protection actions along the LSJR and its tributaries, including but not limited to the following:

    a) Obtain easements or acquire land for riparian and floodplain habitat restoration.
    b) Reduce salmon stranding events in ponds, pits, and other unnatural features by physically modifying problem areas within river corridors.
    c) Facilitate the establishment and maintenance of self-sustaining native riparian and floodplain vegetation.

d) Restore, enhance, and protect secondary/side-channel habitats to increase habitat diversity and function within the Stanislaus, Tuolumne, and Merced Rivers.
e) Import silt or fine sediment onto floodplain restoration projects to improve soil moisture properties and encourage riparian vegetation success.
f) Identify locations in the LSJR and its tributaries that are appropriate for levee modification (e.g. rip-rap removal and levee set back or removal) for the purpose of improving native fish and wildlife habitat.

ii. Reduce Vegetation Disturbing Activities in Floodplains and Floodways, Where Safe and Appropriate: The NMFS, DFW, USFWS, Central Valley Flood Protection Board, USACE, local landowners, county governments, local agricultural commissions and other land management agencies in the LSJR, Stanislaus, Tuolumne, and Merced River watersheds should reduce grazing, mowing, cutting, spraying, discing and other vegetation disturbing activities in floodplains and floodways, where safe and appropriate, to promote and restore these areas with riparian vegetation. Actions include but are not limited to the following:

a) Develop grazing strategies that protect and improve streamside vegetation, and that minimize bank disturbance.
b) Conduct outreach to inform landowners of state and federal laws and regulations that protect riparian, wetland, and Endangered Species Act (state and federal) protected vegetation.
c) Review and potentially modify existing floodplain, floodway, and riparian vegetation management plans, or develop new ones using the best available science, to balance the needs of the ecosystem and the needs of public safety and other considerations.
d) Compile data, conduct studies, and review literature to determine the influence that large trees and other vegetation types have on levee and floodway safety, and use this information to make science based management decisions.

iii. Provide and Maintain Coarse Sediment for Salmonid Spawning and Rearing: DWR, USBR, DFW, USFS, NMFS, FERC, FERC licensees and other entities performing or otherwise participating in habitat restoration, enhancement and protection projects should provide and maintain an adequate supply of coarse sediment for salmonid spawning and rearing habitat. In addition, entities that can control contributions of fine sediment in the Stanislaus, Tuolumne, and Merced River watersheds should reduce the input of fine sediment in spawning areas. These actions, include but are not limited to the following:

a) Develop and maintain coarse sediment management plans for the major LSJR tributaries that consist of two temporal stages: (1) short-term restoration and gravel augmentation to re-build spawning habitat and to restore functional processes important to native fish and wildlife; and (2) long-term course sediment augmentation program to maintain

the functioning of the restored habitat and to compensate for the blockage, by dams, of the natural gravel supply.

b) Develop and implement erosion control measures including the construction of sediment retention basins within the Stanislaus, Tuolumne, and Merced River watersheds.

c) Identify and remediate unpaved roads or other disturbed areas that may be contributing to fine sediment input.

iv. Enhance In-Channel Complexity: The DFW, USFWS, NMFS, FERC, FERC licensees, conservation groups, water districts and other appropriate entities should enhance in-channel complexity within the LSJR tributaries by adding instream structures, including but not limited to the following:

a) Add boulders, large woody debris, or other structures where appropriate in river channels, taking human safety into consideration.

b) If large woody debris or coarse sediment is removed from upstream reservoirs, it should be transported downstream and placed into the Stanislaus, Tuolumne, and Merced Rivers due to that reservoir's contribution to deficits of large woody debris and coarse sediment supply in these rivers.

v. Improve Reservoir Operations and/or Physical Structures to Maintain Adequate Water Temperature Conditions: The USBR, NMFS, USFWS, DFW, FERC, FERC licensees, dam owners or operators, and others, should evaluate and implement temperature control solutions, including but not limited to the following:

a) Cold water pool management.

b) Installation or modification of selective withdrawal structures (e.g. temperature control curtains or shutters).

vi. Expand Fish Screening: The DFW, NMFS, USFWS, water districts, local landowners, and others should evaluate unscreened diversions on the Stanislaus, Tuolumne, and Merced Rivers and the LSJR for their potential to cause mortality to migrating salmonids and implement fish screening solutions where appropriate and effective.

vii. Improve Fish Passage Above Dams: The USBR, NMFS, USFWS, DFW, FERC, FERC licensees, dam owners or operators, and others, should evaluate and implement fish passage solutions to all human-made barriers which block native fishes from accessing important habitats, including but not limited to the following:

a) Near-term actions assessing habitat suitability upstream of dams, investigating fish passage options and developing plans for long-term reintroductions of salmonids upstream of existing dams.

b) Provide fish passage at existing dams which block or impede native fish movements.

viii. Improve Fish and Water Barrier Programs: The USBR, DWR, DFW, USFWS, and NMFS should develop and implement improvements to fish and water barrier programs within the Delta, including but not limited to the following:

a) Research, monitor, and report the effects of physical and non-physical barriers within the delta on water quality and fish.
b) Develop and evaluate physical and non-physical barrier designs to maximize their effectiveness in reducing adverse impacts on native fish and wildlife and their habitat.

ix. Reduce Predation and Competition by Non-Native Fish: The DFW, NMFW, USFWS, FERC, FERC licensees, local water districts, conservation groups, landowners, water users and other appropriate entities should reduce impacts that non-native predators and competitors have on native fish and modify habitats which currently favor non-native fish over native fish in the LSJR and its tributaries to favor native fish. Actions include but are not limited to the following:

a) Study and report the effects that predators and non-native fish have on native fish.
b) Identify gravel pits, scour pools, ponds, weirs, diversion dams, and other structures or areas that harbor significant numbers of non-native fish and predatory fish that may currently reduce native fish survival.
c) Modify priority structures and areas to reduce predation and non-native fish effects and to improve native fish success.
d) Evaluate and implement changes to fishing regulations to reduce the impact that non-native competitor and predator fish have on native fish.

x. Reduce Invasive Species: The NMFS, DFW, USFWS, USBR, United States Department of Agriculture, California Department of Food and Agriculture, the State Lands Commission, the California Fish and Game Commission, the California State Parks Division of Boating and Waterways, local agencies in LSJR Tributaries' watersheds, and other appropriate entities should reduce the impacts aquatic invasive species (plants and animals) have on native fish and wildlife of the Bay-Delta watershed. Actions include but are not limited to the following:

a) Fund and launch prevention, early detection, and rapid response actions, including efforts to coordinate various aquatic invasive species monitoring programs and expand monitoring of freshwater systems.
b) Evaluate and implement appropriate actions to minimize the effects of aquatic invasive species on native fishes in the Bay-Delta watershed.

c) Monitor and regulate the importation of aquatic invasive species to minimize the effects of such species on native fishes in the Bay-Delta watershed.
d) Conduct a statewide assessment of the risk from various aquatic invasive species vectors.
e) Support public education preventing the introduction of aquatic invasive species, including promoting the use of native and noninvasive alternatives.

~~The DFG, USFWS, and NOAA Fisheries, in coordination with the IEP and other interested parties, should compile information and conduct specific studies to determine whether and what changes should be made to the Spring Flow Objectives to protect San Joaquin River chinook salmon and steelhead, pelagic organisms (see the POD section for additional information concerning these studies) and other applicable fish and wildlife species. These entities also should conduct analyses to determine whether it is appropriate to revise the methodology for determining when the higher spring flow objectives apply, to better reflect hydrological conditions within the San Joaquin River Basin. In addition, these entities should conduct modeling to determine the water costs of the various flow proposals and the sustainability of such proposals given current water storage capacities and consumptive use needs within the San Joaquin River Basin. These entities should present any available information from such studies during the State Water Board's workshop on the San Joaquin River flow issues.~~

11. San Joaquin River ~~Pulse Flow Objectives~~ Restoration Program

The historic operation of the Friant Dam resulted in significant portions of the main stem of the San Joaquin River between Friant Dam and the confluence of the Merced River being dry. In 2006, in response to litigation over those impacts, the Department of Interior, the Natural Resources Defense Council, and the Friant Division long-term contractors reached a settlement to restore and maintain fish in "good condition" from below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish. In addition, the parties to the settlement agreed to reduce or avoid adverse water supply impacts to the Friant Division long-term contractors that could result from the implementation of interim and restoration flows. The settlement also acknowledged the potential for significant public benefits beyond its restoration and management goals including water quality benefits downstream of the Merced River.

The DFW, USBR, NMFS, and USFWS in coordination with the IEP, STM Working Group, and other interested parties should evaluate San Joaquin River Restoration Program flow contributions to flow and water quality requirements at Vernalis. The State Water Board may consider water quality objectives for the stream system above the San Joaquin River's confluence with the Merced River in future updates to this Plan.

~~DWR, in cooperation with parties to the SJRA, should establish procedures to install the head of Old River barrier at flows in excess of 5,000 cfs during the pulse flow period to further increase the survival of out-migrating San Joaquin River chinook salmon smolts and to provide additional data for the VAMP experiment.~~

~~In addition, parties to the SJRA should conduct a peer review of the VAMP study design to determine whether changes may be needed to the study to obtain necessary data points and to ensure the protection of San Joaquin River and Delta species. This peer review should be conducted prior to the State Water Board's workshop on San Joaquin River flow issues, anticipated for summer of 2007. Conclusions from the peer review should be presented during the workshop. If the findings of the peer review indicate that changes may be needed to water rights implementing the VAMP study, parties to the SJRA may file a petition to change their water rights with the State Water Board.[17] Alternatively, the State Water Board could undertake its own proceeding to make changes to water rights, the objectives, and/or the program of implementation for the objectives.~~

D. Monitoring and Special Studies Program

This Plan requires, and the permits and license of the DWR and the USBR include conditions for, a monitoring program to provide baseline information and determine compliance with water quality objectives. This Plan also requires, and the permits of DWR and USBR include conditions for, special studies that will (1) evaluate the response of the aquatic habitat and organisms to the objectives; and (2) increase understanding of the large-scale characteristics and functions of the Estuary ecosystem to better predict system-wide responses to management options.

The monitoring and special studies program, also known as the Environmental Monitoring Program (EMP) is predicated on the ongoing monitoring efforts of the IEP. IEP member agencies include the State Water Board, DFG, USGS, NOAA Fisheries, USCOE, USEPA, DWR, and the USBR. The program is coordinated with the CBDA and UC Davis to minimize duplication and facilitate the exchange of data.

Table 4 of the 1995 Plan (now Table 7), established a preliminary compliance and baseline monitoring program. Condition 11 (e) on page 149 of D-1641 required the DWR and the USBR to complete an assessment of the EMP every three years to evaluate whether the goals of the monitoring program were being attained. This review was completed in 2003 and based on the conclusions of the review, several changes to the EMP were proposed that were considered to be functionally equivalent to the existing program. IEP participants developed a more appropriate compliance and baseline monitoring program. The new program contains Geographic Information System (GIS) coordinates for each monitoring and baseline station. In addition the modifications will: 1) enhance continuous monitoring at key locations to better measure the temporal variability in the system; 2) enhance

~~[17] The State Water Board could then determine whether changes would also be needed to the Plan and undertake proceedings to make any necessary changes.~~

shallow water monitoring to better measure the spatial variability in the system; 3) reduce the tidal spring-neap bias that occurs in the current program; 4) improve the quality assurance and quality control of the program by providing continuous monitoring data that can be used as crosschecks against discrete or periodic sampling data; and 5) improve employee safety.

Prior to the release of the 1995 Plan, the IEP had been conducting a special studies program including the 20mm delta smelt survey and the juvenile salmon and delta fishes abundance and distribution sampling. These studies emphasize understanding the ecological responses of species of special concern to water project operations resulting from implementation of this Plan. Other ongoing studies, such as the Bay shrimp and crab abundance and distribution sampling, and the Bay salinity monitoring, enhance knowledge of how the Estuary responds to factors other than the operational impacts of water development facilities.

Since the release of the 1995 Plan, various State and federal agencies and interested parties developed a near-real-time monitoring program managed by the Water Operations Management Team (WOMT) to assist the CALFED Ops group acting pursuant to the Principles for Agreement. The State and federal agencies should continue to conduct a process like the CALFED Ops process to ensure that the SWP and CVP operations developed to comply with the Plan are as efficient as possible.

Table 7. Water Quality Compliance and Baseline Monitoring

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical [6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos [9]
C2 ■	Sacramento River @ Collinsville	38.07395	-121.85010	*					
C3A ⅄	Sacramento River @ Hood	38.36772	-121.52051		*	*	*	*	
C4 ■	San Joaquin River @ San Andreas Ldg.	38.10319	-121.59128	*					
C5 ■	Contra Costa Canal @ Pumping #1	37.99520	-121.70244	*					
C6 ■	San Joaquin River @ Brandt Bridge site	37.86454	-121.32270	*					
C7 ⅄	San Joaquin River @ Mossdale Bridge	37.78604	-121.30666		*				
C8 ■	Old River near Middle River	37.82208	-121.37517	*					
C9 ●	West Canal at mouth of CCForebay Intake	37.8218	-121.55275						*
		37.83075	-121.55703		*	*	*	*	
C10 ●	San Joaquin River near Vernalis	37.67575	-121.26500						
		37.69734	-121.26472		*	*	*	*	
C13 ■	Mokelumne River @ Terminous	38.11691	-121.49888	*					
C14 ■	Sacramento River @ Port Chicago	38.05881	-122.02607	*					
C19 ■	Cache Slough @ City of Vallejo Intake	38.29687	-121.74784	*					
D4 ⅄	Sacramento River above Point Sacramento	38.06214	-121.81792			*	*	*	*

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical [6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos [9]
D6 ⅄	Suisun Bay @ Bulls Head Pt. near Martinez	38.04427	-122.11764			*	*	*	*
D6A ⅄	Suisun Bay @ Martinez	38.02762	-122.14052		*				
D7 ⅄	Grizzly Bay @ Dolphin near Suisun Slough	38.11708	-122.03972	*		*	*	*	*
D8 ⅄	Suisun Bay off Middle Point near Nichols	38.05992	-121.98996			*	*	*	
D9 ⅄	Honker Bay near Wheeler Point	38.07245	-121.93923	*		*	*		
D10 ●	Sacramento River @ Chipps Island	38.04288	-121.92011		*	*			
		38.04631	-121.91829					*	
D11 ⅄	Sherman Island near Antioch	38.04228	-121.79951	*		*	*		
D12 ●	San Joaquin River @ Antioch Ship Canal	38.01770	-121.80273		*	*			
		38.02162	-121.80638					*	
D15 ■	San Joaquin River @ Jersey Point	38.05190	-121.68927	*					
D16 ⅄	San Joaquin River @ Twitchell Island	38.09690	-121.66912					*	*
D19 ⅄	Frank's Tract near Russo's Landing	38.04376	-121.61477	*		*	*	*	
D22 ●	Sacramento River @ Emmaton	38.08406	-121.73912	*					
		38.08453	-121.73914					*	
D24 ●	Sacramento River below Rio Vista Bridge	38.15891	-121.68721		*	*			
		38.15550	-121.68113						*
D26 ⅄	San Joaquin River @ Potato Point	38.07667	-121.56696			*	*	*	
D28A ⅄	Old River near Rancho Del Rio	37.97038	-121.57271			*	*	*	*
		37.96980	-121.57210	*					
D29 ■	San Joaquin River @ Prisoners Point	38.05793	-121.55736	*					
…….. ⅄		38.05793	-121.55736			*	*	*	
D41 ⅄	San Pablo Bay near Pinole Point	38.03016	122.37287			*	*	*	*
D41A ⅄	San Pablo Bay near mouth of Petaluma R.	38.08472	-122.39067			*	*	*	*
DMC1 ●	Delta-Mendota Canal at Tracy Pump. Plt.	37.78165	-121.59050		*				
P8 ⅄	San Joaquin River @ Buckley Cove	37.97815	-121.38242			*	*	*	*
P8A ⅄	San Joaquin River @ Rough and Ready Island	37.96277	-121.36587		*				
P12 ■	Old River @ Tracy Road Bridge	37.80493	-121.44929	*					
MD10 ⅄	Disappointment Slough near Bishop Cut	38.04229	-121.41935			*	*	*	
S21 ■	Chadbourne Slough @ Sunrise Duck Club	38.18476	-122.08315	*					
S35 ⅄	Goodyear Slough @Morrow Island Clubhouse	38.1181	-112.09580	*					
S42 ●	Suisun Slough 300' south of Volanti Slough	38.18053	-122.04696	*		*	*		
		38.18027	-122.04779					*	
S49 ■	Montezuma Slough near Beldon Landing	38.18686	-121.97080	*					
S64 ■	Montezuma Slough @ National Steel	38.12223	-121.88800	*					
S97 ⅄	Cordelia Slough @ Ibis Club	38.15703	-122.11378	*					

Station Number[1]	Station Description[2]	Latitude[3]	Longitude[3]	Cont. Rec.[4]	Cont. Multi-para-meter[5]	Disc. Physical Chemical [6]	Disc. Phyto-plankton[7]	Discr. Zoo-plankton[8]	Discrete Benthos [9]
NZ032 ⅄	Montezuma Slough, 2nd bend from mouth	38.16990	-122.02112					*	
SLBAR3 ■	Barker Sl. at No. Bay Aqueduct (SLBAR3)	38.27474	-121.79499	*					
--- ■	Sacramento R. (I St. Bridge to Freeport) (RSAC155)	38.589 to 38.45585	-121.504 to -121.50302	*					
--- ⅄	San Joaquin R. (Turner Cut to Stockton) (RSAN050-RSAN061)	37.99746 to 37.95242	-121.44435 to -121.31750	*					
--- ⅄	Water supply intakes for waterfowl management areas on Van Sickle Island and Chipps Island			*					

■Compliance monitoring station ⅄Baseline monitoring station ●Compliance and baseline monitoring station

Footnotes for Table 7

1 All stations with compliance monitoring component are identified by historical "interagency" station numbers as given in State Water Board D-1641 (2000) and Water Right Decision 1485 (1978). Modified station ID numbers (e.g. C3A) identify baseline stations near historical stations.

2 All stations with a compliance monitoring component retain their historical "interagency" station descriptions as given in State Water Board D-1641 (2000) and D-1485 (1978). Baseline stations with modified station ID numbers (e.g. C3A) have modified station descriptions.

3 Coordinates are geographic North American Datum 1983 and have been verified to be accurate for 1:24,000 scale mapping.

4 Continuous recording (every 15 minutes) of water temperature, electrical conductivity (EC), and/or dissolved oxygen. For municipal and industrial intake chloride objectives, EC can be monitored and converted to chloride concentration.

5 Continuous, multi-parameter monitoring (recording every 1 to 15 minutes with telemetry capabilities) includes the following variables: water temperature, EC, pH, dissolved oxygen, turbidity, chlorophyll *a* fluorescence, tidal elevation, and meteorological data (air temperature, wind speed and direction, solar radiation).

6 Discrete physical/chemical monitoring is conducted on a year-round, near-monthly basis that alternates between spring and neap tides and includes the following variables: macronutrients (inorganic forms of nitrogen, phosphorus and silicon), total suspended solids, total dissolved solids, total particulate and dissolved organic nitrogen and carbon, chlorophyll *a*, pH, dissolved DO, EC (specific conductance), turbidity, secchi depth, and water temperature. In addition, on-board continuous recording is conducted intermittently for the following variables: water temperature, dissolved oxygen, electrical conductivity, turbidity, and chlorophyll *a* fluorescence.

7 Discrete sampling for phytoplankton enumeration or algal pigment analysis is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.

8 Tow or pump sampling for zooplankton, mysids, and amphipods is conducted on a year-round, near-monthly basis that alternates between spring and neap tides.

9 In water years 2004 and 2005, replicated benthos and sediment grab samples are taken quarterly (every three months) and during special studies; more frequent monitoring sampling resumes in water year 2006.

E. Other Studies conducted by agencies that may provide information relevant to future proceedings

The following studies are currently in progress and are being completed by other agencies independent of State Water Board action. Upon completion, the State Water Board may use the information provided by these studies to amend portions of this Plan.

1. Delta Cross Channel Gate

In the fall of 2000, the CALFED Bay Delta Program and the IEP began investigating the costs and benefits associated with re-operating the Delta Cross Channel (DCC) gate to address water quality and fisheries concerns. These studies have been delayed due to lack of funding and staffing problems. When completed, the Board expects the CALFED Bay Delta Program multidisciplinary studies to address the multi-purpose aspects of DCC gate operation (balancing the beneficial uses of fisheries, water quality, water supply and flood control), and provide evidence for future amendments to the DCC objective.

2. Potential New Municipal and Industrial Objectives

Further understanding of the chemical reactions which form disinfection by-products (DBPs) is required before water quality objectives for bromides and organic carbon can be set. However, USEPA may require compliance with new federal drinking water standards as soon as 2012. The preferred methods for developing this information are collaborative processes such as the CALFED Drinking Water Quality Program (DWQP), which includes the Central Valley Drinking Water Policy. DWR, CALFED, and the Central Valley Regional Water Board are planning to complete development of the Central Valley Drinking Water Policy by 2009. This work may include development of bromide objectives and other constituents for the Central Valley Drinking Water Policy. After the Drinking Water Policy is completed, the State Water Board may convene a workshop to receive comments as to whether there is a need for objectives in the Bay-Delta Plan for bromides and organic carbon.

3. Pelagic Organism Decline

The IEP formed a POD work team to evaluate the potential causes of the marked declines in numerous pelagic fishes in the Sacramento-San Joaquin Delta Estuary and Suisun Bay. This multi-agency effort has produced a work plan that provides an overview of the problem, and a description of the studies used to examine some of the suspected causes of the decline.

In order to better understand the results of the POD studies, the IEP has created a conceptual model of the decline. The model is based on three general factors that may be acting individually or in concert to lower pelagic productivity. The three main suspected factors are: toxins, invasive species and water project operations. The POD studies were designed to provide insight into the reasons for the decline and to set the scientific basis for future work, with the eventual goal of narrowing down the causes of the decline and determining what actions can be taken to reverse the trend. The proposed studies represent an interdisciplinary, multi-agency effort including staff from DFG, DWR, USBR, USEPA, USGS, CBDA, San Francisco State University and UC Davis. The proposed work falls into three general types: (1) an expansion of existing monitoring (five expanded surveys); (2) ongoing studies (19 studies); and (3) new studies (15 studies).

The program will be run by the existing IEP Pelagic Organisms Decline Project Work Team to develop, direct, review and analyze the results of the effort. The program will yield a range of products and deliverables including management briefs, publications and reports, web-based monitoring data, and presentations at conferences, workshops and meetings.

In February 2006, the CBDA provided an independent review of the initial results of the 2005 IEP POD Workplan and the 2005 IEP POD Synthesis Report entitled *Review Panel Report: San Francisco Estuary Sacramento-San Joaquin Delta Interagency Ecological Program on Pelagic Organism Decline*. The report provides perspectives on data synthesis presented and makes recommendations for

improvements in analyzing, interpreting and defining appropriate context for future IEP POD-oriented investigations.

The expected completion date for the POD studies is 2007. Once the study results have been compiled; the State Water Board will ask the IEP to make a presentation of findings to the State Water Board at a subsequent workshop. Study results will be considered in the ongoing Plan review, and may be used to determine whether changes should be made to existing Water Quality Objectives, i.e. adding flexibility to the Delta Outflow Objective or the Delta Export Limits Objective. After the initial presentation to the State Water Board, the IEP shall give the State Water Board updates of current studies and new findings at subsequent workshops on an annual basis. The IEP presentations to the State Water Board shall continue until the next review of this Plan. The information collected by the State Water Board may be used to modify the water quality objectives in this Plan in the future.

4. Suisun Marsh

In 2001, the SMCG was formed to resolve issues of amending the SMPA, obtain a Regional General Permit, implement the Suisun Marsh Levee Program, and recover endangered species. The broader purpose of the SMCG is to develop and agree on a long-term implementation plan. The SMCG principal agencies are USFWS, USBR, DFG, DWR, Suisun Resource Conservation District, and NOAA Fisheries. The proposed Suisun Marsh Plan would be consistent with the goals and objectives of the Resources Agency's Bay-Delta Program, and would balance them with the SMPA, federal and State Endangered Species Acts and other management and restoration programs within the Suisun Marsh in a manner responsive to the concerns of all stakeholders and based upon voluntary participation of private landowners. In March 2006, the Plan was undergoing California Environmental Quality Act (CEQA)/National Environmental Policy Act review. The final CEQA document will be released in December 2008. The State Water Board will use the final Suisun Marsh Plan and the analysis in the final CEQA document in its next periodic review to determine what amendments, if any, to make to Suisun Marsh soil and channel water salinity objectives, and the narrative objective for brackish tidal marshes of Suisun Bay.

Appendix L – Exhibit 14 of the James Irrigation District Comment Letter

Exhibit 14 of the James Irrigation District Comment Letter on the Draft Mendota Pool Group 20-Year Exchange Program EIS/EIR consists of copies of the 2006-2017 Mendota Pool Group Pumping and Monitoring Program Annual Reports. Given the length of these documents, they have been excluded from this Appendix. Copies of these reports are maintained on file at the offices of the U.S. Department of Interior, Bureau of Reclamation, and Westlands Water District.

Appendix L – Exhibit 15 of the James Irrigation District Comment Letter

GROUNDWATER MANAGEMENT PLAN

JAMES IRRIGATION DISTRICT AND THE CITY OF SAN JOAQUIN

NOVEMBER 2010

DATE SIGNED: 11-1-10

PREPARED BY:

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
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List of Abbreviations

AB	Assembly Bill
ACWA	Association of California Water Agencies
AF	Acre-feet
AWMC	Agricultural Water Management Council
bgs	below ground surface
BMO	Basin Management Objective
CVP	Central Valley Project
DBCP	dibromochloropropane
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	Electrical Conductivity
EPA	Environmental Protection Agency
ET	evapotranspiration
EWMP	Efficient Water Management Practices
FKC	Friant-Kern Canal
FWA	Friant Water Authority
FWUA	Friant Water Users Authority
GAC	Groundwater Advisory Committee
GMP	Groundwater Management Plan
GPS	Global Positioning System
HSA	Hydrologic Study Area
ID	Irrigation District
IRWMP	Integrated Regional Water Management Plan
JID	James Irrigation District
KRCD	Kings River Conservation District
KRWA	Kings River Water Association
MOU	Memorandum of Understanding
MVWD	Mid Valley Water District
NRCS	Natural Resources Conservation Service
RCWD	Raisin City Water District
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCIC	Stinson Canal and Irrigation Company
SCS	Soil Conservation Service
SLDMWA	San Luis and Delta-Mendota Water Authority
TDS	total dissolved solids
TID	Tranquillity Irrigation District
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WHPA	Wellhead Protection Area
WWD	Westlands Water District

1 - INTRODUCTION

This Groundwater Management Plan (GMP or Plan) is a joint effort between the City of San Joaquin (San Joaquin or City) and the James Irrigation District (JID or District). The two agencies are preparing this integrated GMP to better coordinate efforts, share data, and improve regional management of groundwater resources. Hereafter, the two agencies will be called the 'Plan Participants' and the area covered by the GMP will be called the 'Plan Area'. This Plan is the first effort by the City of San Joaquin to develop a GMP. This Plan is also an update to JID's GMP prepared in 2001, and this GMP satisfies new requirements for GMPs created by the September 2002 California State Senate Bill No. 1938, which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses recommended components for a Groundwater Management Plan described in Appendix C of Department of Water Resources Bulletin 118 (2003 Update).

1.1 - Background Information on Plan Participants

Following is general information on the Plan Area, followed by specific information on the City of San Joaquin and James Irrigation District.

Climate

The climate in the Plan Area is characterized by cool, mild winters and hot dry summers. Temperatures in the summer often exceed 100 degrees F. Fog occurs for long periods in the winter, with low temperatures typically in the mid 30's F; occasionally dropping into the 20's F. Average annual precipitation is about 7 inches, with 80 percent of the rainfall occurring from December through April. Precipitation is inadequate to meet crop water needs, except during the rainy season for some crops. Crops are sustained by irrigation during the summer. The growing season is typically 250 days per year.

Topography

Land in the Plan Area is relatively flat. It generally slopes westward and northward at a rate of about 3 to 4 feet per mile towards the topographic axis of the San Joaquin Valley, with local variations caused by remnants of slough channels. Elevations range from 160 to 180 feet above sea level.

City of San Joaquin

Below is a summary of the geography, demographics, water demands and water facilities in the City of San Joaquin.

Geography and Demographics

The City of San Joaquin was founded in 1920. The City is located in Western Fresno County about 11 miles southwest of the City of Kerman (see **Figure 1**). The City is an enclave in James Irrigation District. The City currently covers approximately 1 square mile. In 2010, the City had a population of 4,166. The population growth is expected to

be 2.6% per year for the next ten years. Most of the population is employed in the agricultural industry.

Currently, rural dwellings in JID are not commonly being built. Old houses are being torn down and people are moving to San Joaquin or other urban areas. This could lead to more growth in San Joaquin. San Joaquin plans to expand to the east with an area of about one square mile. Specifically, San Joaquin expects to see the construction of about 300 new homes in the next five years.

Water Demand

Water usage in San Joaquin from 2005 to 2009 is summarized in Table 1.1.

Table 1.1 – City of San Joaquin Water Usage

Year	Volume	
	Million gallons	Acre-feet
2005	222	681
2006	221	678
2007	242	742
2008	259	795
2009	257	789

In 2008, the City's per capita water usage was 181 gallons per capita per day (gpcpd), which is close to the national average (ConSol 2009). About 60% of the water is used for outdoor landscaping. Fluctuations in gpcpd from year to year can be explained by a variety of economic, demographic, and climate factors. The per capita water use is not expected to increase, but may reduce with the implementation of conservation measures.

Facilities

The City is serviced by three groundwater wells. Combined, these wells have a maximum capacity of 3,500 gallons per minute (gpm) and 5 million gallons per day (gpd). In 2008, 49% (1,723 gpm) of the maximum groundwater well capacity was used during peak consumption for the City. The City hopes to construct one well in the near future to replace one of the older existing wells. The City does not use or import any surface water. The City also operates three stormwater basins that provide stormwater retention and incidental groundwater recharge. The City has no recharge basins or reservoirs, but has plans to construct a reservoir tank within the next few years.

Based on current analysis, the City is not expected to outstrip its supply capacity or lose ability to meet peak demands over the next ten years, unless one of the wells ceases to operate. This is a concern for the City since some of their wells are old.

The City has about 950 service accounts. Residential accounts are not metered. About 5 percent of the accounts are commercial, and about 20% of the commercial accounts are metered.

James Irrigation District

Below is a brief description of the origin, physiography, geology, water supplies and facilities in JID.

Location

The James Irrigation District (JID or District) was organized in 1920 under the California Water Code. The District covers 26,392 acres wholly within Fresno County, California. The San Joaquin Valley Farmlands Company, successor to the James Ranch, granted to JID a perpetual right to pump and import groundwater from beneath lands east of the District, up to 200 cfs in capacity. This GMP covers the area within the JID boundaries and deeded groundwater area, but the physiography and geology of neighboring lands are also discussed. The District is situated in the central San Joaquin Valley of California and is approximately thirty miles southwest of the City of Fresno. The City of San Joaquin lies near the middle of the District, but is excluded from the District's boundary. State Highways 145, 180 and 33 are in close proximity. Adjacent agricultural water agencies include the Tranquility Irrigation District (TID), Westlands Water District (WWD), Stinson Canal and Irrigation Company (SCIC), Mid Valley Water District (MVWD), Reclamation District 1606, and the Raisin City Water District (RCWD). A location map for the District is included as **Figure 1**, and a vicinity map of the District within the Kings Groundwater Basin is included as **Figure 2**.

Land Use

When JID was formed in 1920, agricultural development of its lands was well underway. As irrigation facilities were constructed, use of the land gradually converted from grasslands to cultivated crop land. District lands are now essentially fully developed for agriculture. Cropping data for 1993 to 2007 is included on **Attachment 1**. Typically, about 23,000 acres are irrigated and prevalent crops include cotton, wine grapes, corn, almonds and seed alfalfa. Other significant crops include tomatoes, sugar beets, wheat, and onions. Currently, the principal irrigation method is furrow irrigation, with smaller amounts of drip, level basin, and micro-sprinkler irrigation. There is a trend towards planting permanent crops and converting to modern irrigation methods.

Facilities

Figure 3 is a map illustrating the major facilities in the District. JID's conveyance system consists of three major components: Eastside Canals, the Main Canal, and the Lateral Canals. The Eastside Canals consist of two canals, the Kerman Line Pump Canal (a.k.a. Lassen Canal) and the Coalinga Line Pump Canal (a.k.a. McMullin Grade Canal). These canals collect and convey groundwater pumped from about 35 JID wells, which lie outside of the District's boundaries, into the district. The Eastside Canals merge together and connect near the south end of the Main Canal by flowing through twin 60-inch diameter reinforced concrete pipelines that cross under the Fresno Slough

Bypass (also called the James Bypass). These 60-inch pipelines are called 'the siphon'. In 1992, 3.25 miles of the Eastside Canals were piped with smooth interior corrugated polyethylene pipe, and the remaining 12.25 miles were concrete lined; the pipeline and canal lining were financed through a DWR sponsored loan and JID bonds.

The JID Main Canal operates as a lift canal for surface water that is pumped from the Mendota Pool. Groundwater and diverted Kings River flood releases feed by gravity into the Main Canal from the south and flow northwesterly. The system also includes 17 lateral canals that are mostly unlined earthen ditches.

The District also has about 63 groundwater extraction wells and about 20 monitoring wells. A summary of well attributes is provided as **Attachment 2**. In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes six wells to recover some of the recharged water.

The proposed JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 4,740 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. Other details on the project are not provided as the design continues to evolve. The project is currently being permitted and designed, and construction is expected to be completed by the end of 2011 or possibly 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

Groundwater Supplies

The District owns and operates about 63 irrigation wells. The well locations are shown on **Figure 3**. About 28 of these are within the District boundary and about 35 are east of the District boundary within their deeded groundwater easement area. The current estimated yield for each well is shown on **Attachment 2**. Well yields range from 950 to 3,400 gpm, with an average of about 1,500 gpm. The total well pumping capacity is about 210 cfs. Most of JID's wells are between 500 and 600 feet deep, and extend to the top of the Corcoran Clay (a local confined aquifer). A few of JID's older wells are 700 to 900 feet deep and penetrate the confined aquifer. Two privately owned irrigation wells are inside of JID's boundary.

An enormous aquifer system lies beneath the Kings Groundwater Sub-basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the usable aquifer in the region are a number of clay layers that can act as confining beds. The confining bed that has greatest significance to the District is known as the Corcoran Clay, or E-clay. The E-clay underlies the entire District. Two other clay layers also partially underlie the District.

JID now primarily uses the unconfined aquifer lying above the E-clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow.

Surface Water Supply

CVP Schedule 2 water (informally called 'Riparian water') is delivered without charge as a settlement of the District's water rights claims in Fresno Slough – during normal and wet years 9,700 acre-feet is available, during dry years 7,600 acre-feet is available. The contract requires that the District take delivery of this water according to a predetermined schedule. In practice, the United States Bureau of Reclamation has allowed some flexibility on when this water is taken.

In addition, JID has a Central Valley Project (CVP) contract (No. 14-06-200-700L) for up to 35,300 acre-feet of water each year. Other water used by the District includes spillwater from the Fresno Irrigation District and Kings River floodwater.

In the past during wet years the USBR has made surplus water available to JID, which is above its normal contract deliveries. The source of this water may be either imports from the Delta via the Delta Mendota Canal, or San Joaquin River flood releases (called Section 215 water by the USBR).

Water Demands

Water demand in the District slowly increased over the years as land was brought into production. Since full agricultural development has now occurred, change in demand is largely the result of changing cropping patterns. **Attachment 3** is a 2009 Water Delivery Report for JID. The table also provides general water supply data for 1994 to 2009. Between 1994 and 2009, JID pumped an average of 29,500 AF/year of groundwater (39% of total supply), and imported an average of 46,600 AF/year of surface water (61% of total

water supply). JID has a goal to reduce their overall water demands through water conservation and water management efforts.

For more general information on JID refer to the James Irrigation District Water Conservation Plan – 2009 Update.

1.2 - Goals and Objectives of Groundwater Management Plan

The overall purpose of this GMP is to develop a coordinated and comprehensive approach to the evaluation and management of groundwater resources within the City of San Joaquin, James Irrigation District, and the James Irrigation District "East Side Wellfield" which is outside the District boundaries. Specific goals of this plan include the following:

1. Develop a consensus among agency staff and stakeholders on the current groundwater conditions, need for proactive groundwater management, and problems that need to be addressed.
2. Document goals and objectives for sustaining existing efforts and improving groundwater management.
3. Develop practical solutions for addressing groundwater issues, especially groundwater overdraft.
4. Improve communication between the City of San Joaquin and JID, and increase awareness of each agencies groundwater management concerns, programs and goals.
5. Provide a realistic and feasible implementation plan for short-term and long-term groundwater management efforts.

This GMP documents the existing groundwater management efforts in the Plan Area and planned efforts to improve groundwater management. Specific groundwater management goals documented in this GMP include:

1. Preserve and enhance the existing quality of the area's groundwater.
2. Preclude surface or ground water exports that would reduce the long-term supply of groundwater.
3. Coordinate groundwater management efforts between regional water users.
4. Maintain local management of the groundwater resources.
5. Implement a groundwater-monitoring program to provide an "early warning" system to future problems.
6. Stabilize groundwater levels in order to minimize pumping costs and energy use, and provide groundwater reserves for use in droughts.
7. Maximize the use of surface water, including available flood water, for beneficial use.

In addition, the Plan Participants will take a proactive role in the legislative process, participate in developing sound legislation concerning groundwater management if it

becomes necessary, and take an active role in opposing any legislation that is detrimental to local groundwater management efforts.

1.3 - Statutory Authority for Groundwater Management

The City of San Joaquin and James Irrigation Districts are both public agencies with the authority to manage groundwater and prepare Groundwater Management Plans. California Assembly Bill 3030, as chaptered, (California Water Code, Division 6, Part 2.75, SEC. 10750-10753.9) grants specified "local agencies" authority to undertake groundwater management. AB 3030 also confers upon local agencies the powers of a water replenishment district. These authorities remained unchanged with the amendments to the law provided by California Senate Bill No. 1938, which was passed in 2002 and outlines additional requirements for GMPs. Agencies adopting a GMP are authorized to enter into agreements with other local agencies or private parties to manage mutual groundwater supplies, including those existing in overlapping areas.

1.4 - Lower Kings Basin Groundwater Management Plan

The Kings River Conservation District has developed a regional GMP that includes the area covered by James Irrigation District and the City of San Joaquin. The GMP is called the '*Lower Kings Basin Groundwater Management Plan*' (Regional GMP) and was prepared in April 2005. The GMP is compliant with Senate Bill 1938 and discusses regional geography, geology and hydrogeology, regional groundwater problems, and regional basin management objectives. The Regional GMP includes several study areas and JID and the City are included in study 'Area A'. One important goal in the Regional GMP is the development of an improvement district for all of Area A to jointly fund regional studies, projects and monitoring.

JID and the City did not participate in the development of the Regional GMP. However, JID found many of the goals and objectives in the regional GMP to be compatible with their needs and beneficial for JID and the region. As a result, JID passed a District Resolution (No. 2007-03) supporting the Regional GMP. As a result, JID will have two GMPs: this document and the Regional GMP. This document will help guide local and regional groundwater management, and the Lower Kings Basin GMP will help guide regional groundwater management.

1.5 - Groundwater Management Plan Components

This GMP includes the required and voluntary components for a GMP as identified in California Water Code Section 10753, et. seq. This Plan is also consistent with the recommended elements for a GMP as identified in DWR Bulletin 118 (2003), Appendix C. **Table 1.2** identifies the location within this document where each of the components is addressed.

Table 1.2 – Location of Groundwater Management Plan Components

Description	Plan Section(s)
California Water Code Mandatory Requirements (10750 et seq.)	
1. Documentation of public involvement	1.5, Appendix A
2. Groundwater basin management objectives	1.2, 3
3. Monitoring and management of groundwater elevations, groundwater quality, land subsidence, and surface water	5
4. Plan to involve other agencies located in the groundwater basin	4.3
5. Monitoring protocols	5.3
6. Map of groundwater basin and agencies overlying the basin	**Figure 2**
California Water Code Voluntary Components (10750 et seq.)	
7. Control of saline water intrusion	6.3
8. Identification and management of wellhead protection areas and recharge areas	6.2, 7.2
9. Regulation of the migration of contaminated groundwater	6.3, 6.4
10. Administration of well abandonment and well destruction program	6.1
11. Mitigation of overdraft conditions	7.1, 7.2
12. Replenishment of groundwater extracted by water users	7.2
13. Monitoring of groundwater levels and storage	5.1, 9.2
14. Facilitating conjunctive use operations	7.3
15. Identification of well construction policies	8.1
16. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.4, 7, 8.2
17. Development of relationships with state and federal regulatory agencies	4.2, 4.3
18. Review of land use plans and coordination with land use planning agencies	9.1
Additional Components Recommended by DWR (App. C of Bulletin 118)	
19. Advisory committee of stakeholders	4.1
20. Description of the area to be managed under the Plan	1.1, 2
21. Descriptions of actions to meet management objectives and how they will improve water reliability	4 - 9
22. Periodic groundwater reports	9.2
23. Periodic re-evaluation of Groundwater Management Plan	9.4

1.6 - Adoption of Plan

Refer to **Appendix A** for documentation on the adoption of the GMP and the public process that was followed.

Public Participation in Plan Development
The public was invited to participate in the development of the updated GMP through newspaper notices and public hearings described below.

Preparation of Integrated Plan with City and JID
JID began to update their GMP in 2009. JID contacted several local agencies to solicit their input on the GMP. The City of San Joaquin was the only agency that expressed interest in the local groundwater management, and requested that the two agencies prepare a joint integrated Groundwater Management Plan. In April 2010, the two agencies signed a Memorandum of Understanding to cooperate on local groundwater management (see **Appendix E**) and prepare a joint GMP.

Groundwater Advisory Committee
The City of San Joaquin and JID used their City Council and Board of Directors, respectively, as groundwater Advisory Committees during preparation of this GMP. The two agencies plan to form a joint GAC for implementing the GMP after it is adopted. The joint GAC will include representatives from JID and the City that can represent and speak for the local interests. Several special sessions on groundwater issues were held at JID Board of Directors and City Council meetings. The GAC were also given a draft copy of the GMP to review. The GAC provided several insightful and useful comments for managing groundwater that were incorporated into the GMP.

As required by the California Water Code Section 10753.2 (a), JID and the City published a series of public notices, held public meetings, and adopted resolutions required for preparing and adopting this GMP. No comments were received from the public other than those offered by the Groundwater Advisory Committees. These public outreach efforts are summarized in Table 1.3 below.

Table 1.3 – Public Participation in Groundwater Management Plan Adoption

Phase of Public Noticing	Description	James Irrigation District	City of San Joaquin
Intent to prepare GMP	Notice of hearing published	12-31-08/1-7-09	4-10/5-10
	Hearing held. Resolution adopted.	1-13-09	5-12-10
	Resolution published	4-8-09/4-15-09	7-7-20/7-14-09
GMP Adoption	Notice of hearing published	9-29-10/10-6-10	9-29-10/10-6-10
	Hearing held. Resolution adopted.	10-19-10	10-13-10

The hearing at JID was advertised for October 12, 2010, but JID was forced to reschedule their Board meeting to October 19, 2010. However, no one appeared at the JID office for the October 12 meeting, and no comments were received at the October 19 Board meeting.

2 - GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of the City of San Joaquin, JID, JID eastside well field, and the surrounding area. The purpose of this section is to provide general background information on the local geology, hydrogeology and water chemistry that will aid in selecting and implementing groundwater management programs. Most of the information in this section was derived from City of San Joaquin records, JID records, USGS Professional Paper 1401-C, USGS Water Supply Paper 1999-H, and a report prepared by the United States Bureau of Reclamation for Tranquillity Irrigation District.

The following sections include technical discussions on the plan area's groundwater. These are intended to provide geologists, engineers, and water managers a greater understanding of the area's stratigraphy, groundwater conditions, and hydrogeologic parameters. Less technical discussions on groundwater management programs are provided in Sections 3-9 of this document.

2.1 - Regional Geology

The San Joaquin Valley is the southern part of a large, northwest-to-southeast trending asymmetric trough of the Central Valley, which has been filled with up to six vertical miles of sediment. This sediment includes both marine and continental deposits ranging in age from Jurassic to Holocene (recent). The San Joaquin Valley lies between the Coast Ranges on the west, the Sierra Nevada on the east, and extends northwestward from the San Emigdo and Tehachapi Mountains to the Delta near the City of Stockton. The San Joaquin Valley is 250 miles long and 50 to 60 miles wide. The relatively flat alluvial floor is interrupted occasionally by low hills.

The San Joaquin Valley is divided into several geomorphic land types including dissected uplands, low alluvial fans and plains, river floodplains and channels, and overflow lands and lake bottoms. The alluvial plains cover most of the valley floor and comprise some of the most intensely developed agricultural lands in the San Joaquin Valley. In general, alluvial sediments of the western and southern parts of the San Joaquin Valley tend to have lower permeability than eastside deposits. The lower permeability in material along the western and southern portions of the valley is mainly attributed to the fine-grained nature of the parent material from which the alluvium is derived. The sediments are predominately marine in origin and consist of the thick sequences of mudstone, claystone, and siltstone that make up the Coast Ranges. Upon weathering and transport down slope along alluvial fans, these sediments readily decrepitate into fine-grained materials consisting mainly of silt and clay found along the axis of the valley trough.

Near the valley trough, fluvial deposits of the east and west sides grade into fine-grained deposits termed Flood-basin deposits by Page (1986) or Basin Sediments by USBR (1955). The San Joaquin Valley has several thick, fine-grained, lacustrine

deposits. The Corcoran Clay Member of the Tulare Formation is the most notable fine-grained deposit in the San Joaquin Valley affecting groundwater quality and creates confined groundwater conditions below. The Corcoran Clay was deposited about 600,000 years ago in the Tulare Lake. This clay bed, which is found in the western and southern portions of the valley, separates the upper semi-confined to unconfined aquifer from the lower confined aquifer. The clay bed covers approximately 5,000 square miles and is up to 160 feet thick beneath the present bed of Tulare Lake and thins with distance from the center of origin.

Regional Hydrogeologic Setting

An enormous aquifer system lies beneath the Kings Basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada Mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the useable aquifer in the region are a number of clay layers that can act as confining beds or perching layers. The confining bed that has greatest significance to the Plan Area is known as the Corcoran Clay, or 'E' Clay. The 'E' Clay underlies the entire Plan Area (**Figure 5**). **Figure 9** is a generalized cross section of the Plan Area. Two other significant clay layers also partially underlie the Plan Area. However, neither the 'C' Clay on the extreme northern edge of the District, nor the 'A' Clay have as a significant impact on the Plan Participants use of the aquifer as the Corcoran clay. However, recent studies completed by JID for the K-Basin recharge project indicates that there, the ‘C’ Clay may be present, extending the ‘C’ Clay several miles southeast as mapped by USGS (1972).

JID wells primarily tap the unconfined aquifer lying above the 'E' Clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow, reflecting the confined groundwater conditions below the Corcoran clay. The use of wells within District boundaries which tap the confined aquifer below the E-clay was slowly phased out due to its poorer water quality, generally lower yields, and more expensive well construction costs. However newer wells are constructed on a case by case basis, and built to recover the highest quality water at a given location, whether that is above or below the Corcoran clay. As a result, some wells tapping the confined aquifer are now constructed.

Groundwater in the plan area is divided into three separate non-marine, water bearing zones. These include the lower water-bearing zone, upper water-bearing zone, and the perched or shallow zone, as discussed below.

- The **lower water-bearing zone** contains fresh water in the lower section of the Tulare Formation from the base of the E-clay (Corcoran Clay) to the base of fresh water or the top of connate, saline marine water. USBR (1955) terms the base of the fresh water aquifer as the base of the effective ground-water reservoir. The depth to the base of fresh water is from about 1,000 feet to 1,400 feet beneath the Plan Area (Page, 1973).

- The **upper water-bearing zone** is from the top of the Corcoran Clay to the upper sections of the Tulare Formation, often considered the bottom of the A-clay.

- The **shallow or perched zone** underlies the portion of the Plan Area from the City of San Joaquin and northward, from the top of the A-clay, if it is present, to the perched groundwater table which is often within 10 feet or less of the ground surface. DWR Bulletin 118-03 uses 25 feet below ground surface (bgs) as a general vertical depth limit for the base of the perched zone.

Subsidence

Land subsidence in the San Joaquin Valley has been studied extensively in the past by the USGS and DWR. A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Land subsidence of up to 16 feet has been experienced in the southern portions of the San Joaquin Valley basin. Between 1926 and 1970, a maximum of 29.7 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million AF of water storage space out of valley sediments during the same period.

There are two types of land subsidence due to groundwater withdrawals; elastic and inelastic. Elastic subsidence is not permanent and is largely reversible, if water levels recover to above historic lows. Recent studies indicate that current subsidence west of the plan area is primarily elastic in nature, and will likely not be inelastic until water levels fall below historic lows. Inelastic subsidence is permanent and occurs when water is removed from a confined aquifer for the first time, and is sometimes referred to as virgin subsidence. Between the mid-1920's to about 1980, the San Joaquin Valley experienced inelastic, non-recoverable subsidence.

The most recent reports on land subsidence in the San Joaquin Valley were completed by R. L. Ireland of the USGS in 1986 and Arvey A. Swanson of DWR in 1995. Ireland (1986) states that "*Land subsidence to groundwater withdrawal in the San Joaquin Valley that began in the mid-1920's and reached a maximum of 29.7 feet in 1981 has been halted by the importation of surface water through major canals and the California Aqueduct in the 1950's through 1970's*." This was generally true at the time, because large scale regional subsidence had halted, but smaller-scale local subsidence continued in many areas.

Poland et al. (1975) estimated that cumulative non-recoverable land subsidence from 1926 to 1972 in the vicinity of the Plan Area was on the order of 4 feet. A land subsidence contour map shows lowering of the land surface due to land subsidence was exacerbated west of the Plan Area and cumulatively, for the period of record, was as much as 8 feet in this area.

As land subsidence is a function of groundwater pumpage and recharge, it is linked to drops in groundwater levels. **Appendix C** shows hydrographs for wells monitored by DWR in the Plan Area. The DWR hydrographs show periodic increases in water levels, but the overall trend is a steady decline in water levels from the 1960's to today. Other hydrographs in the area prepared for KRCD's 2005 Lower Kings Basin Groundwater Management Plan Update and JID's 2001 GMP show continued decreases in water levels. Recent drops in groundwater levels are likely a result of low precipitation years, and the increased reliance on groundwater in the area to supplement surface water supplies.

Poland et al. (1975) show a direct correlation between subsidence and pumpage. In a 1996 draft memo, DWR indicated that from 1975 to 1992 subsidence occurred primarily in drought years when groundwater supplies replaced surface water supplies. The most recent record of land subsidence in the area is from Swanson (1995), were he indicates that 2 feet of subsidence occurred along the Outside Canal near Mendota Dam between the years of 1970 and 1994. However, it is not known how much of the 2 feet of subsidence reported by Swanson was residual subsidence, continued from pre-surface water delivery pumpage west of the Plan Area. Data from 6 extensometers located west of the Plan Area indicates that subsidence there has been elastic since about 1977.

With the recent reductions in surface water supplies for CVP contractors, the demand on the regional aquifer system's groundwater will likely increase. A link between land subsidence and pumpage is well established west of the District. Therefore, studies should be conducted to determine the susceptibility of subsurface deposits to land subsidence with increasing groundwater demand, especially if newly constructed wells tap the confined aquifer.

2.2 - Groundwater Basin

The James Irrigation District and City of San Joaquin are in the Kings Groundwater subbasin (Kings Basin) in the San Joaquin Valley Groundwater basin of the Tulare Lake Hydrologic Region (DWR 2003). See **Figure 2** for a map of the regional groundwater sub-basins. The Kings subbasin has been identified by the DWR as a basin with boundaries appropriate for ground water management purposes (DWR Bulletin 118-80). These boundaries were identified on the basis of geological and hydrological conditions, as well as political boundary lines. There are 19 court adjudicated basins in California, most of them in Southern California or coastal regions of California. The Kings Groundwater Subbasin is not included in the list of adjudicated basins, however DWR Bulletin 118-03

identifies eleven basins in California as being in critical conditions of over draft and the Kings Basin is included on the list.

Geography

The Kings Basin covers 976,000 acres. The Kings Basin extends from the Sierra Nevada foothills on the east to the San Joaquin Valley trough on the west, and from the San Joaquin River on the north to roughly the Fresno County line on the south. The Kings Basin also includes small portions of Kings and Tulare counties. The Plan Participants lie in the northwest portion of the Kings Basin and is bounded to the west by the southern extension of Delta-Mendota subbasin (**Figure 2**). The Westside Groundwater Subbasin borders the southwest portion of the District. The San Joaquin and Kings Rivers are the two principal rivers within or bordering the Kings Basin. There are no hydrogeologic features that would prevent groundwater from flowing between the Kings Basin to the Delta-Mendota or Westside Sub-basins, located to the west.

Tulare Lake Hydrologic Region

The Kings Basin (DWR subbasin No. 5-22.08) lies within the Tulare Lake Hydrologic Region, which covers approximately 10.9 million acres (17,000 square miles) and includes all of the Kings and Tulare Counties and most of Fresno and Kern Counties. The region has 12 distinct groundwater basins and 7 sub-basins of the San Joaquin Valley Groundwater Basin.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the Hydrologic Region's total annual supply and 35 percent of all groundwater use in the State. The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The base of fresh groundwater in the region, at an average of about 1,200 feet below ground surface, is considered to be the maximum effective depth of the basin in terms of pumping and recharge. According to Bullettin118-2003, well yields average 500 to 1500 gpm, with a maximum of 3,000 gpm (this agrees with data for JID wells).

Groundwater Quality for the Tulare Lake Hydrologic Region

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high total dissolved solids (TDS), nitrate, gross alpha, arsenic and organic compounds. The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley, especially in water close to the surface, is the result of concentration of salts because of evaporation and poor drainage. According to DWR Bulletin 18-2003, TDS in groundwater in the Kings Basin ranges from 40 to 2,000 mg/L with an average of 200-700 mg/L. Groundwater quality specific to JID and the City of San Joaquin is discussed in detail in Section 2.6 below.

Groundwater Budget

According to the DWR Bulletin 118-03, in the Tulare Lake Hydrologic Region the San Joaquin Valley Basin only has two subbasins ranked as a Type "C" groundwater budget; Kings and Westside. A Type C budget indicates that there are not enough data to provide either an estimate of the basin's groundwater budget or groundwater extraction from the basin. This suggests a low level of knowledge exists on groundwater inflow, outflow, or storage information in the Kings basin. The C budget type is for the whole subbasin, not just the Plan Area, so it will take collaboration to get information needed to bring the subbasin to a budget type classification of A, which is based on actual groundwater budgets or models, or B which is a use-based estimate of groundwater extraction (using evapotranspiration demand). The Kings Subbasin was determined in DWR Bulletin 118-80 to be a "*critically overdrafted*" basin. This designation was not reevaluated when the bulletin was updated in 2003.

2.3 - Stratigraphy

The following discussion focuses on significant hydrogeologic units that have an impact on the groundwater resources within the Plan Area. From the surface to the base of the effective groundwater reservoir, about 1,200 feet bgs, important hydrogeologic units are topsoil, alluvial fan deposits of eastside origin, basin sediments, the A-, C-, and E-(Corcoran) clays, and alluvial deposits below the E clay, and to a lesser extent alluvial deposits of Westside origin. Depth to bedrock is too deep under the Plan Area to impact groundwater conditions and therefore will not be discussed here.

Topsoils

Soils in the District and vicinity range from coarse sands to heavy clays. In the middle and western portions of the Plan Area the soils generally have a higher clay content. These soils developed on sediments deposited in the valley trough during flood periods. The parent material of these soils is flood basin deposits and fine-grained alluvium of mixed granitic and sedimentary origin from both the Sierra Nevada and Coast Range Mountains. Soils in the eastern portion of the Plan Area and the JID eastside wellfield generally have higher sand content and are derived mostly from granitic Sierra Nevada sediments deposited on alluvial fans. The increase in sandier materials to the east extends into the subsurface and partially explains why more wells are located in the eastern side of JID than the western side. Soils throughout the vicinity of the Plan Area are stratified, with interspersed sandy and clayey streaks. **Figure 4** is a composite of United Stated Department of Agriculture soil survey maps which cover the Plan Area.

Subsurface Geology

The USBR (1955) provides the most focused and detailed descriptions of the subsurface geology in the Plan Area. While the USBR report was prepared for Tranquillity Irrigation District, it also covers the Plan Areas and east to R.17E/R.18E section line (approximately 2 miles east of the eastern JID border). The following discussion on subsurface geology is based on the descriptions found in USBR's report. Surface deposits, as mapped by the USBR, include eastside inactive alluvial fan deposits that cover the Plan Area east of James Bypass. From about the James Bypass

westward surface deposits are composed of Basin Sediments deposited in the axis of the valley during wet climatic cycles. Beneath these sediments lies the Corcoran clay, a regional lacustrine clay that causes confined groundwater conditions below it. Below the Corcoran clay, Sierran alluvial sediments dominate to depths greater than 3,000 feet bgs. These sediments are considered part of the Tulare Formation and are discussed in further detail below. Within the Tulare Formation seven lacustrine clays are mapped to varying extent in the San Joaquin Valley. In the Plan Area the A-clay, C-clay and E-clay or Corcoran clay are the most important of the mapped clay lacustrine clays. Several geologic cross sections passing through JID, the JID Eastside Wellfield, and the City of San Joaquin are included in **Appendix B**. The locations of the cross sections are shown on **Figure 4**.

Alluvial Fan Deposits of Eastside (Sierran) Origin

Surficial deposits of eastside origin are roughly found east of the James Bypass. The alluvial fan deposits above the Corcoran clay are predominately of eastside (Sierran) origin and comprise lenticular beds of sands and silts derived primarily from granitic rocks with rare clay laminae. These sediments probably represent deposits of former Kings River and San Joaquin River distributaries and are geographically higher than alluvium deposits of the active fans. They are slightly wind modified and soils that form on them tend to be saline; developed under conditions of high water table and little sedimentation. USDA-SCS soil classification for soils that formed on the inactive alluvial fans are sandy loam to fine sandy loam, with the finer grained soils dominating near James Bypass (**Figure 4**). Beneath the topsoil the sands vary from fine to medium-grained sizes and coarse sands and gravels are rare. The deposits generally become finer westward; grading into the Basin sediments discussed below. Fine-grained deposits dominate in the western portion of the area where they finger into the Basin sediments. This alluvial sequence occurs from the surface to depths of 500-550 feet bgs. Most of the wells in the JID eastside well field are completed in these deposits. These sediments, while all Sierran fluvial, represent three distinct environments of deposition. Clays and silt/clay mixtures represent deposition in lakes or marshes, well sorted sands and silts represent deposition in water with current such as streambeds or lake beaches, and poorly-sorted silt and clay fractions indicate floodplain origins.

Basin Sediments

West of the alluvial fan deposits of eastside origin (roughly James Bypass) surface deposits are comprised of Basin sediments. The Basin sediments are along the trough of the valley and consist of material of mixed Sierran and Coast Range origin. The Basin sediments are fine sands, silts, and clays. Soils that formed on the Basin Sediments are classified by the USDA-SCS as clay loam and clay. Under natural conditions these deposits are poorly drained, frequently flooded, and ponded or marshy. These sediments grade westward into inactive alluvial fan deposits of Westside (Coast Range) origin.

The A-clay is one of seven recognized lacustrine clay beds in the San Joaquin Valley (**Figure 6**). It was deposited in a widespread lake and is found almost continually beneath the topographic axis of the valley. While not comprised of alluvium of eastside origin or Basin Sediments, stratigraphically it is located within these units, and thus is discussed here. The top of it is often the base of the perched or shallow ground water zone. The A-clay, as mapped by Croft (1972), extends under the Plan Area from the City of San Joaquin northwestward (**Figures 6**). The base is about 60 to 75 feet beneath the land surface and generally it is between 5 to 70 feet thick. Structure contours drawn on the base of the A-clay indicate that it is relatively flat beneath the northern portions of JID. The A clay is an aquitard, not yielding significant water to wells, and in fact is a perching layer stopping the downward migration of water from the surface.

The C-clay is another of one of the seven recognized lacustrine clay beds in the San Joaquin Valley. In the JID area its extent is similar to the A-clay, but it was not mapped with the same level of certitude by Croft (1972) as the overlying A clay or the underlying E-clay. Recent subsurface investigations by JID for the K-Basin recharge project indicate that the C-clay is likely present there at a depth of 235 to 253 feet bgs. These depths correspond to Croft's mapping of the C clay where, in the northern portions of the District, it is roughly 240 to 260 feet bgs. The Report of Findings for Potential Banking Facilities (Provost and Pritchard, 2005) indicates that, based on the results of pump tests at the Lateral K Basin, there is only a small hydraulic connection between groundwater in strata above and below the C-clay.

Alluvial Deposits Beneath The Corcoran Clay

Beneath the Corcoran clay a series of granitic sands, silts, and occasional clays extends to depths greater than 1,200 feet. These sediments were deposited by alluvial fans debauching from the Sierra Nevada Mountains and resemble beds of similar origin above the Corcoran clay, but are texturally coarser grained. While most of the recently built wells, as of 2003, are completed in the alluvial deposits above the Corcoran, two wells built around 1950 were completed to depths below the Corcoran clay. Of these two wells one is abandoned and records indicate that the other is no longer in use. This unit contains the base of the effective groundwater reservoir, as described below. Water quality in this zone is discussed below but generally is of much better quality than water above the Corcoran clay. Currently the District designs and constructs wells based on site specific conditions and wells may be perforated above or below the Corcoran clay.

Corcoran Clay

The Corcoran Clay, also known as the E-clay, is a lacustrine clay bed of lake or swamp origin that effectively underlies the entire Plan Area. The Corcoran clay has long been recognized as the most significant subsurface deposit in the San Joaquin Valley confining water beneath it. It is the upper most boundary of the confined aquifer and the lower most boundary of the unconfined aquifer. The easterly extent of the E-Clay is shown on **Figure 5**. Structure contours drawn on the bottom show it to be about 560 to

620 feet beneath the surface in the plan area (Croft, 1972). Page (1986) provides structure contours to the top of the Corcoran clay. Based on Page's interpretation, the depth to the top is between 500 to 550 feet over the majority of the area with a thickness of 20-40 feet. The structure contours reveal the structure of the clay as a southerly dipping anticline with about 50 feet of relief from the north to south beneath the JID area. On well completion reports it is commonly described as blue or green clay, claystone, or siltstone. The Corcoran Clay has also been described as greenish-grey, dense, compact, and non-laminated claystone or siltstone. The bottom 20 feet is usually silty and it is a characteristic marker on E logs. A few scattered sand lenses exist and in the eastern portions of the area can make up as much as 30 percent of the clay sequence.

Alluvial Deposits of Westside Origin

The Plan Area, being near but east of the axis of the valley, has for the most part been dominated by deposition from the Sierra Nevada. However, there is some indication that subsurface deposits west of JID originated from the Coast Ranges. Contemporaneous deposition from eastside and westside sources is shown in a drill hole located in 15S/16E, Section 17E (about 1 mile west of the Plan Area) at depths of 22 feet where westside deposits overlie eastside deposits. This indicates that the sediments from the two sources occur and overlap west of the Plan Area. USBR (1955) indicates that the westside deposits thin and pinch out easterly. While these sediments probably form a minor component of the area's useable aquifer, water originating from these sediments to the west could have a great impact on water quality.

2.4 - Aquifer Characteristics

Specific Yield

In order to establish the storage capacity of the underground reservoir it is necessary to derive estimates of the specific yield of the sediments. USBR (1955) derived estimates of specific yield for the upper water-bearing zone within JID. These values are based on specific yield estimates from two separate studies done in similar geologic settings. The USBR report defined the upper water-bearing zone as the depth interval between the 1948 static water level in shallow wells and the top of the Corcoran clay (about 30 feet to 500 to 550 feet bgs). USBR computations show specific yield for JID ranges from as high as 22 percent to as low as 6 percent for the sediments above the Corcoran clay. Specific yield contours show a tongue of higher specific yield extends southwestward across the northern portions of the JID area corresponding to eastside alluvial sediments. The higher specific yields are associated with this tongue of coarser grained sediments of Sierran origin.

Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about 11 percent for the District and about 12 percent for the Eastside well field area. Findings from the KRCD Groundwater Management Plan Update (2005) indicate that specific yield in JID is 11.3 to 12 percent.

Safe Yield

Safe yield, or perennial yield, is difficult to quantify because of the shared nature of the aquifer and uncertainty in defining the term. In this analysis perennial yield is defined as the amount of pumping that can be supported over an average hydrologic base period that will not result in a long-term decline in water levels. The base period must be long enough to include both wet and dry hydrologic cycles.

One factor complicating the estimate of perennial yield for JID is that the District and Eastside well field region is not a "closed" ground water basin. That is, groundwater in the region is hydraulically connected to groundwater in adjacent areas within both the "Kings Basin" and the "Tulare Lake Hydrologic Region". If groundwater management activities substantially raised static water levels subsurface inflow would decrease, subsequently decreasing perennial yield.

A previous analysis performed by Provost & Pritchard Consulting Group, Inc. investigated the safe yield using the hydrology from 1975 to 1993. The analysis concluded that the perennial yield for JID is approximately 1,000 AF per year less than the District's estimated average annual pumping of 12,500 AF from within the District, and about 2,700 AF per year less than the average annual pumping from the Eastside well field. This results in an estimate of perennial yield of 11,500 AF per year for JID. Total average annual pumping for the Eastside well field area is unknown as the District's wells account for just a portion of the region's pumpage. Private irrigation wells pump an unknown additional amount. However, the total average annual amount pumped in the study period (1975-1993) appears to be around 2,700 AF per year more than the perennial yield.

Storage Capacity

If it is assumed that the useable ground water reservoir is the unconfined aquifer lying above the E-clay, an estimated ground water storage capacity can be calculated. The elevation of the base of the E-clay averages about 400 feet below sea-level within the District, with an average thickness of around 80 feet. The average ground surface elevation in the District is about 175 feet, resulting in an average total depth for the unconfined aquifer of about 495 feet. Assuming that it is undesirable to have the water table less than ten feet from the ground surface, the average thickness of the useable aquifer is around 485 feet. Applying an average specific yield of 0.11, and multiplying by the total District area of 26,392 acres results in an estimate of total unconfined aquifer storage capacity of 1,400,000 AF.

Groundwater Quantity

The entire District and surrounding lands overlie portions of an enormous aquifer. For water quality reasons most of the ground water pumping occurs along the Fresno Slough and eastward. The District currently operates about 60 turbine pumps which tap this aquifer.

The combined capacity of the wells in 2008 was approximately 93,310 gallons per minute (gpm), or around 208 cubic feet per second (cfs). The locations of the District wells are shown on **Figure 3**. As of 2007 there were only two known private in JID wells being used to supplement District water supplies.

Under the authority of a groundwater deed recorded on September 1, 1920, JID pumps a large portion of their ground water supply from outside the District. The area encumbered by the ground water deed is shown on **Figure 3**. The District operates a wellfield east of the Fresno Slough Bypass consists of about 35 wells feeding two canals; the Lassen Avenue Canal and the McMullin Grade Line (**Figure 3**). From 1986 to 1994, which was largely a drought period, the eastside wells supplied an average annual supply of about 21,000 AF. This was a little more than half of the District's total ground water pumping, which averaged around 42,000 AF per year through the same period.

JID generally uses surface water to the extent it is available and supplements it as necessary with groundwater. In years of average surface water supply total ground water pumping can be expected to be around 25,000 to 35,000 AF, with 15,000 to 20,000 AF coming from the eastside wellfield.

Transmissivity

Transmissivity data for the Plan area is sparse. Schmidt (2004) derived transmissivity values from a 5-day pumping test performed on Well C-81 at the K Basin. Schmidt notes that the transmissivity values are valid for the aquifer below the C-clay at that location. The perforated interval of the well from 250 to 500 feet bgs indicates that this well taps the aquifer between the C-clay and the Corcoran clay. Transmissivity values from that pumping tests ranged from 73,000 gpd/ft to 48,000 gpd/ft.

A study by Davis et al., (1964) summarized numerous regional specific capacity values from Pacific Gas & Electric pump tests performed across the San Joaquin Valley. Using data from field tests in the JID area, they calculated specific capacities ranging from 57 to 85 gpm per foot. Driscoll (1986) provides an approximate relationship between specific capacity data and transmissivity. Using this method, transmissivity values for the northern part of JID range from 106,500 to 127,500 gpd/ft, and range from 85,500 to 86,000 gpd/ft in the southern portion of the District. These values of specific capacity and transmissivity are probably valid for the unconfined aquifer, as at the time of the report most wells drilled in the area were most likely completed above the E-clay.

The City of San Joaquin performed pump tests in their Well No. 5 in July 2003. Estimated specific capacities ranged from 10.7 to 11.0 gpd/ft. Drawdown measurements from a step-drawdown test indicated a transmissivity of 43,000 gpd/ft, and for a constant discharge test indicated 39,000 gpd/ft.

Wells Yields and Depths

Well yields in JID range from around 400 to 2,000 gallons per minute (gpm), with most around 1,000 to 1,500 gpm (**Attachment 2**). Wells in the east side wellfield have yields ranging from about 800 to 2,300 gpm, with the typical well producing about 1,500 gpm. Well depths in the East-Side Well Field and along the James Bypass average about 500 feet deep ranging from 365 to 808 feet.

The characteristics of the three wells in the City of San Joaquin are shown in **Table 2.1** below.

Table 2.1 – City of San Joaquin Wells

Description	Well No. 3	Well No. 4	Well No. 5
Total Depth	510 ft	500 ft	495 ft
Perforated Interval	210-510 ft	300-500 ft	300-435 ft
Year Constructed	1968	1978	2003
% of City water in 2009	50	8	42
Yield	1,200 gpm	1,200 gpm	1,100 gpm

2.5 - Groundwater Levels

Regional Groundwater Levels

Figure 7 is a map showing regional groundwater levels (this map represents the best available depiction of regional groundwater depth, despite being slightly dated). Groundwater depths range from about 40 to 150 feet bgs in the Plan Area. Groundwater generally flows from northwest to southeast, and there is a considerable groundwater depression east of the Plan Area in the Raisin City Water District.

Historical Ground Water Levels

Appendix C includes a collection of hydrographs for indicator wells in JID. Groundwater level data is not available for the City of San Joaquin, but groundwater levels in the City are assumed to be similar to those shown on regional map (**Figure 7**).

Prior to development of JID, regional groundwater levels were typically within ten feet of the ground surface, and wells tapping the aquifer below the E-clay initially exhibited artesian flow. As land was brought into agricultural production, and with the advent of deep well turbine pumps, groundwater levels began to decline. By about 1950 water levels had begun a sharp decline that continued into the mid-1970's. In this period a significant portion of the unconfined aquifer was dewatered, and a large cone of depression developed outside of JID in the Raisin City area.

Beginning in the mid-1970's and continuing to the present, is a trend of much slower ground water decline. Water levels have continued to fluctuate in response to drought and

flood years but have not exhibited nearly as strong a downward trend. This slowing in groundwater level decline probably resulted from increased groundwater inflow induced by the large cone of depression that has formed in the region, as well as groundwater recharge projects implemented by JID.

Water levels in wells tapping the confined aquifer in the region west of JID, (below the E-clay) also declined precipitously through the 1950's and 60's. However, due to the confined nature of the aquifer, these declines track the piezometric or pressure surface of the ground water, and therefore do not indicate a physical reduction of water in storage in the confined aquifer. This downward trend reversed dramatically in the mid-1960's in response to initiation of delivery of imported surface water from the USBR's Central Valley Project (CVP). This surface water supply resulted in decreased pumping from beneath the E-clay in regions west of JID. Water levels in wells pumping from the confined aquifer once again began to decline steeply in the early 1990's when imported water supplies declined as a result of an extended drought.

The Lower Kings Basin GMP provided an evaluation of regional groundwater levels in the Kings Basin. The GMP concluded that there has been a significant regional decline in groundwater levels between 1950 and 2000 and estimate a continued decline. The construction and operation of Pine Flat Dam, while helping to address groundwater issues by providing surface water, has not completely mitigated overdraft conditions in the Lower Kings Basin. According to the GMP, the average annual rate of groundwater overdraft in the Lower Kings Basin is 68,000 AF/year. Groundwater levels are expected to decline in the future if current groundwater management practices remain unchanged.

2.6 - Groundwater Quality

Overall ground water quality has not appeared to change significantly over the years. Ground water quality is generally better on the east side of the District, although salt plumes caused by the unregulated discharge of oil-field brines have degraded ground water in the District's east side wellfield. The poorer quality ground water on the west side of the District is apparently now advancing further into JID.

Ground water pumped by the District is generally of poorer quality (higher salt content and more sodic) than its surface water supply. However, most of the ground water supply is still of good to fair quality for irrigation. The relatively high sodium content of the water has caused infiltration problems in some areas of the District. **Appendix D** includes total dissolved solids measurements for wells in JID from 1977-2009. **Appendix F** includes groundwater quality graphs and a summary of groundwater quality in different regions on JID. In general, groundwater quality is the best in the southern part of JID, and northern parts of the eastside well field, and is worst in the central part of the wellfield. Refer to the groundwater quality maps and tables in **Appendices D** and **F** for more detail.

Oil wells in the area have always brought up brackish water (exceeding 60,000 ppm in salts) with the oil. Prior to the mid-1950's this brackish water was disposed in unlined pits

and was allowed to percolate into the ground water. This led to degradation of groundwater in the Eastside well field due to disposal of saline waters in the Raisin City Oilfield. Unlined pits are now illegal, and deep well injection is used to dispose of the brackish water.

Surface Water Quality

Surface water in JID comes primarily from the Kings River and Delta Mendota Canal (through Fresno Slough and Mendota Pool, respectively). Kings River water is of excellent quality for irrigation. Salt content, measured as total dissolved solids (TDS), typically runs around 50 parts per million (ppm) and boron content is generally less than 0.1 ppm. Infiltration problems sometimes occur due to the purity of the water. Beneficial calcium ions tend to be leached from the soil, reducing permeability. Water supplied from the Delta-Mendota Canal to the District is of good quality for irrigation. TDS for the water is generally around 400 ppm and boron content is typically less than 0.5 ppm.

City of San Joaquin

Groundwater quality in the City is very good, possibly as a result of JID importing significant quantities of pure surface water into the area. Surface water treatment is currently limited to wellhead treatment with chlorine. However, the City is concerned about the migration of poorer quality groundwater from outlying areas, and would like to monitor the encroachment of these water sources.

3 - BASIN MANAGEMENT OBJECTIVES

The Plan Participants have adopted the following five Basin Management Objectives:

1. **Stabilize Water Levels.** Stabilize average long-term groundwater levels by 2015 to prevent the loss of groundwater reserves, and prevent the need for well deepening, and reduce the new for installing new wells.

2. **Increase Groundwater Storage.** Increase groundwater storage capabilities through the development of groundwater banking projects including the JID Water Augmentation Project.

3. **Prevent Further Land Subsidence.** Prevent further land subsidence that can cause a reduction in groundwater storage space and damage water infrastructure. Prevent land subsidence caused by groundwater withdrawals through efficient use of groundwater supplies and full utilization of surface supplies.

4. **Prevent Groundwater Degradation.** Prevent groundwater degradation by protecting groundwater through proper well construction and abandonment, proper use of agricultural amendments, importing clean high quality surface water, and preventing intrusion of poor quality groundwater from neighboring areas.

5. **Improve Coordination between the City of San Joaquin and James Irrigation District.** Improve integrated groundwater management between the City and JID through better coordination, data sharing, joint projects, and annual coordination meetings.

6. **Improve Water Conservation.** Improve water conservation as an alternative to developing new water supplies or increased groundwater pumping. Conservation measures include urban and agricultural best management practices such as metering, plumbing retrofits, efficient irrigation systems, and educational programs.

7. **Increase Knowledge of Local Geology and Hydrogeology.** Increase knowledge of the local geology and hydrogeology through technical studies, and subsurface investigations. Gain a better understanding of regional groundwater quality and flow conditions, and potential impacts from surrounding water sources with poor water quality. Seek funding for these investigations through State and Federal grant programs.

More specific goals related to these BMOs are found in following sections. All existing and on-going activities described in Sections 4-9 will be maintained, unless stated

otherwise. (In Sections 4-9 the Existing Activities are not repeated under Planned Actions, even though they will be continued in the future). All new policies and projects described in Sections 4-9 will be pursued, but their implementation will be subject to available funding and staff time.

4 - STAKEHOLDER INVOLVEMENT

4.1 - Groundwater Advisory Committee

The purpose of a Groundwater Advisory Committee (GAC) is to oversee the creation, updating and implementation of a Groundwater Management Plan. Preferably, the Committee should be comprised of a broad cross section of interests in the Plan Area. James Irrigation District initially invited the public to participate but no local residents expressed interest. JID also invited several local agencies to participate in the Groundwater Advisory Committee but the City of San Joaquin was the only party showing interest. Eventually, JID and the City agreed to jointly prepare a GMP. As a result, both the San Joaquin City Council and JID Board of Directors served as temporary Groundwater Advisory Committees for overseeing the development of the GMP. These two GACs offered several useful and insightful comments that were incorporated into this GMP. After adoption of this GMP, a GAC comprising members of both agencies will be formed to assist with implementing the GMP. The GAC will include two to three members from each agency and will meet annually.

Existing Activities

Assisted with the development of this GMP.

Planned Actions

The Committee will attempt to meet annually, or more frequent if deemed appropriate, and will have the following responsibilities:

- Review trends in groundwater levels and available information on groundwater quality;
- Evaluate the effectiveness of current groundwater management policies and facilities;
- Discuss the need for new groundwater supply/enhancement facilities;
- Educate landowners on groundwater management issues;
- Assess the overall progress in implementing the programs outlined in the Groundwater Management Plan;
- Recommend updates or amendments to the Groundwater Management Plan;
- Identify regional and multi-party groundwater projects; and
- Review and comment on Annual Groundwater Reports.

4.2 - Relationships with Other Agencies

The Plan Area is located in the Kings Groundwater sub-basin and San Joaquin Valley Groundwater basin, which extend beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies, and private water users (see **Figure 2**). This emphasizes the importance of inter-agency cooperation, and the District and City have historically made efforts to work conjunctively with many other water management agencies.

The City of San Joaquin and James Irrigation District have strengthened their working relationship by collaborating on this GMP and signing a Memorandum of Understanding (MOU). The MOU outlines a plan for the two agencies to share information, meet regularly, and collaborate on groundwater management and water conservation projects (see **Appendix E**).

Below is a list of some other agencies that the District or City have worked with in managing local groundwater resources**:**

- Kings River Conservation District
- Kings River Water Association
- United States Bureau of Reclamation
- Department of Water Resources
- McMullin Recharge Group
- San Luis and Delta-Mendota Water Authority
- Association of California Water Agencies
- Agricultural Water Management Council
- Tranquillity Irrigation District
- Mid-Valley Water District

Following is a brief discussion on the relationships between these agencies and the Plan Participants.

Kings River Conservation District
KRCD is a legislatively defined special district that supports local interests in water planning and management, develops projects, collects groundwater data, and prepares an annual report of groundwater conditions; however, KRCD does not have the legislative authority to manage groundwater. The District has recently passed a resolution in support of the KRCD's *"Lower Kings Basin Groundwater Management Plan Update"*.

Kings River Water Association
JID is a member of the Kings River Water Association (KRWA), a 28-member group of water agencies that was formed in 1927 to administer and manage water uses on the Kings River. The benefits of KRWA membership include conflict resolution mechanisms and improved coordination among member agencies. The KRWA opens lines of communication so that members can work together effectively to utilize, trade, and transfer waters from the Kings River.

USBR/DWR
JID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires JID to take water level measurements from specified wells two times a year and share the data with USBR. USBR shares this data with the DWR.

McMullin Recharge Group

The McMullin Recharge Group (Group) is comprised of James Irrigation District, Mid-Valley Water District, Raisin City Water District, Tranquillity Irrigation District, Terranova Management Co, LLC., and Kings River Conservation District. The Group works cooperatively to investigate groundwater recharge projects in the area of the McMullin Grade, just east of the James Irrigation District, adjacent to the Eastside Well Field. The group members share information and JID has acquired valuable knowledge of the local geology as a consequence of their participation.

San Luis and Delta-Mendota Water Authority

James Irrigation District is a member agency of the San Luis and Delta-Mendota Water Authority (SLDMWA), an umbrella organization for 32 water agencies in the Central Valley. The SLDMWA was established in 1992 and represents approximately 2,100,000 acres of federal and exchange water service contractors within the western San Joaquin Valley, San Benito and Santa Clara Counties. The JID General Manager is on the Board of Directors at SLDMWA and is a member of its Water Resources Committee.

The SLDMWA serves the information and representation needs of its members by developing, providing, and disseminating information to legislative, administrative and judicial bodies concerning a variety of issues such as: Sacramento and San Joaquin Delta exports, water supply, water quality, water development, conservation, distribution, drainage, contractual rights, surface and groundwater management, and any other common interest of the member agencies. The SLDMWA also works with other governmental and public agencies to promote the common welfare of the landowners and member water agencies.

The SLDMWA prepared a regional water management plan in 2005 entitled "*Westside Integrated Water Resources Plan*". The Plan provides guidance for JID and other water agencies on regional priorities and multi-agency projects.

Association of California Water Agencies

JID is an active member of the Association of California Water Agencies (ACWA). ACWA fosters cooperation among all interest groups concerned with stewardship of the state's water resources. JID attends the ACWA annual meeting and benefits from the educational and informational services that ACWA offers.

Agricultural Water Management Council

JID is a member of the Agricultural Water Management Council (AWMC or Council). The AWMC was formed in 1996, following the work of an advisory committee formed by Assembly Bill (AB) 3616, Agricultural Efficient Water Management Act of 1990. The

Council consists of members of the agricultural and environmental communities and other interested parties with the expressed goal for water suppliers to voluntarily develop Water Management Plans and implement Efficient Water Management Practices (EWMPs) to further advance water use efficiency while maintaining and enhancing economic, environmental and social viability and sustainability of soil and crop production. Members sign a Memorandum of Understanding that includes a comprehensive methodology by which each and every Efficient Water Management Practice is analyzed and provides a consistent analysis by all participating water suppliers.

Tranquillity Irrigation District

JID had a long-term relationship with the neighboring Tranquillity Irrigation District. The two Districts have collaborated on SCADA monitoring projects in the Fresno Slough, and have discussed developing interties between the districts to provide better service to their growers.

Mid-Valley Water District

In 1999 and 2000, the Mid-Valley Water District, with the cooperation of James Irrigation District and Reclamation District No. 1606, evaluated the feasibility of a groundwater recharge basin near the James Bypass between Manning Avenue and American/Placer Avenues.

Existing Activities

- On-going involvement with the agencies and associations listed above.

Planned Actions

- When relevant to JID, implement the multi-agency projects identified in the Westside Integrated Water Resources Plan.

4.3 - Plan to Involve the Public and Other Agencies

The District and City of San Joaquin are already involved with many neighboring and regional agencies on groundwater management projects. Nevertheless, the Plan Participants are always interested in building new relationships with other agencies that share the same groundwater basins, and will also strive to involve the public in groundwater management decisions. Additional cooperative relationships can be achieved through the data sharing, inter-agency committees, interagency meetings, memorandums of understandings, formal agreements, and collaborations on groundwater projects. Furthermore, the development of this integrated GMP will foster cooperation between the City and JID.

Existing Activities

- Conducted public hearings to discuss the content of this GMP prior to its adoption.

Planned Actions

- Hold annual Groundwater Advisory Committee meetings with representatives from JID and the City.
- Provide copies of the JID annual groundwater reports to the public at their request. Notify the public of the availability of the annual reports in the JID District newsletter.
- Publish information on groundwater management accomplishments in the JID newsletter and City website.

5 - MONITORING PROGRAM

This section discusses monitoring of groundwater levels, groundwater quality, land surface subsidence, and surface water. Monitoring is considered critical to future management decisions, and the proposed monitoring program is intended to:

1. Provide warning of potential future problems;
2. Use data gathered to generate information for water resources evaluations;
3. Develop meaningful long-term trends in groundwater characteristics; and
4. Provide data comparable from place to place in the Plan Area.

JID prepared a Groundwater Quality Monitoring and Mitigation Plan in 2010 (see **Appendix F**). The plan includes a discussion on the District's existing groundwater quality, monitoring well network, groundwater level and monitoring program, and recommendations for protecting and mitigating groundwater quality. The plan enhances the discussion provided below on groundwater monitoring in JID.

5.1 - Groundwater Level Monitoring

The District regularly measures spring and fall water levels in District wells and a few private wells in cooperation with a valley-wide monitoring program coordinated by the USBR and the DWR. In addition, groundwater levels are monitored monthly in some shallow wells. **Figure 3** illustrates the location of wells that are monitored. **Attachment 2** includes a list of attributes for these wells. The City of San Joaquin does not regularly measure groundwater levels in their wells, but relies on the regional data collected by JID. However, the City will be installing three monitoring wells at their wastewater treatment plant in 2010 or 2011, which will be monitored on a regular basis.

The purpose of a groundwater level monitoring program is to provide information that will allow computation of the change in ground water storage. Contour maps depicting groundwater levels in the District and surrounding area will be prepared annually, along with estimates of changes in groundwater storage.

Existing Activities

- Measurement of groundwater levels in shallow monitor wells each month
- Measurement of groundwater levels each spring and fall in active and abandoned JID production wells
- Share groundwater level data with USBR and DWR

Planned Actions

- Periodically review the monitoring network to determine if it provides sufficient areal coverage to evaluate groundwater levels.
- Protect wells in monitoring program from being abandoned.
- Encourage landowners and developers to convert unused wells to monitoring wells.
- Prepare annual groundwater reports, which will include groundwater contour maps and detailed evaluations of groundwater level trends (see Section 9.2).
- Work with KRCD in the development of a Kings Basin Groundwater Data Center
- Perform a Well Canvass to collect detailed information and precise coordinates on each production well, monitoring well and abandoned well in the Plan Area (see **Appendix F** for more details on the proposed well canvass).
- Investigate the feasibility of installing a SCADA/telemetry system to monitor and operate production wells in JID. If available seek funding to assist with expenses.

5.2 - Groundwater Quality Monitoring

The City performs groundwater quality monitoring as required by the State of California. JID test each well for electrical conductivity annually and performs agricultural suitability analyses on all new wells.

The aforementioned groundwater quality monitoring efforts have one or more of the following objectives:

1) Spatially characterize water quality according to soils, geology, surface water quality, and land use;
2) Establish a baseline for future monitoring;
3) Compare constituent levels at a specific well over time (i.e. years and decades);
4) Determine the extent of groundwater quality problems in specific areas;
5) Identify groundwater quality protection and enhancement needs;
6) Determine water treatment needs;
7) Identify impacts of recharge and banking projects on water quality;
8) Identify suitable crop types that are compatible with the water characteristics; and
9) Monitor the migration of contaminant plumes.

Existing Activities

- Measure electrical conductivity in JID production wells on an annual basis.
- Perform agricultural suitability analysis on all newly constructed wells.

Planned Actions

- Regularly collect new water quality information from other agencies and review it to identify any impending groundwater quality problems.
- Protect wells in monitoring program from being abandoned.

- Prepare groundwater quality maps when sufficient information is available with the aid of a qualified hydrogeologist. Attempt to characterize groundwater quality with depth and provide the information to growers so they can use it when designing and installing wells.
- Work with KRCD in the development of a Kings Basin Groundwater Data Center.
- Perform Agricultural Suitability Analysis every 5 years (2015, 2020, 2025, etc.) in selected wells in areas of concern. This will be timed with the submission of 5-Year Water Management Plans to the USBR.
- Test for Additional Constituents in wells near the City of San Joaquin. If funding from the City of San Joaquin is available, perform more detailed water quality sampling in JID wells near the City of San Joaquin. This information could be useful in determining the quality of groundwater that may be migrating toward the City. Constituents that could be tested include arsenic, gross alpha, Total Organic Carbon, and other constituents important to drinking water quality.
- Regularly calibrate the hand-held TDS meter used to test wells each year, to help ensure that measurements are accurate and trends are properly identified.

5.3 - Groundwater Monitoring Protocols

Monitoring protocols are necessary to ensure consistency in monitoring efforts and are required for monitoring evaluations to be valid. Consistency should be reflected in factors such as location of sample points, sampling procedures, testing procedures, and the time of year when the samples are taken. Without such common ground, comparisons between reports must be carefully considered. Consequently, uniform data gathering procedures will be practiced by the Plan Participants.

The District has developed new water level and water quality monitoring protocols, which can be found in **Appendix G**. The District has also adopted protocols prepared by a local laboratory, Fruit Growers Laboratory of Visalia, California. These are included as **Attachment 4** and supplement the protocols described above. The City has not adopted specific protocols, but will follow JID's protocols until they adopt their own.

Existing Activities

None

Planned Actions

- The District will work with KRCD to establish uniform protocols that are used basin wide.
- The City will review JID's protocols and adopt them or develop their own protocols.

5.4 - Surface Water Monitoring

Surface water sources in the Plan Area include the Fresno Slough and Fresno Slough Bypass. In addition, the Mendota Pool is located near JID and is a source of surface water.

Existing Activities

- Monitor flowrates in the Fresno Slough Bypass.
- Monitor surface water quality in the Mendota Pool at P Booster.

Planned Actions

None

5.5 - Land Surface Subsidence Monitoring

Land subsidence results from excessive groundwater pumping beneath laterally extensive confining clay layers. The removal of groundwater from a confined aquifer causes increased pressure on the aquifer skeletal system below the confining layer. This causes compaction of the fine-grained layer at depth, and is evident at the ground surface as land subsidence. Land subsidence has been monitored throughout the San Joaquin Valley. The most serious subsidence occurred north of the Districts and monitoring efforts have declined in recent years.

A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Between 1926 and 1970, a maximum of 28 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million acre-feet of water storage space out of the sediments during the same period. From 1975 to 1992, subsidence occurred mostly in drought years when groundwater pumping replaced unavailable surface water supplies. The Department of Water Resources has continued to measure subsidence along the California Aqueduct in the winter of 1993-1994. Very little quantitative data has been collected since 1970 by others. In neighboring Tranquillity Irrigation District, there is a benchmark on Lift Station No. 1 that is periodically resurveyed to check for land subsidence.

It is likely that some of the local land subsidence has been arrested with the importation of large volumes of surface water since the District established its surface water contracts. However, there is often a time delay in subsidence after groundwater withdrawals, so the Plan Area may still be experiencing residual subsidence. In addition, groundwater levels can drop appreciably in extended droughts, which could also lead to further subsidence. Lands within the Plan Area will be observed for land

subsidence, and, if land subsidence becomes a problem, this Plan will be amended to include preventative and mitigative measures.

Existing Activities
None

Planned Actions
- Periodic resurvey of control points and local benchmarks to check for land subsidence. The control points and local benchmarks will be checked relative to High Precision Geodetic Network benchmarks.

6 - GROUNDWATER RESOURCES PROTECTION

6.1 - Well Abandonment

Existing State and Fresno County law requires that owners or lessees properly destroy their abandoned wells. Proper destruction of abandoned wells is necessary to protect groundwater resources as abandoned or improperly destroyed wells can result in water of different chemical qualities from different strata mixing, and useable groundwater being degraded. This is especially important because part of the Plan Area has a confined aquifer.

The administration of a well construction, abandonment and destruction program has been delegated to the Counties by the State legislature. Fresno County has adopted a permitting program consistent with Department of Water Resources Bulletin 74-81 for well construction, abandonment, and destruction.

The Plan Participants will properly abandon their own wells when they are no longer useful. In addition, they will encourage landowners and developers to properly abandon their own wells, or preferably, convert unusable wells to monitoring wells so that they can become a part of JID's groundwater monitoring program.

Existing Activities

None

Planned Actions

- When possible, convert unusable production wells to monitoring wells.
- Destroy any District or City owned wells that have no use according to County and State standards.
- Seek funding to perform a survey of all inactive wells and properly abandon those that have no potential for rehabilitation or use them as monitoring wells.

6.2 - Wellhead Protection

The Federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. The program is based on the concept that the development and application of land use controls, usually applied at the local level in California, and other preventative measures can protect groundwater.

A Wellhead Protection Area (WHPA), as defined by the 1986 Amendments, is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily determined from topography, WHPA's can vary in size and shape depending on subsurface geologic conditions, the direction of groundwater flow, pumping rates and aquifer characteristics.

Under the WHPA, States are required to develop an EPA-approved Wellhead Protection Program. To date, California has no state-mandated program, but instead relies on local agencies to plan and implement programs. This is one of the factors that prompted the State Legislature to enact AB 3030. Wellhead Protection Programs are not regulatory in nature, nor do they address specific sources. They are designed to focus on the management of the resource rather than control a limited set of activities or contaminant sources.

Essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources. Wells constructed by the Plan Participants will be designed and constructed in accordance with DWR Bulletin 74-81. In addition, landowners will be encouraged to follow the same standards for privately owned wells. DWR Bulletin 74-81 provides specifications for the following:

- Methods for sealing wells from intrusion of surface contaminants;
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism;
- Site grading to assure drainage is away from the well head; and
- Set-back requirements from known pollution sources.

Existing Activities

- Provide wellhead protection on all newly constructed wells according to County and State standards.

Planned Actions

- Encourage local growers to incorporate proper wellhead protection into all new wells, and retrofit old wells with proper wellhead protection.

6.3 - Saline Water Intrusion

Saline water intrusion is a concern in two portions of the Plan Area. The first is a generalized condition on the west side of JID. The groundwater in the western portion of the District is significantly saltier than in the eastern portion. Additionally, given the

direction of ground water flow is in a southeasterly direction, this poorer quality water is encroaching on many of the District's wells.

The second area of concern, the Raisin City Oil Field salt plumes, lies outside the District boundaries but affects the District's east-side wellfield. These plumes formed when brines pumped from oil wells were disposed in surface ponds. It is believed that these plumes currently impact JID wells, even though the practices that created them were halted over three decades ago.

Currently, the District strives to prevent the importation of saline surface waters that could ultimately degrade the groundwater. When alternative water sources are available for importation, the District considers not only the cost but also the quality, including salinity, of the water. The District will evaluate all possible alternatives, and, when practical and feasible, select water sources with acceptable levels of salinity.

Existing Activities
None

Planned Actions
- Review available water quality data to identify areas with the potential for saline water intrusion.

6.4 - Migration of Contaminated Groundwater

Ground water contamination can originate from many sources or activities. Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Sources of groundwater contamination can include irrigation, dairies, improper application of agricultural chemicals, septic tanks, industrial sources, stormwater runoff, and disposal sites.

Clean-up of contaminated ground water is a complex and expensive task generally involving a number of organizations. Agencies with roles to play in mitigating ground water contamination include the California Regional Water Quality Control Board (RWQCB), the California Department of Toxic Substances Control (DTSC) and the U.S. Environmental Protection Agency (EPA). Each agency has its own set of regulatory authorities and expertise to contribute. The degree to which they participate depends on the nature and magnitude of the problem. If JID or the City identify a ground water contamination problem, they will refer the information to the appropriate regulatory agency.

According to the Lower Kings Basin GMP, the migration of contaminated groundwater is a secondary concern for the area. Contaminated plumes are relatively small and localized in the Lower Kings Basin. Furthermore, the Plan Participants do not know of

any contaminant plumes in their service area, aside from salinity from the Raisin City Oilfields. Nevertheless, the Plan Participants recognize that migration of contaminated groundwater is always possible. The City and District will continue to monitor groundwater quality and remain cognizant of the possibility of contaminated groundwater migration into the Plan Area.

Existing Activities

- Regularly review data and reports from regulatory agencies on contaminant plumes to provide warning of potential future problems.
- Construct wells with adequate seals between the formations to prevent the downward migration of poor quality water.

Planned Actions

- Seek to locate recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes.

6.5 - Groundwater Quality Protection

The City relies exclusively on groundwater and JID cannot support all of their crop demands with their surface water supplies. Clearly, groundwater is a very important resource in the area. The groundwater, however, will have limited or no use if it has poor quality. Therefore, protecting the quality of the groundwater is a cardinal component of this GMP. Groundwater quality can be protected through proper use of pesticides, herbicides and fertilizers, stormwater quality management, septic system management, and water vulnerability planning and management.

JID has outlined several existing and proposed methods for protecting and mitigating groundwater quality. These are document in their Groundwater Quality Monitoring and Mitigation Plan (**Appendix F**)

Existing Activities

- Educate staff on proper use of herbicides used in JID canals.

Planned Actions

- Seek funding to improve security at water facilities and reduce the potential for contamination from acts of vandalism or terrorism.
- Educate growers on the proper use of pesticides, herbicides and fertilizers in the District newsletter.
- Implement groundwater mitigation methods documented in **Appendix F**.

7 - GROUNDWATER SUSTAINABILITY

Between 2000 and 2009, groundwater has comprised about 45% of the water used in JID in a typical year, but has comprised up to 78% of water supplies. During years with low surface water allocations, groundwater is essential to prevent the loss of permanent crops. The City of San Joaquin relies exclusively on groundwater and has no surface water rights or facilities to accept surface water. Therefore, preserving the sustainability of groundwater is essential for the economic well being of the District growers and City residents.

7.1 - Issues Impacting Groundwater Sustainability

The James Irrigation District relies on both surface and groundwater for irrigation demands. **Table 7.1** shows surface and groundwater usage from 2000-2009.

Table 7.1 – James Irrigation District Surface and Groundwater Use (2000-2009)

Year	Surface Water		Groundwater	
	Volume (AF)	%	Volume (AF)	%
2009	15,900	22	55,100	78
2008	21,300	27	56,900	73
2007	34,300	42	48,200	58
2006	67,400	91	6,300	9
2005	50,300	69	22,500	31
2004	38,600	47	43,000	53
2003	39,000	51	37,400	49
2002	37,400	43	48,700	57
2001	26,400	35	48,600	65
2000	35,400	49	36,400	51
Avg	36,600	48	40,300	52

Table 7.1 shows that for typical years, groundwater constitutes about 50% of the District's water use. In almost all years the District's surface water supply is fully utilized, and groundwater is pumped to supplement the surface water. Typically, groundwater pumping begins in the middle of the irrigation season and groundwater is often the only water source available at the end of the irrigation season (August to October).

2005 and 2006 were not typical years since flood waters were released down the Kings River. When this was available JID used the flood water instead of their CVP supply,

and saved their CVP supply for a later date. This permitted for a larger and longer supply of surface water which allowed for decreased groundwater pumping, and groundwater recharge as a result of diverting flood flows. A two year supply of flood water only occurs occasionally and cannot be relied upon.

The District's surface water supplies are sporadic, unreliable and unpredictable. In addition, due to recent regulatory actions, surface water supplies from the Central Valley Project have become less dependable and shortages occur more frequently. This has caused the District's available surface supplies to be reduced causing more reliance on pumping groundwater. Furthermore, the acquisition of new water contracts or substantial water transfers in the future is unlikely. In summary, groundwater supplies are vital to the JID and consequently the District considers the proper management of their groundwater resources to be imperative.

The City of San Joaquin relies exclusively on groundwater. When local and regional groundwater supplies are stressed, such as during droughts, this can impact groundwater supplies in the City. It is unlikely that the City can secure a long-term surface water contract, and therefore they must protect and preserve the local groundwater resources.

7.2 - Overdraft Mitigation

Overdraft of the groundwater supply can lead to a variety of problems, including subsidence and increased pumping costs. Additionally, if overdraft continues unchecked, the groundwater supply may be unreliable when surface water is scarce, as in a time of extended drought. Groundwater overdraft is considered the principal groundwater problem in the Plan Area.

Groundwater Overdraft Estimates

JID estimates overdraft using historical groundwater levels during a hydrological base period. This base period must extend for a long enough time that both wet periods and droughts are covered, and the water supply conditions approximate the average. The term overdraft is used here to indicate a long-term water-level decline in an area during an average hydrologic base period. It is not used to describe short-term water-level declines during droughts.

The procedure to estimate overdraft from groundwater levels uses many measurements over a long period of time. In the Plan Area, measurements are made in the winter or early spring, following a period of minimal pumping, and again in the fall, following a period of heavy pumping. The complete water-level data record can be used to prepare well water-level hydrographs and to determine long-term water level changes. A well water-level hydrograph is a plot of depth to water versus time for a particular well.

After the well water-level hydrographs are prepared, the trends in the water levels in the base period are closely examined. In most agricultural areas the annual low values are in the late summer or early fall, at the end of a long irrigation season, and annual high values are in the winter or early spring, just before pumping begins for the next growing season. Linear regressions are then performed on the data within the base period that appear valid and representative of the water-level conditions. The slope of these "best-fit" lines are then used as the long-term average annual changes in ground water level.

JID calculated overdraft during the period from 1975 to 1993, but has not performed any more recent analyses. The hydrographs created indicate gradual long-term water-level declines in both the District and the east side wellfield for the chosen hydrologic base period. In order to determine the change in ground water storage, a parameter known as the "specific yield" was multiplied by the average water-level change during the period evaluated. Specific yield is the ratio of the volume of water which will drain freely from a material to the total volume of the formation. Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about eleven percent for the District and about twelve percent for the east side wellfield area. Using these specific yields, the ground water overdraft was calculated to be about 1,000 AF per year for the District, and around 2,700 AF per year for the eastside wellfield for the chosen hydrologic base period.

Overdraft could be a significant concern if the Plan area experiences increased pumping, reduced recharge, and/or increased ground water outflow. Periodic analyses of ground water overdraft, perhaps every five years, are needed to reassess the need for overdraft mitigation.

Mitigation Measures

Groundwater overdraft is due to an imbalance in the rates of extractions and replenishment. There are several methods to correct this imbalance. The first is to decrease the extraction to match the rate of replenishment. The second is to increase groundwater replenishment to match the extraction rate. The third method is a combination of the first two, to balance replenishment and extraction. Each of the methods are applied over an extended period, making use of the storage capacity of the aquifer. Extractions can exceed replenishment in drought periods as long as replenishment equally exceeds extractions in wetter periods.

Factors that will affect the future rate of overdraft include surface water supplies available to JID through the Central Valley Project and future water demands in the District.

The District utilizes both surface water and groundwater conjunctively to meet the water needs of its growers. The Plan Participants understand that the existing condition of overdraft is regional in nature and correction and mitigation of the problem will need to be addressed not only by the District and City, but also by neighboring agencies.

Groundwater Recharge

Mitigation measures to negate current overdraft and contribute to lessening future overdraft conditions rely on the importation of additional surface supplies. Increasing JID's surface water supply would rely on improving the District's ability to use excess Kings River flows. Flood water appears adequate on the Kings River to mitigate the overdraft condition if sufficient recharge capacity can be developed. JID already recharges water in the K-Basin Recharge Project and plans to recharge additional flood waters with their proposed Water Augmentation Project (see Section 7.4).

Mitigative measures to reduce demands can include conversion to more efficient irrigation systems, and urban conservation measures discussed in Section 7.5. Demand reduction can also be achieved by cropping changes or land fallowing, but these would have adverse economic impacts and therefore are not considered.

Water Transfers

In 2001 the JID Rules and Regulations were amended to restrict the transfer of surface and groundwater supplies outside of the District. The purpose of this amendment was to prevent further groundwater overdraft. Specifically, the Rules and Regulations state:

> "*Any transfer of surface water which is replaced by increased groundwater pumping would therefore exacerbate groundwater overdraft....Similarly, if a Water User were to pump groundwater within the District and export it, the same effect would occur.*" (pg 8)

Such exports are only allowed under certain circumstances; for example, surface water exports are allowed if the land that would have used the water is fallowed. Refer to the Rules and Regulations for more details on this policy. Clearly, the District recognizes the gravity of their groundwater overdraft problem and this amendment illustrates their commitment towards preserving their groundwater resources.

Limitations on Pumping

The California Water Code gives water and irrigation districts the power to limit or suspend groundwater extractions. However, such limits will only be implemented if the Plan Participants determine through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen impacts to groundwater. In the unlikely event that it becomes necessary to reduce groundwater extractions, the District intends to accomplish such reductions under a voluntary program, which would include suitable incentives to compensate users for reducing their groundwater pumping. The District will not attempt to restrict or otherwise interfere with any landowner or water user exercising a valid right to pump and utilize groundwater.

Economic Inducements
The District recognizes that management of water supplies should reflect water conservation and the protection of groundwater resources. The District currently provides an indirect economic inducement by establishing water rates high enough to promote water conservation yet low enough to compete with groundwater pumping costs. This pricing system encourages the use of surface water to meet irrigation demands when available, thereby preserving the underlying groundwater resource.

Existing Activities
- Restrict groundwater exports from the District.
- Set surface water rates low enough to be competitive with groundwater pumping costs.

Planned Actions
- Urban water conservation measures (see Section 7.5)
- Seek funding to prepare a Drought Preparedness Plan that will identify triggers and response measures for droughts.

7.3 - Groundwater Replenishment

Replenishment of ground water is an important technique to manage a groundwater supply and mitigate a condition of overdraft. The estimated overdraft for the Plan Participants and the east side wellfield can probably be offset with recharge projects that would use excess Kings River flows (flood releases from Pine Flat Reservoir).

The types of groundwater replenishment include the following:

- Direct groundwater recharge
- Incidental groundwater recharge
- Injection wells
- In-lieu recharge
- Groundwater banking
- Canal seepage
- Pipeline seepage
- Flood flow seepage
- Deep percolation from precipitation
- Deep percolation from irrigation

Direct Groundwater Recharge. Two recharge projects are currently in operation in JID. The first involves the diversion of Kings River flood water from the Fresno Slough Bypass (James Bypass) into basins in the upland areas of the Bypass between the two outer flood channels. The Bypass area has fairly permeable soils and provides a modest opportunity for ground water replenishment. This project may have potential for expansion. The second project includes the 220-acre K-Basin Project. Some of this water is recovered with wells and some of the water remains underground for recharge. The District is also

developing recharge capability with the Water Augmentation Project, described in Section 7.4

Incidental Groundwater Recharge. Incidental groundwater recharge occurs in the three stormwater basins operated by the City of San Joaquin, located at Colorado Avenue, California Avenue and Cherry Lane. Flows to these basins are not measured and there are no current estimates of the volume of incidental recharge.

Injection Wells. Injection wells pump water directly into the groundwater basin and are primarily used in urban areas, where land is at a premium. Capital costs are high and include conveyance, treatment and well construction. Some injection well projects have been denied by the Regional Water Quality Control Board due to water quality issues, especially disinfection byproducts in the source water. Given the high cost of injection wells, regulatory hurdles and the presence of more viable and lower costs options for recharging water, this option was removed from further consideration.

In-lieu recharge. The District views in-lieu deliveries as the most practical and effective means of groundwater replenishment. In-lieu deliveries, also called indirect deliveries, involve the delivery of surface water to landowners and water users who would otherwise have pumped groundwater, thus leaving water in the aquifer for future use. From 2000 to 2006, JID imported between 26,000 and 67,000 AF/year of surface water, and, as a result, JID is performing a significant amount of in-lieu recharge.

Groundwater banking. Groundwater banking agreements often require that a portion of the banked water be left in the aquifer as a payment to the banking agency. JID is planning to develop a groundwater bank through the Water Augmentation Project. Water banking partners will be required to leave 10% of their water behind for District recharge.

Canal seepage. Canal seepage in JID is estimated to be about 12,300 AF in a typical year.

Pipeline Seepage. Seepage from City of San Joaquin pipelines, and JID's Lateral G pipeline, help to recharge the groundwater. No estimates of the seepage are currently available.

Flood flow seepage. Natural seepage occurs in the District from flood flow waters in the Fresno Slough and the James Bypass channel. However, this seepage volume has not been measured or estimated.

Deep percolation from precipitation. In JID, deep percolation from normal rainfall events is probably negligible. Some deep percolation occurs during exceptionally long and heavy storms. However, such storms are infrequent.

Deep percolation from irrigation. Deep percolation occurs when some of the water applied for irrigation percolates beyond the crop root zone and accumulates in the aquifer. The extent of deep percolation varies with the irrigation method, irrigation efficiency, and antecedent moisture condition. During 2002 and 2003, deep percolation from local irrigation was estimated to be from 8,000 to 10,000 AF/year, but was only estimated to be about 2,000 AF in 2009.

Existing Activities

- Groundwater recharge in the 220-acre K-Basin recharge project.
- Groundwater recharge in the Fresno Slough and Fresno Slough Bypass
- Measure the volume of water delivered to groundwater recharge basins.
- Periodically remove sediment and rip the soils in recharge basins to maintain recharge rates.

Planned Actions

- Work cooperatively to minimize development on lands that are favorable for artificial recharge.
- Design and construct the Water Augmentation Project, which will increase recharge capabilities in the District
- Estimate seepage from City of San Joaquin pipelines either from water balance calculations or through field tests.
- Install staff gauges in City of San Joaquin stormwater basins so incidental recharge can be estimated.

7.4 - Conjunctive Use of Water Resources

Conjunctive use of water is defined as the coordinated use of both subsurface and surface water sources so that the combination will result in optimum benefits. Conjunctive operation of a ground water basin is defined in DWR Bulletin 118-80 as:

> *"Operation of a ground water basin in coordination with a surface water reservoir system. The basin is intentionally recharged in years of above average precipitation so ground water can be extracted in years of below average precipitation when surface water supplies are below normal."*

Such management results in the groundwater storage being reduced in dry periods and increased in wetter periods. To avoid a condition of overdraft, replenishment must balance extraction over the long-term.

A conjunctive use program requires:

- A source of surface water in years of high surface water supply.
- Recharge facilities.
- Conveyance facilities to import and export water to and from the ground water storage area.

- Available storage capacity in the aquifer.
- Extraction facilities.
- Distribution facilities for surface and ground water.

Existing conjunctive use operations can be expanded by adding interconnections and promoting water supply exchanges between districts that allow for more flexibility in the region's water supply. The region's assets of federal, state, and local water supplies, dewatered groundwater storage, numerous interconnected conveyance facilities, and significant irrigation demand make it an ideal location to regulate surface and groundwater supplies conjunctively.

The region must absorb wet year water supplies in order to maintain a reliable and economical water supply. Wet year water is available on short notice and not always at times when the water can be delivered for an irrigation demand. Therefore, it is important that the region work cooperatively to increase its ability to absorb surface water when available. Regional Water Management Plans, including the 'Westside Integrated Water Resources Plan', can help identify viable regional projects.

Regional Conjunctive Use Projects

In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes several wells to recover some of the recharged water.

The JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 2,100 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. JID will work with the City in locating the wells and will keep the City apprised of progress on the project. The project is currently being designed and construction is expected to be completed by the end of 2011 or 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

One example of a 'regional' groundwater recharge project is the proposed McMullin Group recharge project. This project would use flood flows to recharge the groundwater system. The project, which includes a series of ponds and canals, was investigated and

a draft feasibility study was completed in April 2000. At that time, two sites in the McMullin Recharge Project area were considered covering 138 acres. With support from DWR grant funding, additional hydrogeologic evaluations have been made of the sites since the completion of the draft feasibility study. In response to interpretation of the hydrogeologic evaluations, several recharge ponds have been proposed for development. These ponds can be operated using available floodwater. This project was identified as a regional goal in the Lower Kings Basin GMP with estimated costs of $2.2 million and a completion date of 2010.

The City of San Joaquin does not have a surface water supply, but does divert stormwater to basins where some is percolated, thereby recharging the groundwater.

Existing Activities

- Continue groundwater recharge and banking in the K-Basin Recharge Project.

Planned Actions

- Support the development of new surface storage and water supply projects that would permit the participants to better utilize surface water supplies.
- Investigate additional groundwater banking projects and facilities.
- When transferring surface water, attempt to transfer it to neighboring agencies so it benefits local groundwater levels.
- Design and construct the JID Water Augmentation Project.
- Construct four production wells in JID as part of a Federal Drought Relief grant.
- Actively recruit regional water agencies to store water in JID's groundwater banking facilities.
- Discuss options with the Fresno Irrigation District to purchase surplus surface water to reduce demand on local groundwater resources.

7.5 - Water Conservation and Education

City of San Joaquin

The City of San Joaquin prepared a Water Conservation Plan in 2009. The plan identified several measures that can help reduce water consumption. The Plan outlined two general conservation strategies:

1) **Twenty Percent Reduction in Water Use.** A citywide reduction in water use of 20% by the year 2011 (to mirror the reduction goals of the current California Green Building Standards Code). These savings will be accomplished through equipment upgrades and a targeted education and community outreach program. Showerhead and faucet replacements are planned to be part of the upgrades installed as part of the city's low income housing rehabilitation program. Beginning in the 2010-2011 academic year, students at San Joaquin Elementary school will receive water conservation training.

2) **Water Meters.** Install water meters on all service accounts by the year 2020. California state law requires meters on all service accounts by the year 2025. Installing meters can also lead to reduced water use, and will enable to city to charge residents based on actual water usage. Studies show that cities with metered water use up to 15% less water than cities without meters. When meters are used to institute a tiered pricing structure, another 10% savings occurs. In addition to providing customers with feedback on their consumption levels, service meters in conjunction with supply meters, enable a system to better account for leaks in the system, The guidance from the EPA estimates that by installing meters water use can be reduced by 20%. Currently, only some commercial and industrial accounts are metered. Residential meters are planned for the future as required by the State. In the Water Conservation Plan, meters were not found to be the most economical alternative for conserving water, so the City will seek funding to assist with their purchase and installation.

The City's current ordinance that allows landscape watering only on certain days is also a fairly effective method in preventing over watering. The City will include inserts in water bills reminding residents of these landscape watering rules.

James Irrigation District

The District considers water conservation and education important aspects of their overall groundwater management efforts. All water deliveries are metered and billed based on the volume used. Therefore, all customers have an incentive to minimize water usage. Water conservation education is achieved through the annual grower's meeting and district newsletter. JID has also constructed several regulation reservoirs, that help to reduce operational spills and thus conserve water.

Existing Activities

- JID's monthly water statements include water use information for each customer. In addition, the District maintains historic water use by turnout. This data is available to water users on request as it could be beneficial in making on-farm water management decisions.
- The District holds an annual grower's meeting and publishes a semi-annual newsletter to help educate local growers on important issues such as water conservation and water quality protection.

Planned Actions

- Evaluate the feasibility of a grey water system in the City of San Joaquin.
- Seek funding to install water meters in the City of San Joaquin
- Implement the City of San Joaquin's water conservation education program.

7.6 - Water Recycling

The City does not currently recycle any of their water. Wastewater effluent is currently discharged to aerated lagoons at the western end of JID for evaporation and percolation. The annual volume of water treated is about 121 million gallons. The City plans to improve their wastewater treatment system to include advanced secondary treatment with activated sludge, nitrogen removal, and sludge handling. Construction of the new facilities is expected in 2010 or 2011. The effluent will have better quality that is suitable for non-edible crops. The City has held discussions with farmers to use the effluent, and also plans to meet with JID to discuss delivery of the water into the JID distribution system. No other urban agencies are located in the area that could feasibly deliver recycled water to the Plan Area.

The City has noticed some high salt contents in their wastewater. They are investigating whether a commercial or industrial entity is dumping wastewater with high salt loads.

Existing Activities

None

Planned Actions

- Remain cognizant of opportunities to purchase recycled water from other municipalities.
- Hold a joint meeting with the City and JID to discuss beneficial use of recycled WWTP water on JID crops. Discuss the merits of performing a feasibility study on importing recycled water to JID.
- Investigate the source of saline water in the San Joaquin wastewater.

8 - GROUNDWATER OPERATIONS

8.1 - Well Construction Policies

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. Department of Water Resources Bulletin 74-81 provides useful guidelines for the construction of groundwater wells. In addition, Fresno County has enacted and is responsible for enforcing a County Well Ordinance that regulates well construction. Proper wellhead protection is essential to ensure that contaminants do not inadvertently enter a well. Well construction policies that are intended to ensure proper wellhead protection are discussed in Section 6.2 – Wellhead Protection.

In addition, the following quality assurance procedures will be followed when constructing District or City owned wells. Landowners are also encouraged to follow these procedures when constructing private wells:

1. Well construction will be performed under contract by a licensed and experienced well driller, in accordance with specifications prepared by a licensed engineer or geologist, and reviewed by legal counsel.
2. A licensed engineer or geologist will oversee construction of the wells.
3. A licensed land surveyor will oversee survey of any newly constructed wells.
4. Wells will be constructed according to guidelines in DWR Bulletin 74-81.

Existing Activities

- Construct wells according to DWR Bulletin 74-81.
- Construct wells using qualified and licensed contractors, engineers, geologists and land surveyors.
- Use plastic well casings in areas where the groundwater and soils are highly corrosive.

Planned Actions

None

8.2 - Operation of Facilities

The City currently has three productions wells but has an immediate need for one more wells due to the age and condition of their current wells (the three wells are 10, 30 and 40 years old). The City is concerned about how they will pay for a new well and are seeking funding opportunities.

The City will be installing three monitoring wells at the water treatment plant expansion in 2010 or 2011. The wells are expected to have depths ranging from 50 to 80 feet deep.

Groundwater facilities in JID include the K-Basin Recharge Project, about 65 extraction wells and about 20 monitoring wells. Proper construction, operation, and maintenance of these groundwater facilities is an important part of groundwater management.

The District normally constructs two new irrigation supply wells each year and subsequently retires two older wells that have a combination of the lowest efficiencies and poorest water quality. This helps to ensure the District's water reliability (by retiring older wells), and ensuring higher water quality. This also expands the grid of available testing points.

JID will also strive to provide the best facilities for delivery of surface water supplies, since they are used conjunctively with groundwater. JID realizes that the success of conjunctive use programs is often contingent on the quality of surface water conveyance systems.

Existing Activities

- Development of a groundwater bank as part of the JID Water Augmentation Project
- Maintenance and upgrading of conveyance facilities for capacity and stability.
- Maintenance of recharge facilities including de-vegetation, disking, deep ripping, and de-silting, as necessary to improve recharge potential.
- Replace at least two wells each year to help ensure the wells are efficient and have suitable water quality.

Planned Actions

None

9 - GROUNDWATER PLANNING AND MANAGEMENT

9.1 – Land-Use Planning

An important component of developing a Groundwater Management Plan is the review of land-use plans for the surrounding area or basin, and coordinating efforts with regional and local land-use planning agencies. Land-use planning activities in unincorporated areas of Fresno County are performed by the County of Fresno's Department of Public Works planning department, and overseen by the Fresno County Planning Commission. Responsibility for land-use planning in incorporated areas lies with each city's planning staff. The City of San Joaquin is the only urban development within the Plan Area, and its staff is responsible for land-use planning within its Sphere of Influence.

The intent of this Plan is not to dictate land-use planning policies, but rather to establish some land-use planning goals that can aid in protecting and preserving groundwater resources. The Plan Participants will comment on environmental documents for land-use related activities that may impact groundwater. They will also work cooperatively with other agencies to minimize adverse impacts to groundwater supplies and quality as a result of proposed land-use changes. Some specific land-use planning goals include: (1) preserving areas with high groundwater recharge potential for recharge activities; (2) protecting areas sensitive to groundwater contamination; (3) requiring hydrogeologic investigations, water master plans, and proven and sustainable water supplies for all new developments; and (4) requiring appropriate mitigation for any adverse impacts that land-use changes have on groundwater resources.

Existing Activities

- Notify residents and agencies of projects that have the potential to impact groundwater within their sphere of influence.
- When appropriate, comment on environmental documents and land-use plans that have the potential to impact groundwater.

Planned Actions

None

9.2 - Groundwater Reports

The City of San Joaquin has not historically prepared Annual Groundwater Reports, primarily due to their small size, limited water use, limited water supply data, and lack of available staff. However the City plans to improve groundwater monitoring and data collection, and develop an outline for a brief groundwater report or groundwater memorandum consistent with their needs. This groundwater memorandum will be completed prior to the Annual Groundwater Advisory Committee meeting and used during discussions with JID. The City will consider preparing a comprehensive Groundwater Report as they expand.

JID has a goal to prepare groundwater reports every year to document groundwater levels, available groundwater storage, historical trends, and other important groundwater related topics. This information will be used to forecast future problems, plan future groundwater projects, and develop new groundwater policies. The annual report will cover the prior calendar year and will be completed each year by April 30th. See **Attachment 5** for a report outline.

Existing Activities

- JID prepares a Water Management Plan every five years for the United States Bureau of Reclamation as a requirement to maintain their Central Valley Project water supply. The Water Management Plan includes sections on groundwater usage and groundwater projects.

Planned Actions

- Prepare an annual Groundwater Memorandum documenting the City's groundwater efforts and statistics including groundwater pumping, well construction, groundwater studies, groundwater quality data, and other pertinent information. As the City expands their groundwater monitoring and management efforts, the memorandum would evolve into an annual report as described below for JID.
- Prepare an annual JID Groundwater Report that will include the following:

    1. Groundwater level data;
    2. Groundwater contour maps and groundwater flow directions;
    3. Groundwater storage calculations;
    4. Evaluation of one-year and five-year historical trends in groundwater levels, contours, and storage, and perceived reasons for any changes;
    5. Evaluate the adequacy of monitoring efforts and monitoring protocols.
    6. Estimates of deliveries to recharge basins;
    7. Summary of important groundwater management actions;
    8. Discussion on whether management actions are meeting the management objectives;
    9. Summary of proposed management actions for the future;
    10. Summary of groundwater related actions taken by other regional groups;
    11. Recommendations for changes in the content or format of the annual report;
    12. Recommendations for updates to the GMP.

9.3 - Plan Implementation

Implementation of this updated GMP is expected to result in significant amounts of new knowledge and an achievable improvement in groundwater management in JID and the City of San Joaquin. **Attachment 6** includes an implementation schedule for this GMP from 2010-2015. The schedule does not include existing activities that will be continued, but rather documents new projects.

The goals listed in this GMP are considered reasonable and within the capabilities of the District and City. However, most of the goals will require some funding or staff time to achieve. Since staff time and funding are only available in finite quantities, and can often fluctuate, the Plan Participants must by necessity prioritize efforts and cannot guarantee that all of the goals will be accomplished. The Plan Participants recognizes the importance of groundwater management, and will make their best efforts to meet the goals outlined in this plan. If staff or funds are limited, then the projects in the implementation schedule will be prioritized. Plan implementation for the City will rely largely on grant funding.

9.4 - Plan Re-evaluation

The Groundwater Advisory Committee will be responsible for monitoring the progress in implementing the GMP objectives. Refer to Section 4.1 for more information on the membership, policies, and procedures of the Committee. The Committee will attempt to meet at least once a year to review and evaluate groundwater conditions as well as evaluate the effectiveness of the GMP. As new policies, practices, and ordinances become necessary or desirable to enhance the management of the local groundwater supply, this Plan will be amended as necessary.

Existing Activities

None

Planned Actions

- Update the GMP at least every five years, or more frequently if deemed appropriate.
- Evaluate the effectiveness of the GMP and need for an update at the annual Groundwater Advisory Committee meetings.
- Document recommendations for improving or updating the GMP in each annual Groundwater Report.

9.5 - Dispute Resolution

Dispute resolution is addressed in JID through the District's *Rules and Regulations Governing Water Distribution and Canal Maintenance* as follows:

> "*When Landowners/Water Users cannot resolve differences or controversies with the Ditchtender, the Superintendent or Assistant Superintendent, they are expected to discuss the problem with the Manager prior to asking the Board of Directors for final determination. Unresolved disputes must be presented in writing to the Board of Directors. The Board of Directors will take no action until a written complaint is received. The Board of Directors reserves the authority to act as the final level of appeal on differences and controversies between Water Users and District employees*." (pg 9-10)

If necessary, the District Manager may also use legal counsel or technical consultants to assist in addressing disputes. In addition, the Districts participation in numerous multi-agency organizations (see Section 4.2 - Relationships with Other Agencies)

provides several forums and dispute resolution mechanisms when issues arise between different agencies. No groundwater disputes have occurred in JID in recent years.

The City of San Joaquin does not have special procedures for groundwater disputes, but rather they would be handled through standard dispute resolution processes. These would involve contacting the Department of Public Works, and if necessary meeting with the City Manager or the City Council.

Several mechanisms are also available for resolving regional groundwater disputes through agencies such as KRCD, KRWA, and SLDMWA. The Lower Kings Basin Groundwater Management Plan Update also includes a discussion on the resolution of regional groundwater disputes.

Existing Activities

- Resolve groundwater disputes through general dispute resolution procedures.

Planned Actions

- Discuss issues of concern at the annual GAC meetings in an effort to prevent future disputes.

9.6 - Program Funding and Fees

Several alternatives are available to the City and JID for funding groundwater projects, and are described below:

Water Replenishment Fees

Under AB3030, local agencies have the authority to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort and the Plan Participants will make any and all efforts to ensure the private, non-metered use of groundwater by the local growers.

Capital Improvement Fees

The District has the authority to finance capital improvement projects and collect repayment charges from the benefited parties. This process would require a favorable vote from the constituency, and is considered a realistic alternative for large capital projects, such as groundwater recharge or banking projects. The City also has several mechanisms to finance long-term capital projects, and collect revenue through water user fees.

Grants and Loans

The Plan Participants will pursue available grants and low-interest loans from the Department of Water Resources as well as other State and Federal agencies. The District and City will also seek opportunities to jointly submit grant and loan applications.

The District and City realizes that funding from State and Federal agencies for groundwater projects will be partially based on their progress in implementing this GMP.

Groundwater Banking Fees
JID is currently developing a groundwater bank that will be partially used to store water for other agencies. The revenue generated from operating the bank could be reinvested into other groundwater projects.

Other Revenue Sources
Groundwater projects can also be financed through water user fees and assessments that are collected regularly from all landowners.

Exiting Activities

- Regularly research grant and loan opportunities from the State and Federal government.

Planned Actions

- Identify beneficial groundwater projects that become economically feasible when costs are shared among two or more participants.
- Seek funding for projects that could benefit both the City and District.

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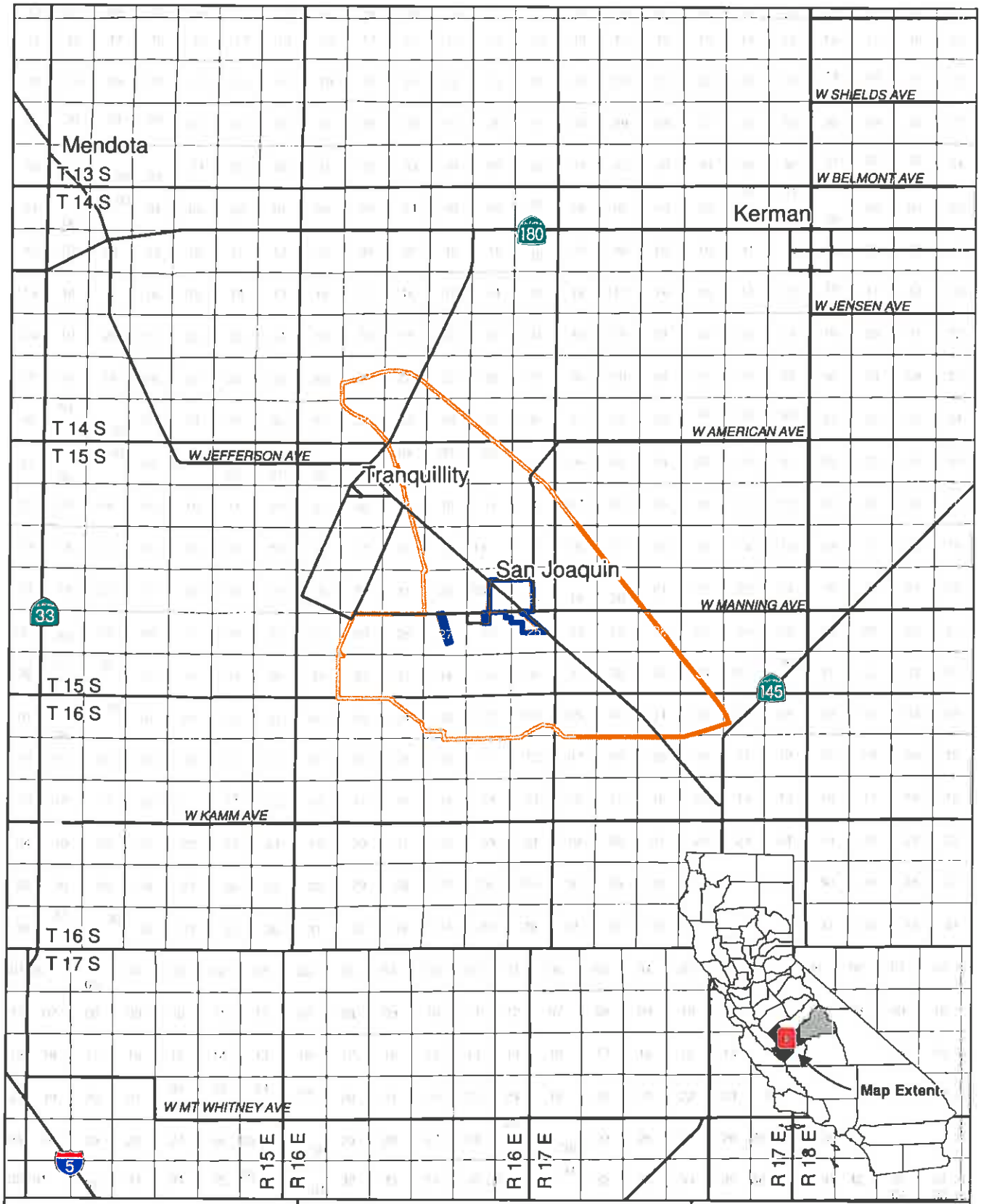
JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

FIGURES AND ATTACHMENTS



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286 W. Cromwell Ave.
Fresno, CA 93711-6162
(559) 449-2700

James Irrigation District
City of San Joaquin

Location Map

FIGURE 1

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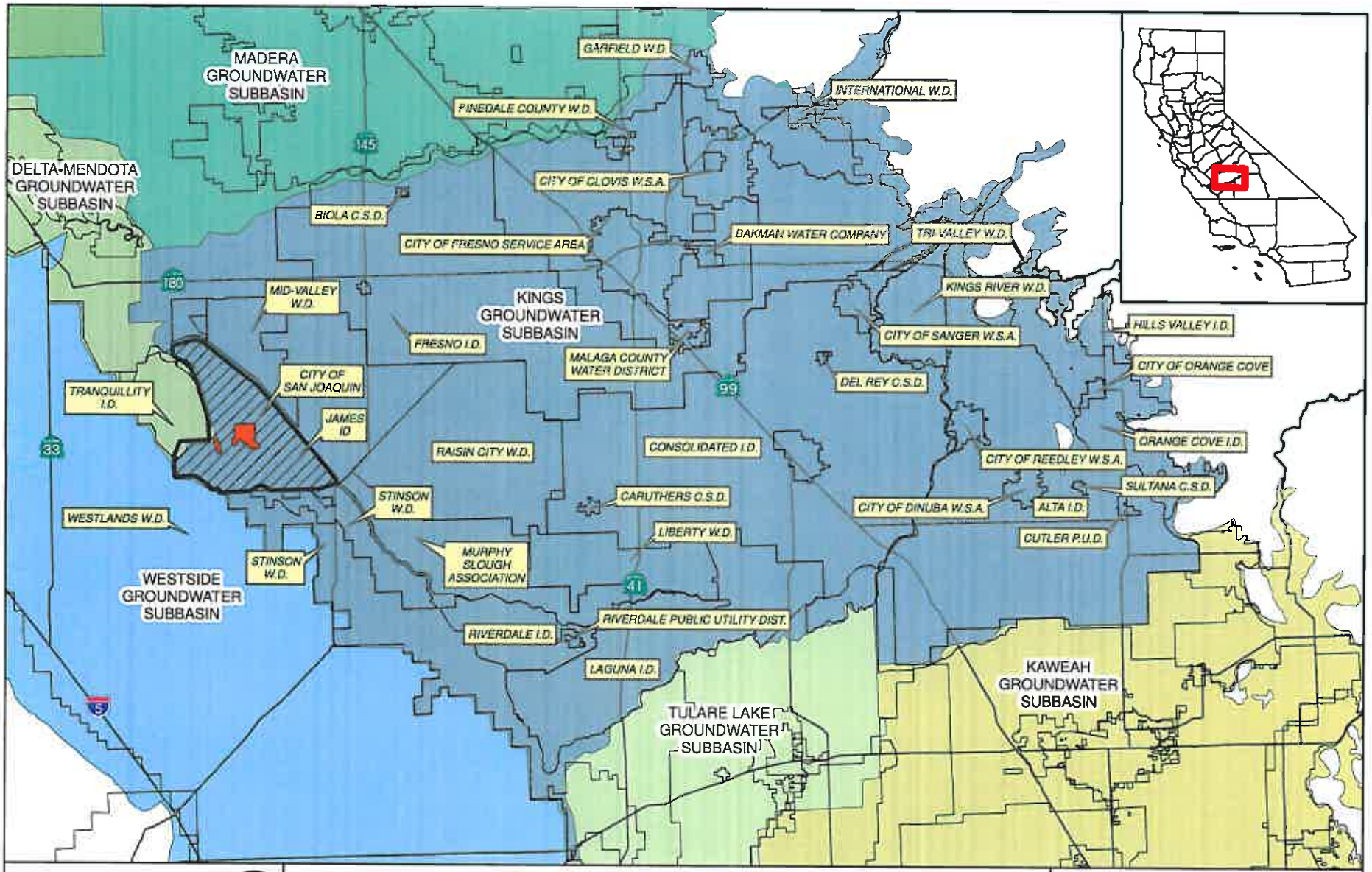

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Legend

Water District Boundary

City Of San Joaquin

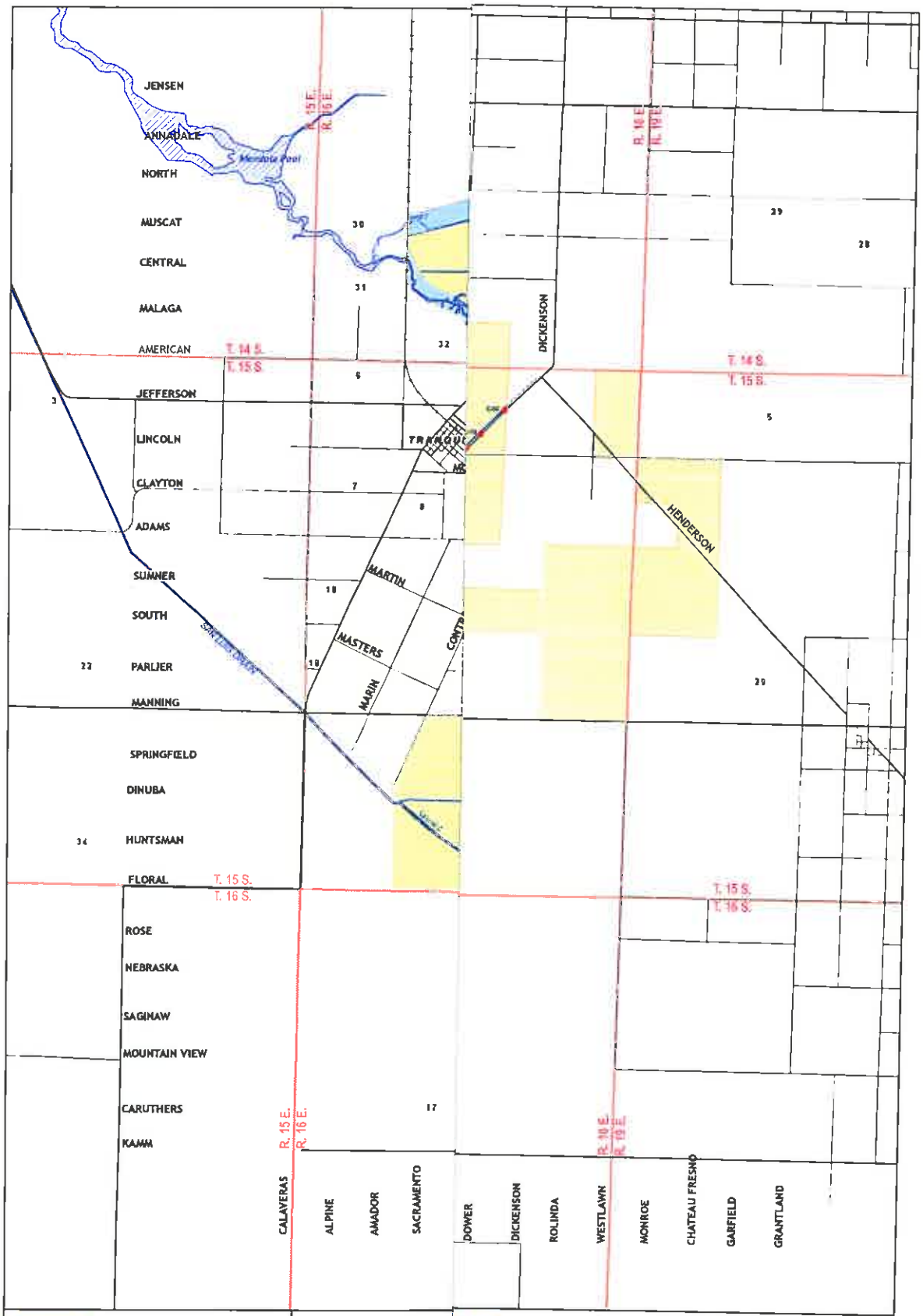
James ID

Source: California Department of Water Resources Bulletin 118, California's Groundwater Update 2003

James Irrigation District
City of San Joaquin

Groundwater Subbasins

FIGURE 2



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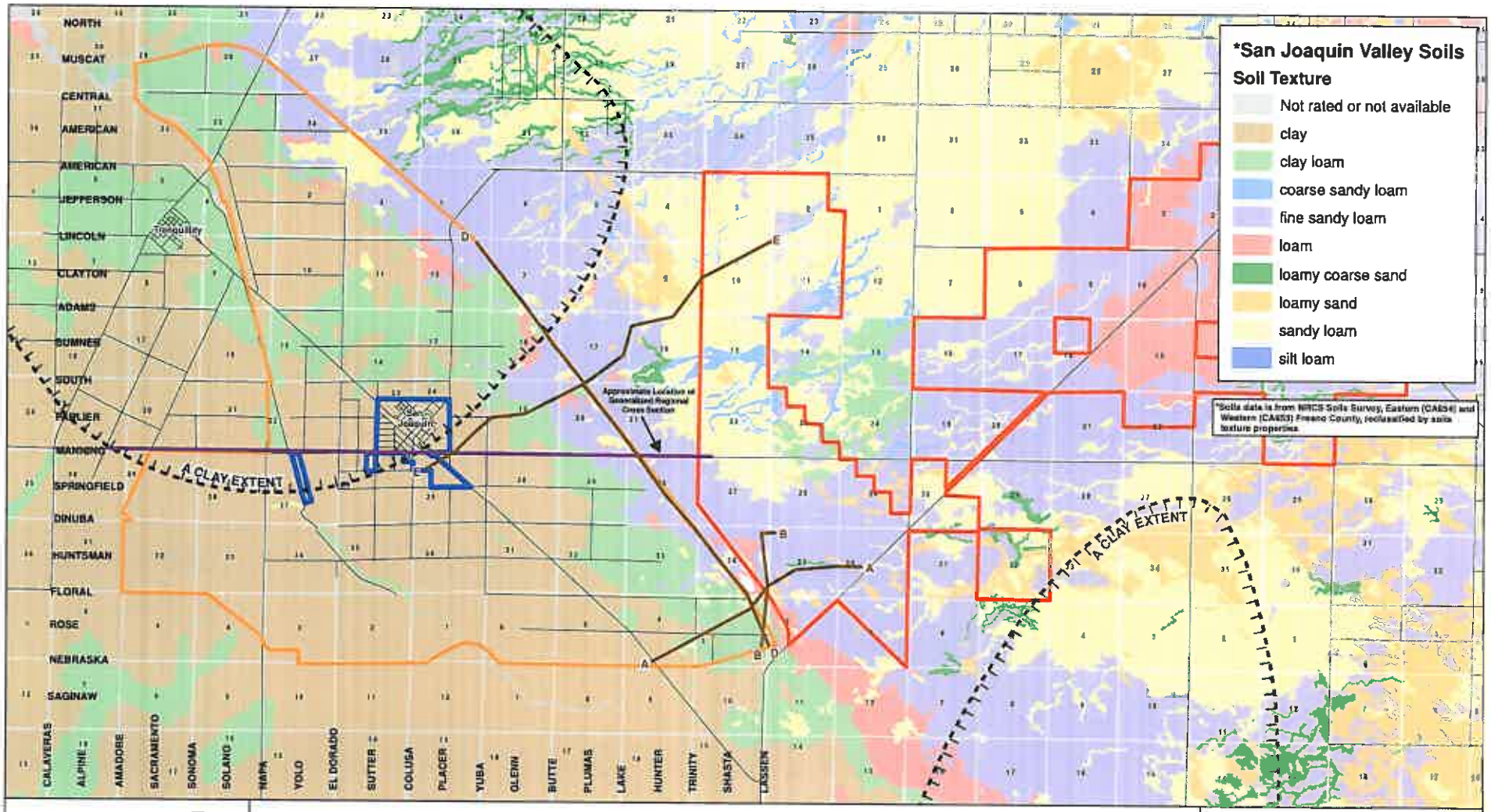
MAJOR ROAD
STREET
RAILROAD
TOWNSHIP/RANGE
SECTION

James Irrigation District
Fresno County, CA (June 2010)

Facilities Map

FIGURE 3

8/5/2010 \\Evolution\clv_clients\Clients\James ID-1051\Projects\105108C1-AB303 Study\GIS\Map\Figure3_JI



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Legend

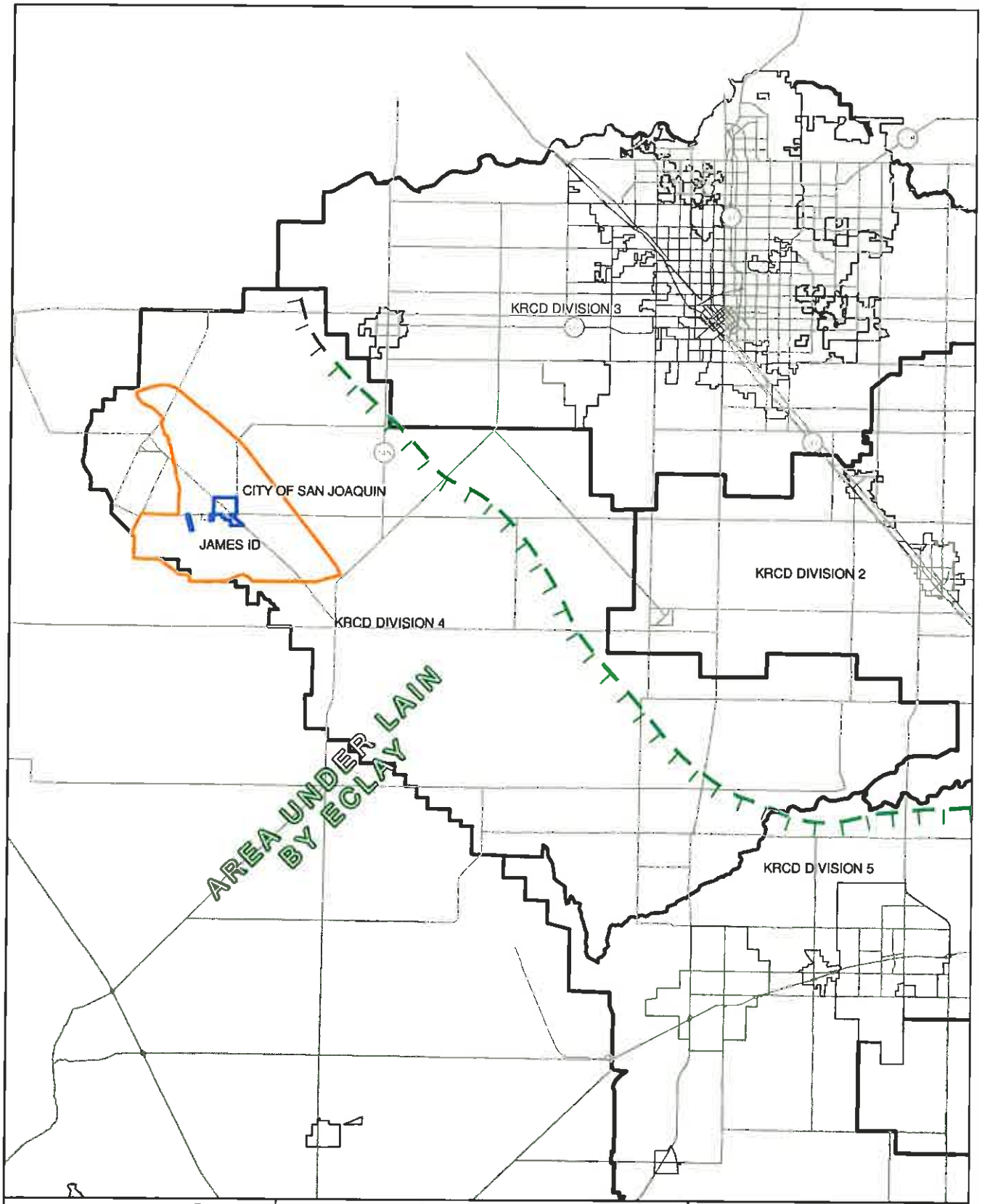
- A Clay Extent
- Generalized Regional Cross Section
- Geologic Layers From USGS Water Supply Paper 1988-H
- Cross Section
- James ID Wellfield
- City Of San Joaquin
- James ID
- Street
- Section

James Irrigation District
City of San Joaquin

Top Soils and Locations of Subsurface Geologic Cross Sections

FIGURE 4

6/29/2010 \\Evolutionary_clients\Clients\James ID-1051\Projects\1051C1-AB303 Study\GIS\Maps\soils_clay_crosssections.mxd



EST 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company
286 W. Cromwell Ave.
Fresno, CA 93711-6162
(559) 449-2700

Legend

Boundary of E Clay

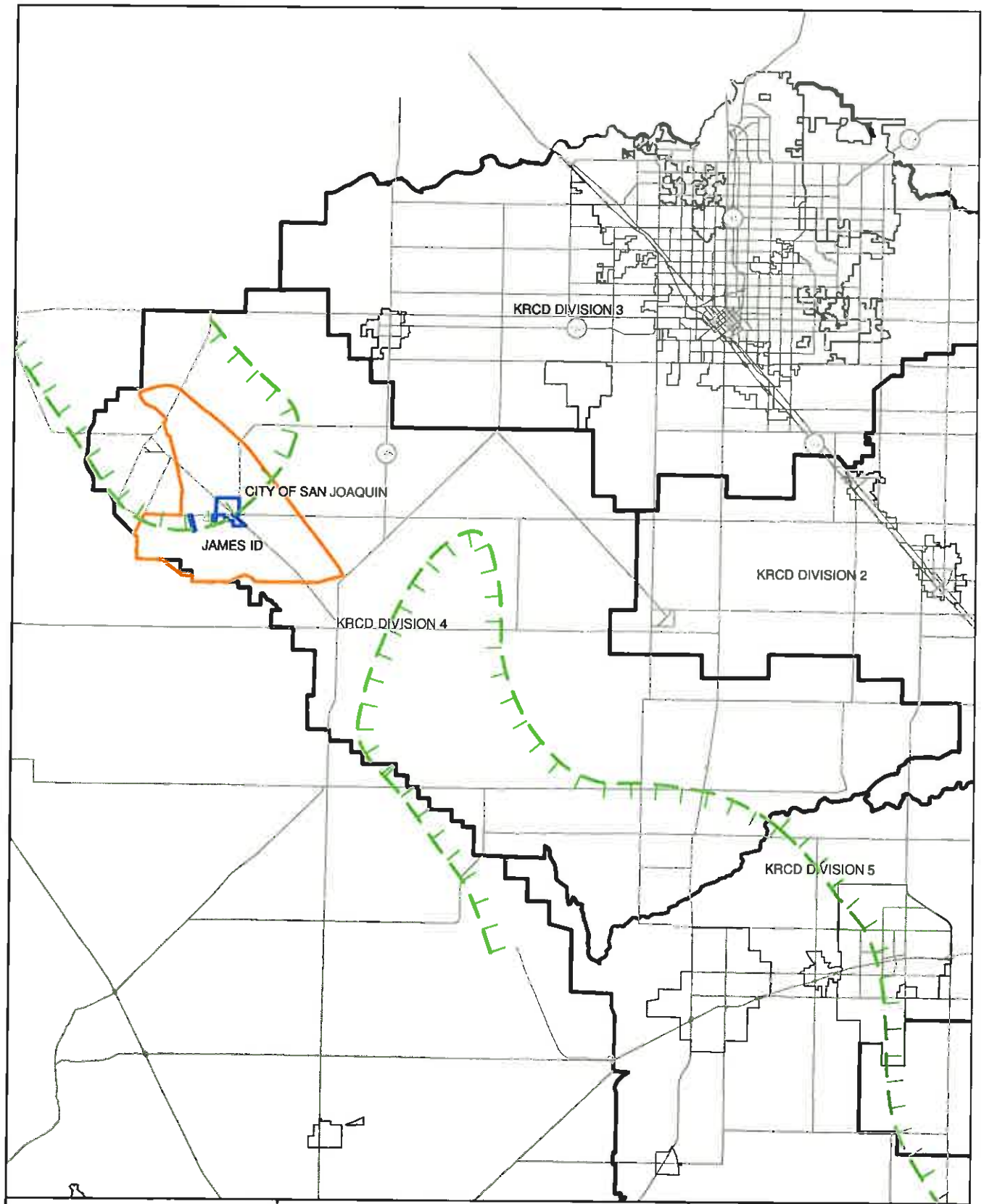
* Source: Plate 4, USGS Water Supply, Paper 1999-H

James Irrigation District
City of San Joaquin

Easterly Extent of E Clay

FIGURE 5

6/30/2010 \\Evolution\clv_clients\Clients\James ID-1051\Projects\105108C1-AB303 Study\GIS\Map\Figure5_Eclay.mxd

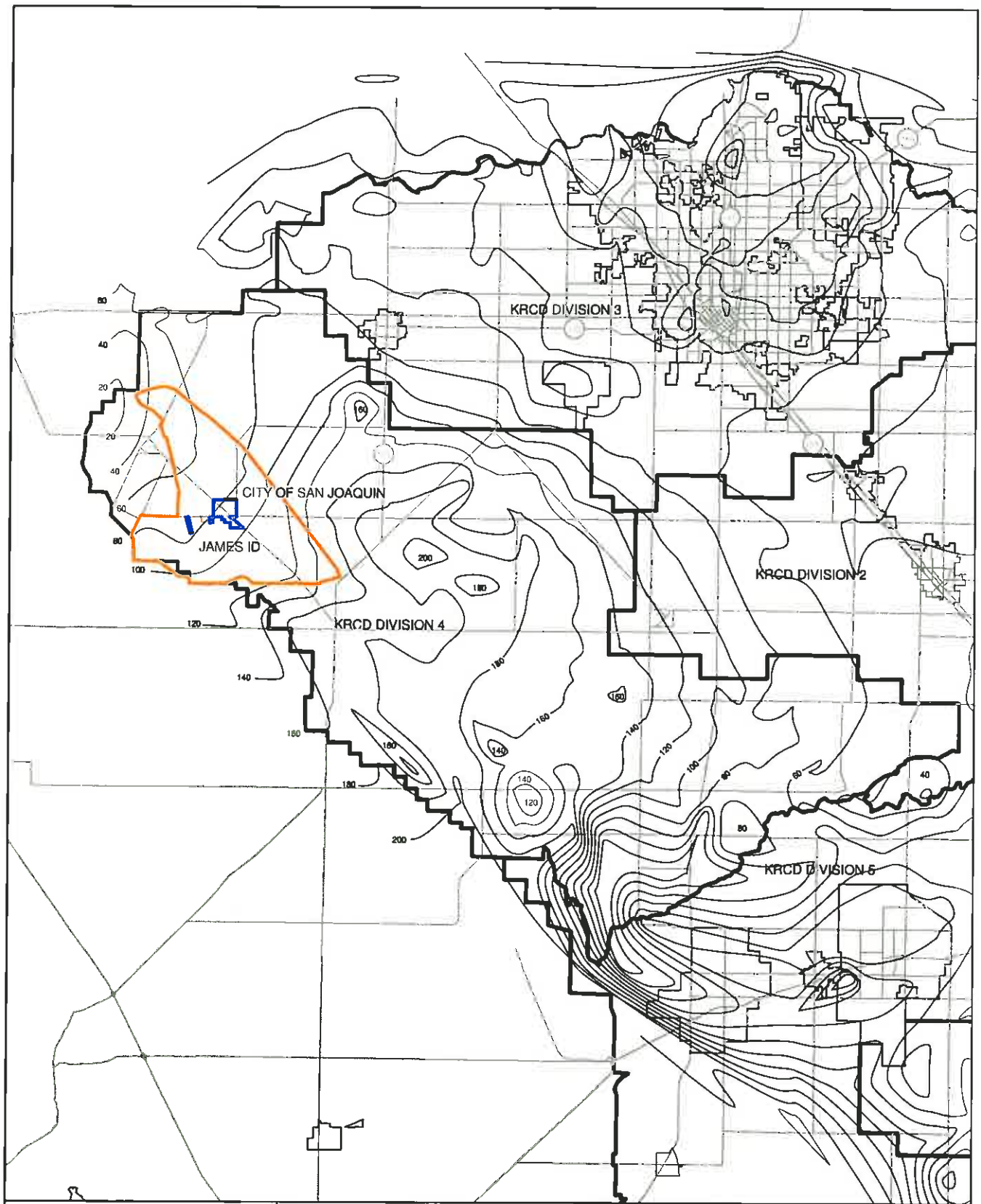


EST 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company
286 W. Cromwell Ave.
Fresno, CA 93711-6162
(559) 449-2700

James Irrigation District
City of San Joaquin

Easterly Extent of A Clay

FIGURE 6



0 1 2 3 4 Miles

ESTABLISHED 1958
PROVOST& PRITCHARD CONSULTING GROUP
An Employee Owned Company
286 W. Cromwell Ave.
Fresno, CA 93711-6162
(559) 449-2700

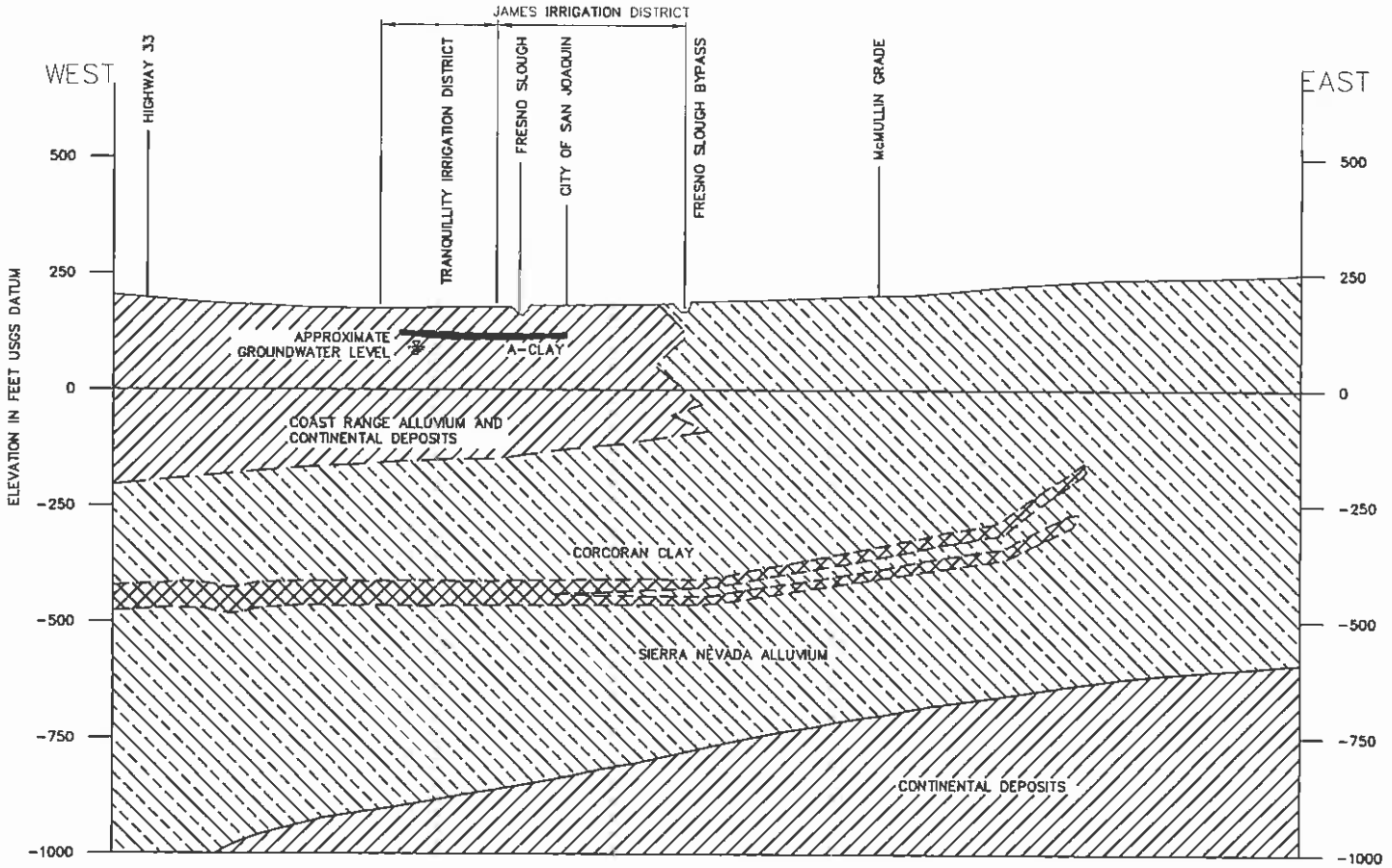
Legend

Line of Equal Depth (ft)

* Source: Figure 3, 2001-2003 Groundwater Report, Kings River Conservation District, Feb. 2004

James Irrigation District
City of San Joaquin
Regional Groundwater Contours 2003
Depth To Groundwater
FIGURE 7

FIGURE 8



GENERALIZED REGIONAL GEOLOGIC CROSS SECTION
THROUGH JAMES IRRIGATION DISTRICT AND THE
CITY OF SAN JOAQUIN

HORIZONTAL SCALE IN MILES

3 0 3 6

MODIFIED FROM
USGS WATER SUPPLY PAPER 1999-H

NOTE: GROUNDWATER LEVELS VARY
THROUGHOUT THE AREA AND OVER TIME

PROVOST& PRITCHARD

James Irrigation District
CROPPING DATA

ATTACHMENT 1

CROP ACREAGE HISTORY

CATEGORY: CROP	2009 ACRES	2008 ACRES	2007 ACRES	2006 ACRES	2005 ACRES	2004 ACRES	2003 ACRES	2002 ACRES	2001 ACRES	2000 ACRES	1999 ACRES	1998 *(2) ACRES	1997 ACRES	1996 ACRES	1995 ACRES	1994 ACRES	1993 ACRES	HISTORICAL AVERAGE
FIELD: COTTON	5,814	6,550	11,090	12,683	14,321	14,390	12,766	12,648	13,135	10,707	10,896	10,541	14,905	15,761	15,200	13,755	14,173	12,314
FIELD: SUGAR BEETS		548	795	764	504	237	399	574	264	381	734	382	219	90	449	920	589	491
FRUITS: POMEGRANATES	597	526	514	157														449
GRAIN: BARLEY	112	114	171	137	161	213	214	144	0	12	0	12	100	134	380	426	296	154
GRAIN: CORN / HUMAN CONSUMPTION	225	1,676	2,039	119	1,099	1,051	932	1,021	74	119	195	0	0	0	0	0	0	503
GRAIN: OATS						100	230	281	90	0	0	0	0	0	43	247	0	83
GRAIN: WHEAT	1,378	1,947	801	328	671	952	3,029	1,024	764	212	691	583	184	462	109	275	426	814
GRAPES: WINE / BEARING	1,253	1,253	1,253	1,253	721	458	383	383	383	383	382	190	114	114	114	114	114	521
GRAPES: WINE / NON-BEARING			incl	incl	incl	150	0	0	0	0	0	192	268	86	0	0	0	58
HAY: ALFALFA	151	108	190	40	165	84	147	448	876	140	120	120	56	126	69	147	165	185
HAY: BARLEY			0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	1
HAY: GRASS (Var. Love)	56		48		56	0	0	0	0	0	0	0	0	0	0	0	0	11
HAY: GRASS (Var. Sudan)		160	84		80	80	0	0	0	0	0	260	0	0	0	0	0	44
HAY: OAT	38	8	92	92		64	262	575	280	216	111	103	53	0	0	0	0	118
MELONS: CANTALOUPE						0	0	0	0	5	0	375	65	0	0	60	424	77
MELONS: HONEYDEW						0	0	0	0	0	140	0	57	0	0	0	0	16
NUTS: ALMONDS / BEARING	2,428	2,320	2,108	1,886	1,514	991	615	842	438	695	635	280	80	40	40	20	20	880
NUTS: ALMONDS / NON-BEARING			incl	incl	incl	179	320	37	367	138	134	240	360	400	140	20	20	196
PASTURE (PERMANENT)	58	58	14	15	16	10	16	11	7	11	11	5	9	63	59	68	69	29
SEED: ALFALFA	6,005	4,099	3,127	2,604	2,407	2,321	1,772	2,256	4,632	6,942	8,194	7,405	5,568	5,320	5,663	5,562	5,116	4,647
SEED: BROCCOLI				54	54	0	0	0	0	0	0	0	0	0	0	0	0	8
SEED: CARROT					12	12	0	0	0	0	0	0	0	0	0	0	0	2
SEED: CORN	30	16	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
SEED: LETTUCE	115	13	37	38	38	42	40	39	0	42	36	75	0	0	0	0	0	30
SEED: MUSTARD		1		26	51	25	0	0	0	5	0	0	0	0	0	0	0	7
SEED: ONION	2	2																2
SEED: RADISH				5	5													5
SEED: SPINACH (Var. Komatsuna)				8	8													8
SEED: SUDAN GRASS						0	0	156	0	0	0	0	0	0	0	0	0	13
SILEAGE: CORN	773	2,320	254	499	573	410	351	640	391	269	264	764	431	167	173	186	230	511
SILEAGE: OATS	80					321	0	0	0	0	0	0	0	0	0	0	0	31
SILEAGE: WHEAT	48	160	148	140	142	69	0	0	0	25	57	0	0	0	0	0	0	46
TREES: EUCALYPTUS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
VEG: ONIONS/DEHYDRATED	333	401	523	504	486	226	145	144	0	0	0	0	0	0	0	0	0	162
VEG: SQUASH	7																	7
VEG: TOMATOES (CANNING)	2,938	1,796	844	570	703	801	820	1,240	902	2,185	1,250	1,133	673	586	608	620	514	1,070
TOTAL	22,442	24,077	24,183	21,923	23,788	23,167	22,442	22,464	22,604	22,488	23,863	22,881	23,143	23,350	23,048	22,421	22,158	22,954
SET-ASIDE				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLOW / IDLE, IRRIGATED	504	52	306	1,611	187	178	362	369	290	40	197	0	14	0	0	1,008	0	302
FALLOW, GRAZED				0	0	0	0	0	0	0	0	0	0	0	0	76	0	5
LESS MULTIPLE CROPS	-174	-1,304	-1,383	-924	0	-1,048	-319	-821	-388	-278	-426	-193	-327	-117	-43	-580	-155	-498
GRAND TOTAL	22,772	22,835	23,086	22,610	23,976	22,317	22,475	22,032	22,508	22,250	23,834	22,488	22,930	23,233	23,005	22,924	22,001	22,762

*(1) 1998 - INCLUDES ADJUSTMENT (131.24) ACFT / ALMONDS FOR ERRONEOUS METER READINGS/PRIOR YEAR
*(2) 1999 - COTTON: ABANDONED 402 ACRES

JAMES IRRIGATION DISTRICT
SUMMARY OF PRODUCTION WELL ATTRIBUTES

ATTACHMENT 2

Well No.	Type	State ID #	Location	Casing Diameter (in)	Depth (ft)	Perforated Interval (ft)	Date Constructed	Capacity (gpm)	Notes
C-49	Agricultural		Coalinga Alignment (McMullin Grade)						ABANDONED
C-53	Agricultural		Coalinga Alignment (McMullin Grade)						ABANDONED
C-54	Agricultural		Coalinga Alignment (McMullin Grade)						ABANDONED
C-55	Agricultural		Main Canal Alignment	16	500	275 to 496	*	1621	DIFFICULT TO READ
C-56	Agricultural		Main Canal Alignment	18	484	218 to478	6/12/1959	1661	
C-57	Agricultural	15/18-30F2	Coalinga Alignment (McMullin Grade)	16	365	167 to 361	3/16/1960	-	MULTIPLE C-57'S
C-58	Agricultural	15/17-2	Kerman Alignment (Lassen Avenue)	16	382	148 to 376	6/5/1960	1786	
C-59	Agricultural	15/17-23	Kerman Alignment (Lassen Avenue)	16	416	154 to 408	11/29/1960	-	Abandoned as of 2008
C-60	Agricultural	15/17-3	Kerman Alignment (Lassen Avenue)	16	405	148 to 400	2/16/1961	1490	
C-61	Agricultural	15/18-10	Coalinga Alignment (McMullin Grade)	16	418	163 to *	2-8-*	1190	
C-62	Agricultural	15/17-14	Kerman Alignment (Lassen Avenue)	16	430	168 to 410 410 to 427	6/18/1962	1197	
C-63	Agricultural	15/17-34	Main Canal Alignment	16	477	220 to 470	4/31/1963	-	ABANDONED
C-64	Agricultural	15/16-2	Main Canal Alignment	16	492	212 to 485	6/20/1963	-	ABANDONED
C-65	Agricultural	15/16-1	Main Canal Alignment	16	496	200 to 488	7/6/1961	1032	
C-66	Agricultural		Main Canal Alignment						ABANDONED
C-67	Agricultural	15/17-3	Kerman Alignment (Lassen Avenue)	16	414	200 to 400	2/3/1966	926	
C-68	Agricultural	15/16-12	Main Canal Alignment	16	494	250 to 488	6/8/1967	1149	
C-69	Agricultural	15/18-10	Coalinga Alignment (McMullin Grade)	16	417	200 to 411	1/22/1963	975	
C-70	Agricultural	15/18-30	Coalinga Alignment (McMullin Grade)	16	458	230 to 452	4/28/1969	1225	
C-71	Agricultural	15/18-20	Coalinga Alignment (McMullin Grade)	16	422	230 to 415	6/25/1969	1110	
C-72	Agricultural	15/18-16	Coalinga Alignment (McMullin Grade)	16	424	230 to 404; 412 to 418	12/9/1969	1491	
C-73	Agricultural	15/17-28D	Main Canal Alignment	16	490	250 to 284; 308 to 484	4/24/1972	1362	
C-74	Agricultural	-	Coalinga Alignment (McMullin Grade)	16	442	235 to 437	5/9/1972	1470	
C-75	Agricultural	15/16-12	Main Canal Alignment	16	499	250 to 494	5/30/1972	-	
C-76	Agricultural	16/17-3	Main Canal Alignment	16 @ 0 to 386 14 @ 315 to 515	515	260 to 380; 330 to 511	5/24/1974	1058	
C-77	Agricultural	15/18-16	Coalinga Alignment (McMullin Grade)	16	458	245 to 454	6/21/1974	1311	
C-78	Agricultural	15/18-2	Coalinga Alignment (McMullin Grade)	16	516	280 to 345; 375 to 512	12/20/1976	1906	
C-79	Agricultural	15/17-36A	Coalinga Alignment (McMullin Grade)	16		250 to 520; 520 to 528	12/16/1979	1454	
C-80	Agricultural	-	Coalinga Alignment (McMullin Grade)	16	576	250 to 504	3/17/1981	2086	

JAMES IRRIGATION DISTRICT
SUMMARY OF PRODUCTION WELL ATTRIBUTES

ATTACHMENT 2

Well No.	Type	State ID #	Location	Casing Diameter (in)	Depth (ft)	Perforated Interval (ft)	Date Constructed	Capacity (gpm)	Notes
C-81	Agricultural	15/17-7	Main Canal Alignment	16	504	250 to 500	3/30/1982	1655	
C-82	Agricultural	15/17-36L	Coalinga Alignment (McMullin Grade)	16	533	270 to 282, 292 to 302; 310 to 322; 330 to 380; 384 to 420; 434 to 464; 506 to 524	11/16/1989	1379	
C-83	Agricultural	15/18-2	Coalinga Alignment (McMullin Grade)	16	511	253 to 265; 280 to 300; 324 to 330; 360 to 370; 380 to 422;446 to 450, 470 to 500	4/19/1997	2008	
C-84	Agricultural	15/17-26	Kerman Alignment (Lassen Avenue)	16	500	340 to 476	4/29/1998	1670	
C-85	Agricultural	15/18-30	Coalinga Alignment (McMullin Grade)	16	532	340 to 320; 370 to 520	6/17/1998	1430	
C-86	Agricultural	15/16-36	Main Canal Alignment	16	500	330 to 420	5/24/2000	1211	Abandoned in 2010
C-87	Agricultural	15/17-7	Main Canal Alignment	16	492	330 to 484	10/25/2001	1391	
C-88	Agricultural	15/18-10	Coalinga Alignment (McMullin Grade)	16	500	335 to 406; 424 to 460; 480 to 490	10/29/2002	1419	
C-89	Agricultural	15/18-10	Coalinga Alignment (McMullin Grade)	16	500	300 to 306; 326 to 335; 368 to 376, 398 to 448; 469 to 483	7/19/2003	-	
D-04	Agricultural		Main Canal Alignment						ABANDONED
D-06	Agricultural		Kerman Alignment (Lassen Avenue)						ABANDONED
D-08	Agricultural	-	Main Canal Alignment	-	-	-	-	-	LIMITED LOG INFO
D-09	Agricultural		Main Canal Alignment						ABANDONED
D-10	Agricultural	15/17-28	Main Canal Alignment	18	808	208 to 808	1948	-	LIMITED LOG INFO
D-15	Agricultural	-	Main Canal Alignment	-	-	-	3/16/1950	-	LIMITED LOG INFO
D-16	Agricultural	-	Kerman Alignment (Lassen Avenue)	16	811	257-807	3/14/1952	-	ABANDONED
D-17	Agricultural		Kerman Alignment (Lassen Avenue)						ABANDONED
D-21	Agricultural		Main Canal Alignment						ABANDONED
D-22	Agricultural		Kerman Alignment (Lassen Avenue)						ABANDONED
D-23	Agricultural		Kerman Alignment (Lassen Avenue)						ABANDONED
D-24	Agricultural	-	Main Canal Alignment						MISSING
D-25	Agricultural		Main Canal Alignment						ABANDONED
D-29	Agricultural	-	Main Canal Alignment						MISSING
D-30	Agricultural	16/17-3	Main Canal Alignment	16	550	240 to 540	4/28/1972	1390	
D-31	Agricultural	15/17-35N	Kerman Alignment (Lassen Avenue)	16	520	240 to 510	4/18/1977	1345	

JAMES IRRIGATION DISTRICT
SUMMARY OF PRODUCTION WELL ATTRIBUTES

ATTACHMENT 2

Well No.	Type	State ID #	Location	Casing Diameter (in)	Depth (ft)	Perforated Interval (ft)	Date Constructed	Capacity (gpm)	Notes
D-32	Agricultural	15/17-35K	Coalinga Alignment (McMullin Grade)	16	525	270 to 510	9/15/1977	1399	
D-33	Agricultural	15/18-30	Coalinga Alignment (McMullin Grade)	16	495	270 to 480	9/17/1977	950	
D-34	Agricultural	15/17-36F	Coalinga Alignment (McMullin Grade)	16	575	270 to 540	11/17/1978	971	
D-35	Agricultural	15/17-35J	Coalinga Alignment (McMullin Grade)	16	550	270 to 540	1/24/1979	1267	
D-36	Agricultural	15/18-10	Coalinga Alignment (McMullin Grade)	16	543	270 to 540	2/2/1980	-	
D-37	Agricultural	-	Inside JID Boundary	16	520	270 to 480	11/13/1980	-	
D-38	Agricultural	15/16-1	Main Canal Alignment	16	515	270 to 510	11/12/1981	1157	
D-39	Agricultural	15/16-1	Main Canal Alignment	16	525	240 to 480	11/7/1984	1008	
D-40	Agricultural	15/17-20	Main Canal Alignment	16	525	270 to 510	5/3/1985	1349	
D-41	Agricultural	15/17-22	Kerman Alignment (Lassen Avenue)	16	520	270 to 510	4/30/1987	1319	
D-42	Agricultural	15/17-10	Kerman Alignment (Lassen Avenue)	16	520	270 to 510	5/9/1987	1343	
D-43	Agricultural	15/17-27	Kerman Alignment (Lassen Avenue)	16	525	270 to 510	5/20/1987	1199	
D-44	Agricultural	16/16-1	Inside JID Boundary	16	520	240 to 510	4/29/1989	-	ABANDONED
D-45	Agricultural	15/16	Inside JID Boundary	16	495	240 to 480	5/25/1990	-	ABANDONED
D-46	Agricultural	16/17-9	Inside JID Boundary	16	540	280 to 520	4/3/1991	-	
D-47	Agricultural	15/16-36	Inside JID Boundary	16	538	280 to 520	4/12/1991	-	
D-48	Agricultural	15/17-34	Main Canal Alignment	18	480	240 to 480	5/15/1992	1470	
D-49	Agricultural	15/17-27	Kerman Alignment (Lassen Avenue)	18	480	240 to 480	-	1355	Date Completed not given. Date of permit is 12/1/92
D-50	Agricultural	15/17-35D	Kerman Alignment (Lassen Avenue)	18	480	240 to 480	12/23/1992	1590	
D-51	Agricultural	15/16-20	Coalinga Alignment (McMullin Grade)	16	500	240 to 500	1/28/1994	1754	
D-52	Agricultural	15/17-22	Kerman Alignment (Lassen Avenue)	16	500	260 to 500	2/7/1995	1465	
D-53	Agricultural	-	Coalinga Alignment (McMullin Grade)	-	-	-	-	1625	No Info
D-54	Agricultural	15/17-34	Main Canal Alignment	16	480	240 to 480	7/12/1996	1248	
D-55	Agricultural	7/16/1996	Main Canal Alignment	16	480	240 to 480	7/16/1996	1523	
D-56	Agricultural	15/16-36	Inside JID Boundary	16	520	260 to 520	6/22/2000	-	
D-57	Agricultural	15/17-2	Kerman Alignment (Lassen Avenue)	16	520	280 to 520	3/24/2004	1750	
D-58	Agricultural	15/17-28	Main Canal Alignment	16	520	280 to 520	6/23/2005	2103	

JAMES IRRIGATION DISTRICT
WATER DELIVERY REPORT
CALENDAR YEAR 2009

ATTACHMENT 3

SOURCE / LOSS REPORT - CURRENT YEAR

SOURCE >>	SJQN RVR Schedule 2	CENTRAL VALLEY PROJECT				JAMES	KINGS RIVER						FRESNO IRRIGATION DISTRICT					TRANSFERRED / WHEELED				INFLOW SUB-TOTAL	JID WELL PUMPS	INFLOW GRAND TOTAL	TOTAL (DELIV)	OUTFLOW TOTAL (SPILLED)	RECOVERED (RECHARGED)	(LOSS) SURPLUS	LOSS %
POINT OF ENTRY >>	BOOSTER P	BOOSTER P 1/1/2009				BOOSTER P	JID WEST WEIR	JID EAST WEIR	BOOSTER P	BOOSTER P		MUD DAM	DRY CREEK	LINCOLN AVE			BOOSTER P											
PERIOD / CONTRACTp	100% RIPARIAN WTR RTS 9,700	10% USBR CONTR ENTITLE 35,300	USBR RESCHED/ CARRYOVR 6,169	USBR SEC 215	TOTAL CVP	MENDOTA POOL +RECD -5% LOSS	WEST WEIR	REG BASIN #1	BOOSTER P	SPILL BACK	TOTAL KINGS RIVER			FRESNO IRR INFLOW	SPILL BACK EASTSIDE CHANNEL	TOTAL FRESNO IRR	TRANQ IRR DISTR	RECL 1606 YRIBARREN	SAN LUIS WATER DISTR	MENDOTA POOL (BANKED)							
JAN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1656	1656	-926	0	142	972	59%
FEB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-405	-405	3599	3194	-2230	0	123	1087	34%
MAR	0	0	0	0	0	176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176	5218	5394	-4213	0	131	1311	24%
APR	495	0	0	0	0	209	0	0	0	0	0	0	0	138.8	0	138.8	0	0	0	0	843	5133	5976	-4872	0	193	1296	22%
MAY	963	0	0	0	0	472	0	0	0	0	0	0	0	109.1	0	109.1	54	0	0	0	1598	8788	10386	-8135	0	438	2689	26%
JUN	5642	0	137	0	137	0	0	0	0	0	0	0	0	93.2	0	93.2	417	0	0	0	6289	7182	13471	-11360	0	89	2201	16%
JUL	2000	0	2939	0	2939	0	0	0	0	0	0	0	0	41.6	0	41.6	160	0	0	0	5141	9289	14430	-12163	-86	442	2643	18%
AUG	400	0	152	0	152	0	0	0	0	0	0	0	0	63.5	0	63.5	0	0	0	0	616	6555	7171	-6878	-60	259	1502	21%
SEP	200	0	105	0	105	0	0	0	0	0	0	0	0	5.9	0	5.9	0	0	0	0	311	3388	3699	-2654	-32	101	1114	30%
OCT		0	319	0	319	0	0	0	0	0	0	0	0	0	0	0	140	0	0	0	459	2051	2510	-1722	-88	76	766	31%
NOV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2234	2234	-1351	-731	46	198	9%
DEC		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-28	-28	0	-28	0	0	0	-28	100%
TOTALS	9700	0	3652	0	3652	857	0	0	0	0	0	0	0	452.1	0	452.1	771	0	0	-433	14999	55093	70092	-55403	-977	2039	15751	22%
																					14999						15751	
2008 CONTRACT YR / JAN-FEB	0	0	0	0	0	*Note 3																						
2009 CONTRACT YR / MAR-DEC	9700	3530	6169	0	9699																							
TOTAL ENTITLEMENT	9700	3530	6169	0	9699	<<TOTAL ENTITLEMENT																						
PAPER TRANSFERS OUT																												
JAN		0	0	0	0																							
FEB		0	-1200	0	-1200																							
MAR		0	0	0	0																							
APR		0	0	0	0																							
MAY		0	0	0	0																							
JUN		0	0	0	0																							
JUL		0	0	0	0																							
AUG		0	0	0	0																							
SEP		0	0	0	0																							
OCT		0	0	0	0																							
NOV		0	0	0	0																							
DEC		0	0	0	0																							
TOTAL PAPER TRANSFERS		0	-1200	0	-1200								DETAIL - PAPER TRANSFERS>>							0							
JID ENTITLEMENT REMAINING	0	3530	1317	0	4847																							
	*Note 1	*Note 2																										

HISTORICAL

YEAR: RIPARIAN / CVP % ALLOCTN	SJQN RVR Schedule 2	USBR CONTRACT	USBR RESCHED/ CARRYOVR	USBR SEC 215	TOTAL CVP	MENDOTA POOL	JID WEST WEIR	JID EAST WEIR	BOOSTER P	SPILL BACK	TOTAL KINGS RIVER	MUD DAM	DRY CREEK	LINCOLN AVE	SPILL BACK EASTSIDE	TOTAL FRESNO IRR	TRANQ IRR DISTR	RECL 1606 YRIBARREN	SAN LUIS WATER DISTR	MENDOTA POOL (BANKED)	INFLOW SUB-TOTAL	JID WELL PUMPS	INFLOW GRAND TOTAL	TOTAL (DELIV)	OUTFLOW TOTAL (SPILLED)	RECOVERED RECHARGED	(LOSS) SURPLUS	LOSS %
2009: 100% RIP / 10% CVP	9700	0	3652	0	3652	857	0	0	0	0	0	0	0	452	0	452	771	0	0	-433	14999	55093	70092	-55403	-977	2039	15751	22%
2008: 100% RIP / 40% CVP	9700	7951	2579	0	2579	0	0	0	0	0	0	0	1618	801	0	2419	0	0	2897	28	21256	56886	78142	-63323	-410	0	14408	18%
2007: 100% RIP / 50% CVP	9700	16571	3500	0	20071	28	0	0	0	0	0	0	0	355	0	355	0	0	9421	-28	39547	48713	82976	-63435	-383	877	20037	24%
2006: 100% RIP / 100% CVP	9700	23866	0	0	23866	0	14159	2481	4419	0	21039	0	831	2519	0	3349	0	0	9452	0	67406	6282	73688	-47949	-344	-8610	16785	23%
2005: 100% RIP / 85% CVP	9700	28343	0	2477	30820	0	5870	482	2227	0	8578	0	63	1149	0	1212	0	0	0	0	50310	22537	72847	-56419	-247	-2288	14892	20%
2004: 100% RIP / 70% CVP	9700	27077	0	1690	28767	0	0	0	0	0	0	0	0	589	0	589	0	0	1200	0	38555	42983	81549	-63109	-137	-934	17370	21%
2003: 100% RIP / 75% CVP	9700	26475	1945	0	28420	0	0	0	0	0	0	0	0	906	0	906	0	0	0	0	39026	37352	76378	-57544	-86	N/A	18748	25%
2002: 100% RIP / 70% CVP	9700	24710	1488	0	26198	0	0	0	0	0	0	0	0	1467	0	1467	0	0	0	0	37365	48653	86018	-61695	-126	N/A	24196	28%
2001: 100% RIP / 49% CVP	9700	15809	97	0	15906	3110	0	0	0	0	0	0	0	771	0	771	0	0	0	-3110	28377	48640	75017	-57516	-97	N/A	17403	23%
2000: 100% RIP / 65% CVP	9700	22945	948	0	23893	0	0	0	0	-63	-63	0	133	1803	0	1936	0	0	0	0	36465	36416	71764	-55023	UNK	N/A	16761	23%
1999: 100% RIP / 70% CVP	9700	23442	10000	0	33442	0	111	0	0	0	111	0	107	1356	0	1464	0	0	0	0	44717	33812	78529	-60294	UNK	N/A	18234	23%
1998: 100% RIP / 100% CVP	1128	13142	0	0	13142	0	31242	0	7061	-153	38150	786	797	1979	-103	2673	0	0	0	0	55879	1916	57795	-42851	UNK	N/A	14944	26%
1997: 100% RIP / 90% CVP	9700	31770	0	0	31770	0	13142	0	2377	-18	15501	0	280	1525	0	1805	0	0	0	0	58776	26484	85259	-66551	UNK	N/A	18708	22%
1996: 100% RIP / 95% CVP	9700	27354	10000	0	37354	0	21302	0	2372	0	23674	0	286	1456	0	1741	-584	0	0	0	71686	7235	79120	-61085	UNK	N/A	18035	23%
1995: 100% RIP / 100% CVP	3317	8126	0	0	8126	0	31413	0	12298	0	43711	0	0	1434	0	1434	0	0	0	0	56688	11326	67913	-54130	UNK	N/A	13783	20%
1994: 75% RIP / 35% CVP	7600	12361	2655	0	15006	0	0	0	0	0	0	0	0	752	0	762	-200	-48	0	-254	22856	59802	82657	-59713	UNK	N/A	22944	28%
1993:																												
1992:																												
																												24%
AVERAGES	8388.076923	21955	2087	321	24362	239	9018	2943	2366	-18	11592	60	192	1362	-8	1546	-60	-4	819	-259	46555	29495	76043	-57145	-173	-3944	17908	24%

*Note 1: San Joaquin Riparian: FEB-JUN Schedule must be taken by June 30; JUL-SEP / Fixed Schedule must be taken by September 30; JAN, OCT-DEC No Deliveries
*Note 2: USBR CVP Contract Total Entitlement allocation reflects 14-month period
*Note 3: Mendota Pool Received: Includes 5% loss

Sampling Instructions for Aqueous Samples

FGL provides the appropriate containers, labels, chain of custodies, ice chests and blue ice at no charge. All samples should be cooled to approximately 4° C prior to shipping to the laboratory. A list of proper holding times and preservation techniques is available upon request. **If you have any questions concerning the containers or sampling techniques please call.** Please do not rinse out containers provided by FGL prior to filling. The containers are labeled as to the type of sampling.

Type 1 - Semi-volatile Organics, Inorganics, and Radio Chemistry (except Radon):

1) Fill the sample container to the top and cap.

Type 2 - Volatile Organics:

1) Fill the sample containers (two VOA vials) until there is a raised portion of water above the rim of the vial and cap carefully. It helps to run the water very slowly.
2) After capping, invert the sample vial, tap the vial, then check for bubbles (headspace).
3) If bubbles are present repeat sampling until no bubbles are observed. Having no headspace is very important to the overall quality of the analytical results.

Type 3 - Bacteriology:

Source sampling (testing the well) -

1) Selecting a spigot closest to the well and run the water for approximately 5 minutes. If only air is vented, turn on spigots after the holding tank to drop the holding tank pressure which should turn on the pump. The well pump should turn on and run through at least one cycle.
2) If the spigot is not frequently used it should be flamed with a propane torch or wiped with bleach and run the water again for 1 minute (longer for very contaminated spigots).
3) Please take care opening the sample container and do not remove the powder or pill inside. Permit only the water sample to contact the inside of the bottle and cap.
4) Fill the sample container to slightly more than the 100 mL line. This will insure adequate sample volume and enough headspace for mixing.
5) Because the analysis needs to be started as soon as possible (maximum time is 30 hours). Please keep the samples cool and ship or deliver to the lab as soon as possible.

System sampling (testing plumbing and faucets away from the well) -

1) If possible, select a tap in frequent use. If the tap has an aerator screen it will need to be removed.
2) Turn on the faucet and allow the water to run for approximately 5 minutes.
3) If the spigot is not frequently used it should be flamed with a propane torch or wiped with bleach and run the water again for 1 minute (longer for very contaminated spigots).
4) Please take care opening the sample container and do not remove the powder or pill inside. Permit only the water sample to contact the inside of the bottle and cap.
5) Fill the sample container to slightly more than the 100 mL line. This will insure adequate sample volume and enough headspace for mixing.
6) Because the analysis needs to be started as soon as possible (maximum time is 30 hours). Please keep the samples cool and ship or deliver to the lab as soon as possible.

Reservoir and stream sampling -

1) Tilt the bottle approximately 45 degrees and hold at the base. In a scooping motion, move the bottle away from you, mouth first, as you fill the bottle.
2) Please take care opening the sample container. Permit only the water sample to contact the inside of the bottle and cap.
3) Fill the sample container to slightly more than the 100 mL line. This will insure adequate sample volume and enough headspace for mixing.
4) Because the holding time is 30 hours please ship or deliver to the lab as soon as possible.

Type 4 - Radon:

Radon is a gas and emanates quickly from agitated water. The hold time for regulated water is 4days. (8d for non-Reg.) Proper collection techniques and handling of the Radon sample is critical for valid data to be obtained. For best results follow the instructions listed below:

1) Sample by slowly run water from a hose into a 2 liter container until it overflows for 5 minutes. The water entering the container should be as free as possible of bubbles.
2) Fill 2 x 125 mL Boston round or 2 x 40 mL VOA vials under water by placing the hose into the bottle, taking care to release all of the air bubbles. Cap tightly under water.
3) Take the sample from container and turn it upside down to check for bubbles. If necessary, repeat sampling until no bubbles are observed.
4) Dry sample container and place electrical tape around cap.
5) Record time and date of the duplicate samples.
6) Pack in a cool ice chest and ship NEXT DAY AIR to the laboratory for analysis.

Other considerations for proper sampling:

- Make an accurate record on the chain of custody of every sample collected. Identify every container by attaching an appropriately inscribed tag or label which corresponds to the record on the chain of custody.

- Before collecting samples from a distribution system, be sure to flush lines sufficiently to insure that the sample is representative of the supply.

- Before sampling from a well, be sure to run the pump long enough to insure that the sample represents the groundwater source.

- When samples are collected from a river or stream, analytical values may vary with depth, stream flow, and distance from shore and channel width. If equipment is available, take and "integrated" sample from top to bottom in the middle of the stream in such a way that the sample is composited according to time or flow. If only a grab or catch sample can be collected, take it in the middle of the stream and, if possible, at mid-depth.

- Lakes and reservoirs are subject to considerable variations from normal influences such as seasonal stratification, rainfall, runoff, and wind. Choose the location, depth and frequency of sampling based on local conditions and the purpose of the investigation. Avoid surface scum.

Well Cleanup Procedure for Bacterial Contamination:

- FGL has a written procedure to help you through the well cleanup process. Please call to obtain a copy of this procedure.

JAMES IRRIGATION DISTRICT
ANNUAL GROUNDWATER REPORT

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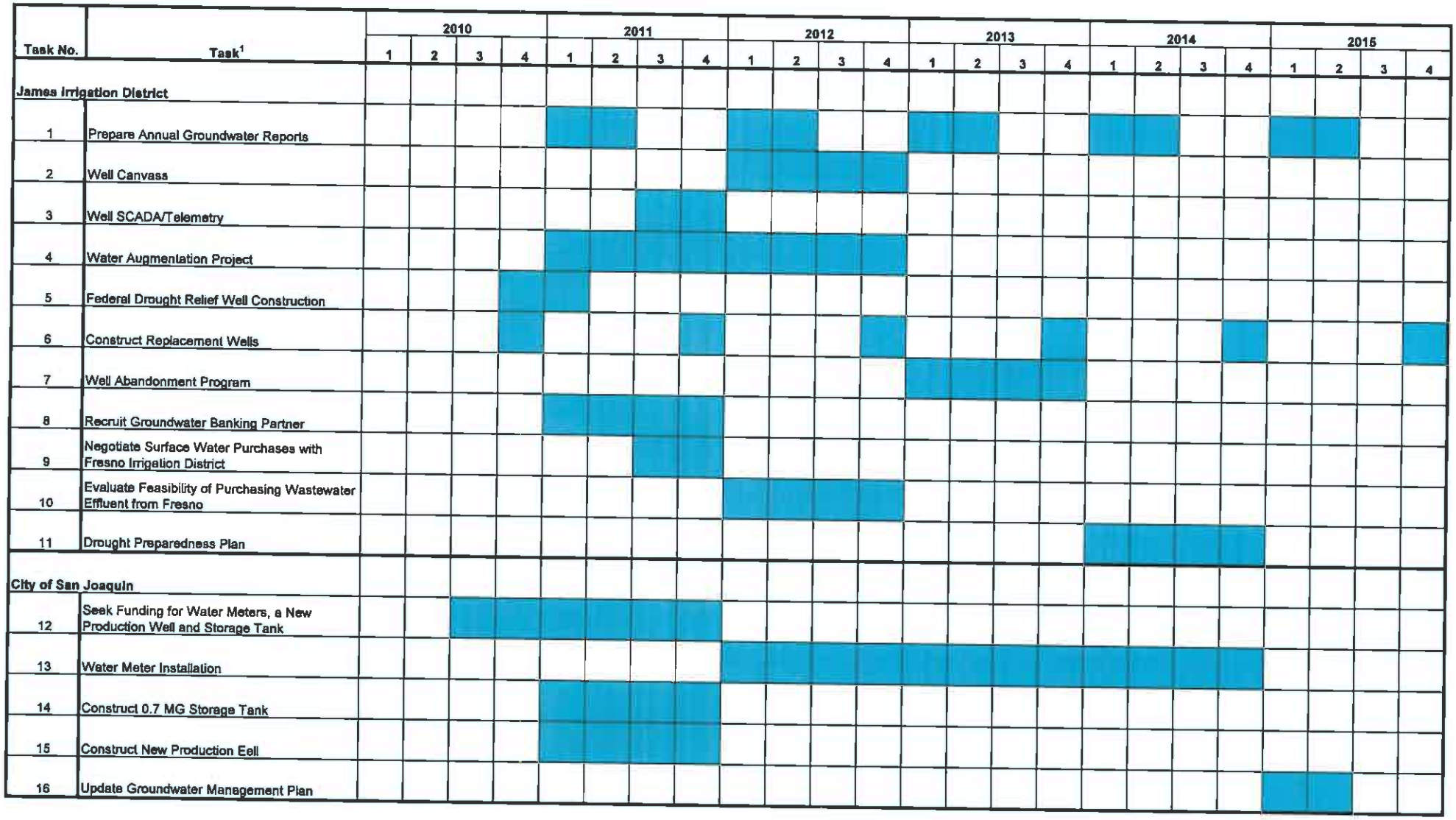
ATTACHMENT 6

James Irrigation District and City of San Joaquin
Groundwater Management Plan
Implementation Schedule (2010-2015)



Notes:

1 - Only proposed new projects are shown in this schedule. Existing and on-going projects are not shown. Also, new policies and guidelines that will be implemented on a continuous basis are not shown.

2 - Implementation of these projects will depend on the results of current feasibility studies and the availability of funding.

JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX A

PUBLIC PARTICIPATION

RESOLUTION 2010-05

RESOLUTION
OF THE
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

TO ADOPT A GROUNDWATER MANAGEMENT PLAN

At a meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT, a public Irrigation District organized and existing under the Irrigation District Law (California Water Code, Division 11, Section 20,500 *et seq.*) of the State of California, held on the 19th day of October, 2010, the following resolution was adopted:

WHEREAS, the California Water code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, the JAMES IRRIGATION DISTRICT (JID) and CITY OF SAN JOAQUIN (CITY) have entered a Memorandum of Understanding (MOU) to improve coordination of water management activities in their local area;

WHEREAS, in accordance with the MOU, JID and the CITY have collaborated in the preparation of an integrated Groundwater Management Plan; and

WHEREAS, adoption of a Groundwater Management Plan is in furtherance of and consistent with the District's goals and objectives and will be in the best interests of the District's landowners and water users; and

WHEREAS, a public hearing was held on October 12, 2010, to consider adoption of the Groundwater Management Plan which is attached as Exhibit A and incorporated herein by reference;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the JAMES IRRIGATION DISTRICT as follows: The Groundwater Management Plan prepared in compliance with Senate Bill No. 1938 and attached as Exhibit A is hereby adopted.

The foregoing Resolution was introduced and adopted at a Regular Meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT conducted October 19th, 2010, on motion of Director Kenneth Hale, and seconded by Director Thomas Chaney, was hereby authorized by the following vote, to wit:

AYES:	5	(Hale, Chaney, Ayerza, Motte, Carvalho)
NOES:	0	
ABSTAIN:	0	
EXCUSED:	0	
ABSENT:	0	

Michael A. Carvalho, President
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

ATTEST:

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

CERTIFICATION OF SECRETARY

The undersigned certifies that she is the Secretary of JAMES IRRIGATION DISTRICT and that the foregoing Resolution was adopted by the Board of Directors of said District at a meeting thereof, duly and regularly held on October 19th, 2010, at which meeting a quorum of the Board of Directors was at all times present and acting.

IN WITNESS WHEREOF, I have set my hand and seal of the Board of Directors this 19th day of October, 2010.

{ SEAL }

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

RESOLUTION NO. 10-38

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SAN JOAQUIN ADOPTING A GROUNDWATER MANAGEMENT PLAN

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their services areas; and

WHEREAS, the City of San Joaquin and the James Irrigation District (JID) have entered a Memorandum of Understanding (MOU) to improve coordination of water management activities in their local area;

WHEREAS, in accordance with the MOU, the City and JID have collaborated in the preparation of an integrated Groundwater Management Plan; and

WHEREAS, adoption of a Groundwater Management Plan is in furtherance of an consistent with the City's goals and objectives and will be in the best interests of the City's landowners and water users; and

WHEREAS, a public hearing was held on October 13, 2010, to consider adoption of the Groundwater Management Plan, this is attached as Exhibit A and incorporated herein by reference;

NOW THEREFORE BE IT RESOLVED, by the City council of the City of San Joaquin as follow: The Groundwater Management Plan prepared in compliance with Senate Bill No. 1938 and attached as "Exhibit A" is hereby adopted.

The foregoing resolution was adopted at a special meeting of the City Council of the City of San Joaquin the 13th Day of October 2010 and passed at said meeting the following vote:

Amarpreet Dhaliwal, Mayor

ATTEST:

I Lupe Estrada, Deputy City Clerk of the City of San Joaquin, do hereby certify that the foregoing resolution was duly adopted and passed by the City Council at a special Council, held at the San Joaquin Council Chambers on October 13, 2010, by the following vote:

AYES:	-3-	Hernandez, Lua, Vallejo
NOES:	-0-	
ABSENT:	-2-	Dhaliwal, Reynaga
ABSTAIN:	-0-	

Lupe Estrada, Deputy City Clerk
City of San Joaquin

WEST SIDE ADVANCE
14693 W. Whitesbridge Ave.
P.O. Box 336
Ke n, CA 93630
Tel. one: 559-846-6689

This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Fresno,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the **West Side Advance**, a newspaper of general circulation, printed and published weekly in the City of Kerman, County of Fresno, and which newspaper has been ad ed a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of February 9, 1956, Case Number 45745; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following date, to-wit:

September 29, Oct. 6

all in the year 20 10. I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Kerman, California this 6th

day of October, 2010

Kathy A Matth

Signature

Proof of Publication

Notice of Hearing

NOTICE OF HEARINGS TO ADOPT AN INTEGRATED GROUNDWATER MANAGEMENT PLAN FOR THE JAMES IRRIGATION DISTRICT AND CITY OF SAN JOAQUIN

NOTICE IS HEREBY GIVEN that public hearings will be held at the James Irrigation District Office and the City of San Joaquin Veterans Memorial Hall to consider adoption of an Integrated Groundwater Management Plan to be in compliance with California Senate Bill No. 1938.

The hearing for James Irrigation District will be held at James Irrigation District office, 8749 9th Street, San Joaquin, CA 93660 on October 12, 2010 at 10:00 a.m. The hearing for the City of San Joaquin will be held at the City of San Joaquin Veterans memorial Hall, 22001 Manning Avenue, San Joaquin, CA 93660 on October 13, 2010 at 6:00 p.m. or as soon thereafter as may be heard.

Part 2.75 of Division 6 of the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas.

Property owners within the James irrigation District, property owners and residents of San Joaquin, and other interested parties are invited to attend the hearings. copies of the Groundwater management Plan and a proposed resolution to adopt it will be available for review by the public at the hearings or may be viewed before the hearings at the San Joaquin City Hall or James irrigation District office. members of the public will have an opportunity to ask questions and to provide input at the hearings.

John Mallyon
James Irrigation District Manager
Cruz Ramos
City of San Joaquin City Manager
3916-w39-40c

WEST SIDE ADVANCE
14693 W. Whitesbridge Ave.
P.O. Box 336
Kerman, CA 93630
Telephone: 559-846-6689

This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Fresno,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the **West Side Advance**, a newspaper of general circulation, printed and published weekly in the City of Kerman, County of Fresno, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of February 9, 1956, Case Number 45745; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following date, to-wit:

Dec. 31, Jan 7

all in the year 20 09. I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Kerman, California this 7th

day of January, 20 09

Kathy A. Mattix

Signature

Proof of Publication

Notice of Hearing on Intention To Update Groundwater

NOTICE OF HEARING ON INTENTION TO UPDATE GROUNDWATER MANAGEMENT PLAN FOR JAMES IRRIGATION DISTRICT NOTICE IS HEREBY GIVEN that at 10:00 a.m on January 13, 2009, at 8749 9th Street San Joaquin CA, a public hearing will be held to discuss whether or not the James Irrigation District should update their Groundwater Management Plan to be in compliance with California Senate Bill No. 1938.

Part 2.75 of Division 6 of the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas.

Landowners within the agency boundaries and other interested parties are invited to attend the hearing. Opportunity for public questions and input will be provided at the hearing. In compliance with Water Code § 10753.4 (b), landowners and other interested parties who wish to participate in preparing the Groundwater Management Plan may do so by attending the hearing and indicating their interest or by submitting a written letter to John Mallyon, General Manager, James Irrigation District, 8749 9th Street, San Joaquin, CA 93660.

John Mallyon
District Manager
Dated December 22 2008

5311-w53-1c

RESOLUTION 2009-01

RESOLUTION
OF THE
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

INTENTION TO UPDATE GROUNDWATER MANAGEMENT PLAN

At a meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT, a public Irrigation District organized and existing under the Irrigation District Law (California Water Code, Division 11, Section 20,500 *et seq.*) of the State of California, held on the 13th day of January, 2009, the following resolution was adopted:

WHEREAS, the JAMES IRRIGATION DISTRICT adopted a Groundwater Management Plan in 2001 that is in accordance with Assembly Bill 3030; and

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, updating the District's Groundwater Management Plan is in furtherance of and consistent with the District's goals and objectives and will be in the best interests of the District's landowners and water users; and

WHEREAS, a public hearing was held on January 13, 2009, to discuss updating the Groundwater Management Plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the JAMES IRRIGATION DISTRICT that it is the intention of the District to update their Groundwater Management Plan in accordance with Senate Bill No. 1938, that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2 and that the Board hereby authorizes its officers to execute all documents and take any other action necessary or advisable to carry out the purposes of this resolution.

The foregoing Resolution was introduced and adopted at a Regular Meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT conducted January 13th, 2009, on motion of Director Robert Motte, and seconded by Director Thomas Chaney, was hereby authorized by the following vote:

AYES:	5	(Motte, Chaney, Ayerza, Carvalho, Hale)
NOES:	0	
ABSTAIN:	0	
EXCUSED:	0	
ABSENT:	0	

Kenneth R. Hale, President
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

ATTEST:

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS
\MES IRRIGATION DISTRICT

CERTIFICATION OF SECRETARY

The undersigned certifies that she is the Secretary of JAMES IRRIGATION DISTRICT and that the foregoing Resolution was adopted by the Board of Directors of said District at a meeting thereof, duly and regularly held on January 13th, 2009, at which meeting a quorum of the Board of Directors was at all times present and acting.

IN WITNESS WHEREOF, I have set my hand and seal of the Board of Directors this 13th day of January, 2009.

{ SEAL }

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS
JAMES IRRIGATION DISTRICT

WEST SIDE ADVANCE
14693 W. Whitesbridge Ave.
P.O. Box 336
Kerman, CA 93630
Telephone: 559-846-6689

This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Fresno,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the **West Side Advance**, a newspaper of general circulation, printed and published weekly in the City of Kerman, County of Fresno, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of February 9, 1956, Case Number 45745; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following date, to-wit:

April 8, 15

all in the year 20 09. I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Kerman, California this 15th

day of April, 20 09

Kathy A Mallett

Signature

Proof of Publication
Resolution 2009-01
Resolution of James Irrigation District

RESOLUTION 2009-01

RESOLUTION OF THE BOARD OF DIRECTORS JAMES IRRIGATION DISTRICT
INTENTION TO UPDATE GROUNDWATER MANAGEMENT PLAN

At a meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT, a public Irrigation District organized and existing under the Irrigation District Law (California Water code. Division 11, Section 20,500 et seq.) of the State of California, held on the 13th day of January, 2009, the following resolution was adopted:

WHEREAS, the JAMES IRRIGATION DISTRICT adopted a Groundwater Management Plan in 2001 that is in accordance with Assembly bill 3030: and

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, updating the District's Groundwater Management Plan is in furtherance of an consistent with the District's goals and objectives and will be in the best interests of the District's landowners and water users; and

WHEREAS, a public hearing was held on January 13, 2009, to discuss updating the Groundwater management Plan'

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the JAMES IRRIGATION DISTRICT that it is the intention of the District to update their Groundwater Management Plan in accordance with Senate Bill No 1938, that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2 and that the Board hereby authorizes its officers to execute all documents and take any other action necessary or advisable to carry out the purposes of this resolution.

The foregoing Resolution was introduced and adopted at a Regular Meeting of the Board of Directors of the JAMES IRRIGATION DISTRICT conducted January 13th, 2009, on motion of Director Robert Motte, and seconded by Director Thomas Chaney, was hereby authorized by the following vote:

AYES: 5 (Motte, Chaney, Ayerza, Carvalho, Hale)
NOES: 0
ABSTAIN:0
EXCUSED:0
ABSENT: 0

Kenneth R. Hale, President
BOARD OF DIRECTORS JAMES IRRIGATION DISTRICT
ATTEST:

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS JAMES IRRIGATION DISTRICT

CERTIFICATION OF SECRETARY

The undersigned certifies that she is the Secretary of JAMES IRRIGATION DISTRICT and that the foregoing Resolution was adopted by the Board of Directors of said District at a meeting thereof, duly and regularly held on January 13th, 2009, at which meeting a quorum of the Board of Directors was at all times present and action

IN WITNESS WHEREOF, I have set my hand and seal of the Board of Directors this 13th day of January, 2009.

Donna Y. Hanneman, Secretary
BOARD OF DIRECTORS JAMES IRRIGATION DISTRICT
1405-W14-15C

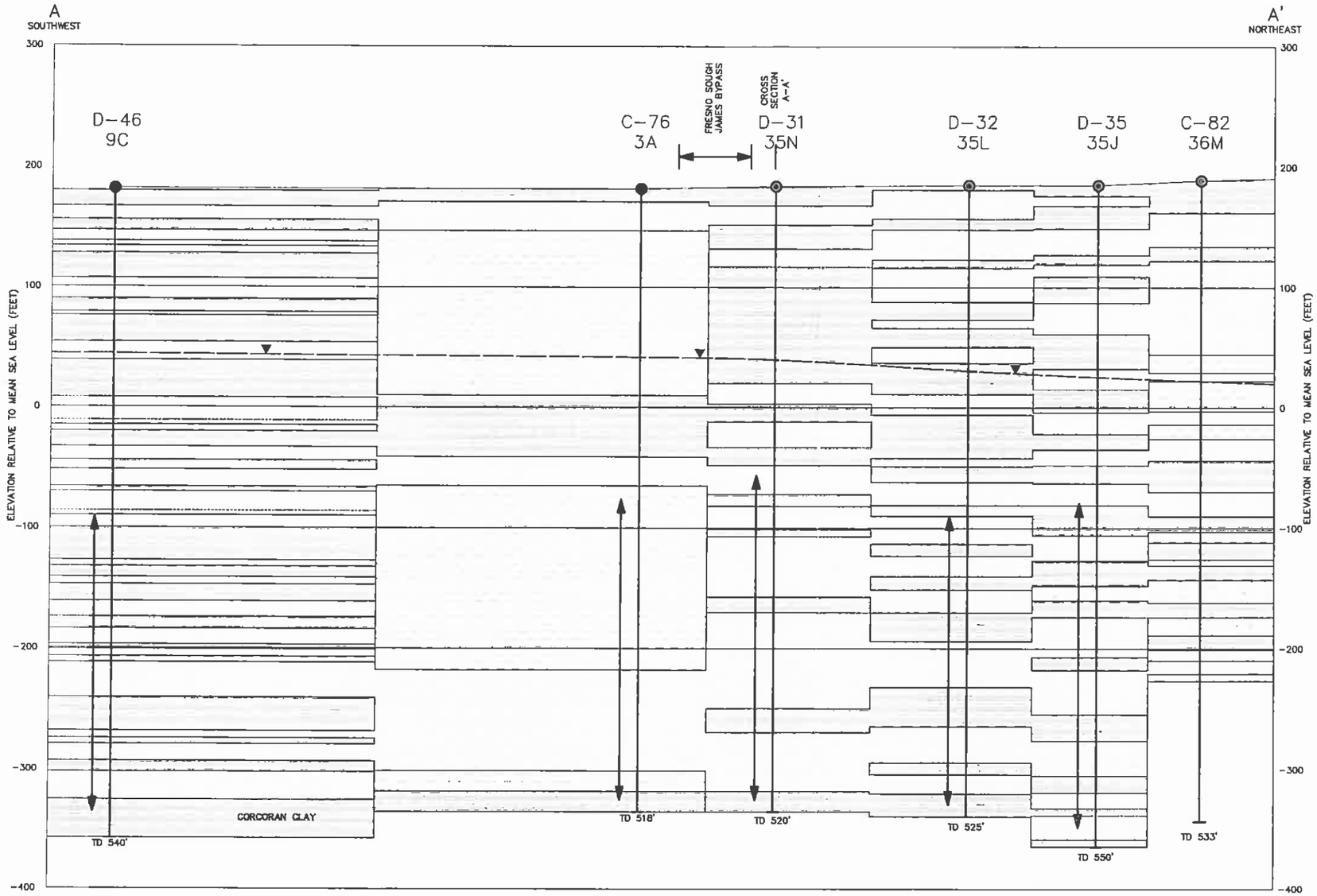
JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX B

GEOLOGIC CROSS SECTIONS



EXPLANATION

- NO INFORMATION
- SAND, GRAVEL, OR COBBLES
- SAND, SILTY SAND
- CLAY, SILTY CLAY
- SANDY CLAY, CLAYEY SAND, AND SAND AND CLAY MIXTURES
- 3G — WELL IDENTIFICATION
- PERFORATED INTERVAL
- TD 215 — TOTAL DEPTH (FEET)
- PIEZOMETRIC WATER 01/98

HORIZONTAL SCALE IN FEET
0 1000 2000

Kenneth D. Schmidt & Associates

PROVOST & PRITCHARD ENGINEERING GROUP
ESTABLISHED
786 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/448-2700 FAX 559/449-2715
www.provostandpritchard.com

Job No. 10510801
Dwg. No.

James Irrigation District
Fresno County, CA

Subsurface Geologic
Cross Section A-A'

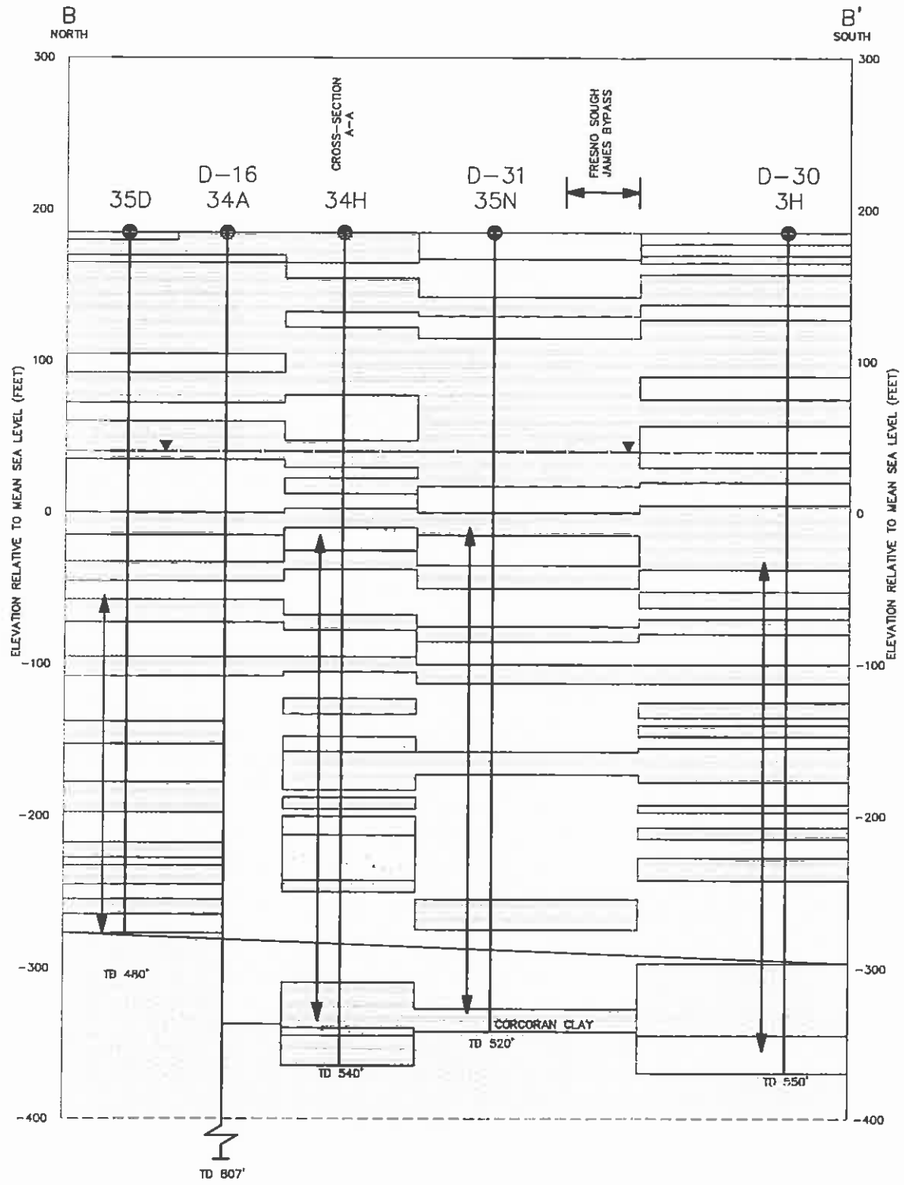
DESIGN ENGINEER
DATE 2-13-01 C.E. LICENSE NO.

Date Revised
Approval

SCALE AS SHOWN
DRAWN BY ARM
REVISED

SHEET 1 OF 1 SHEETS

G:\Clients\James 10-10510\Projects\10510801-AB303 Study\Dwg\Exhibit\10510801-EX- 8X11 A.dwg



EXPLANATION

- NO INFORMATION
- SAND, GRAVEL, OR COBBLES
- SAND, SILTY SAND
- CLAY, SILTY CLAY
- SANDY CLAY, CLAYEY SAND, AND SAND AND CLAY MIXTURES
- BLUE CLAY

3G — WELL IDENTIFICATION

PERFORATED INTERVAL

TD 800' — TOTAL DEPTH (FEET)

PIEZOMETRIC LEVEL 01/99

HORIZONTAL SCALE IN FEET

0 1000 2000

Kenneth D. Schmidt & Associates

PROVOST & PRITCHARD ENGINEERING GROUP
CA. P. 1988
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/448-2700 FAX 559/448-2715
www.provostandpritchard.com

James Irrigation District
Fresno County, CA

Subsurface Geologic Cross Section B-B'

DESIGN ENGINEER
DATE 2-13-01 C.E. LICENSE NO.

Job No. 10510BC1
Dwg. No.
Date Revised
Approval

SCALE AS SHOWN
DRAWN BY AWC
REVISED
SHEET 1 OF 1 SHEETS

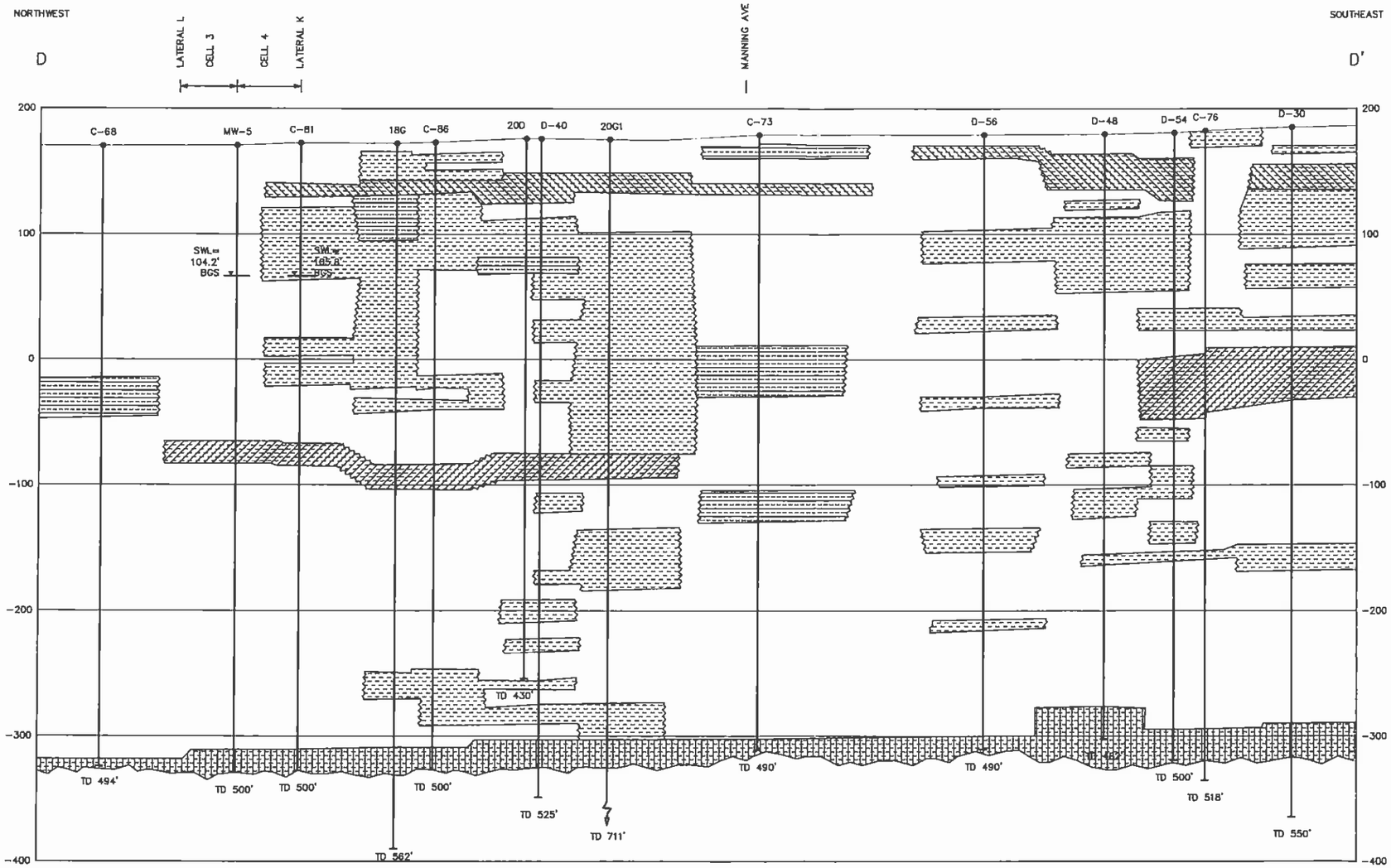
G:\Clients\James ID-10510\Projects\10510BC1-ASR\Study\Dwg\Exhibits\10510BC1-EX2-SEC B.dwg

NORTHWEST

D

SOUTHEAST

D'



EXPLANATION

- CLAY
  - A-CLAY
  - C-CLAY
  - CORCORAN CLAY
- SANDY CLAY
- OTHER DEPOSITS

C-68 WELL IDENTIFICATION

TD 494' TOTAL DEPTH (FEET)

0 2000 4000

HORIZONTAL SCALE IN FEET

Kenneth D. Schmidt & Associates

CIVIL ENGINEERS
PROVOST & PRITCHARD
ENGINEERING GROUP
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/449-2700 FAX 559/449-2715
www.provostandpritchard.com

James Irrigation District
Fresno County, CA

Subsurface Geologic
Cross Section D-D'

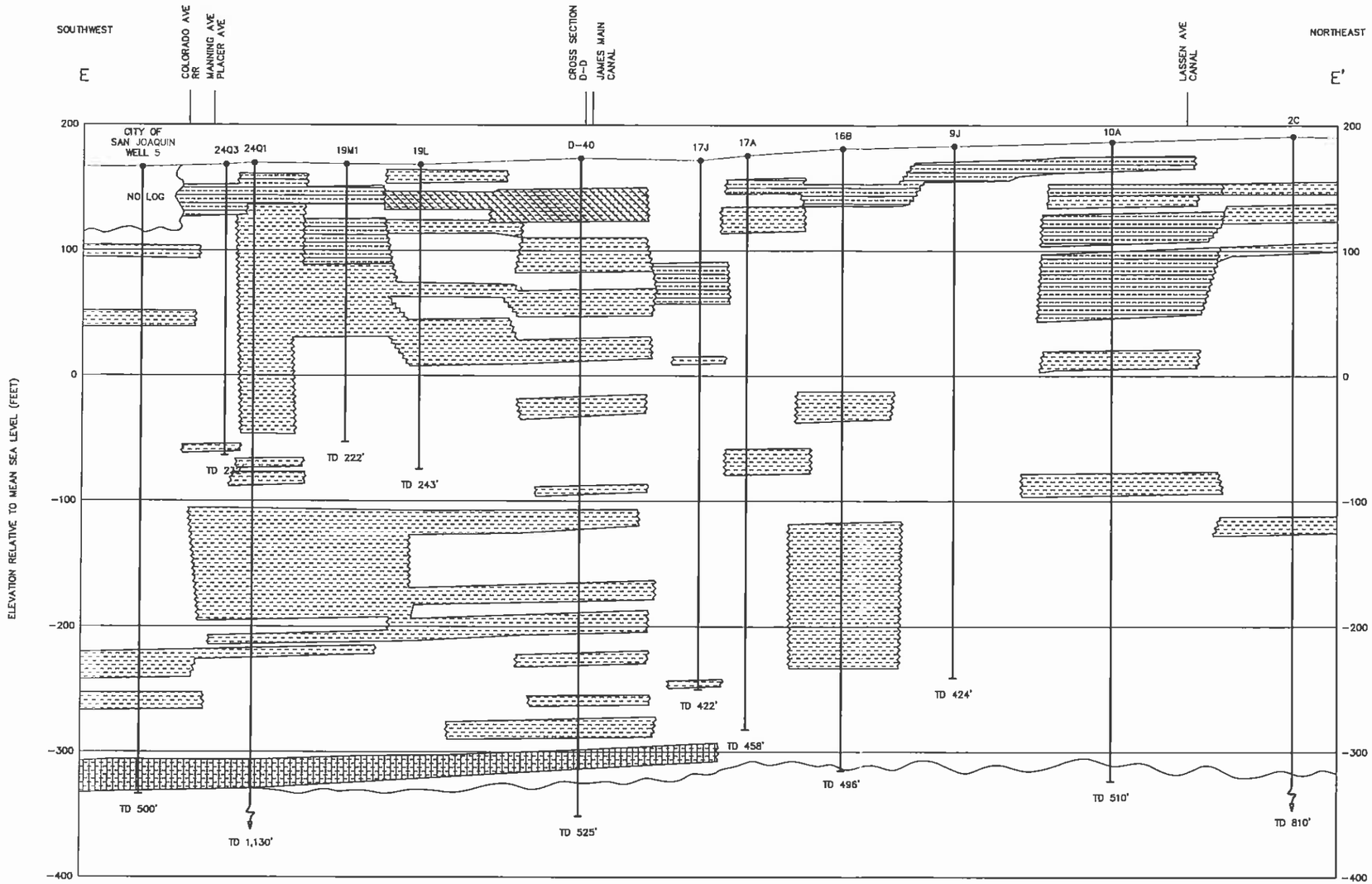
SCALE: as shown
DRAWN BY: DVS
REVISED:

DESIGN ENGINEER
DATE 3/8/2005 C.E. LICENSE NO.

SHEET 1 OF 1 SHEETS

Job No.
Dwg No.
Date Revised
Approved

G:\Clients\James ID-1501\Projects\1501501-AG303 Study\DWG\2005MTR\1501501-02-SEC D.dwg



EXPLANATION

- CLAY
  - A-CLAY
  - C-CLAY
  - CORCORAN CLAY
- SANDY CLAY
- OTHER DEPOSITS

16B WELL IDENTIFICATION

TD 496' TOTAL DEPTH (FEET)

0 2000 4000

HORIZONTAL SCALE IN FEET

Kenneth D. Schmidt & Associates

PROVOST & PRITCHARD ENGINEERING GROUP
EST. 1923
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/448-2700 FAX 559/449-2715
www.provostandpritchard.com

James Irrigation District
Fresno County, CA

Subsurface Geologic Cross Section E-E'

SCALE: as shown
DRAWN BY: DVS
REVISED:

DESIGN ENGINEER
DATE 3/8/2005 C.E. LICENSE NO.

SHEET 1 OF 1 SHEETS

Job No. 1051080
Dwg. No.
Date Revised
Approved

G:\Clients\James ID-1051\Projects\1051080\-AB303 Study\DWG\2080ST\1051080-EX -SED.dwg

JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

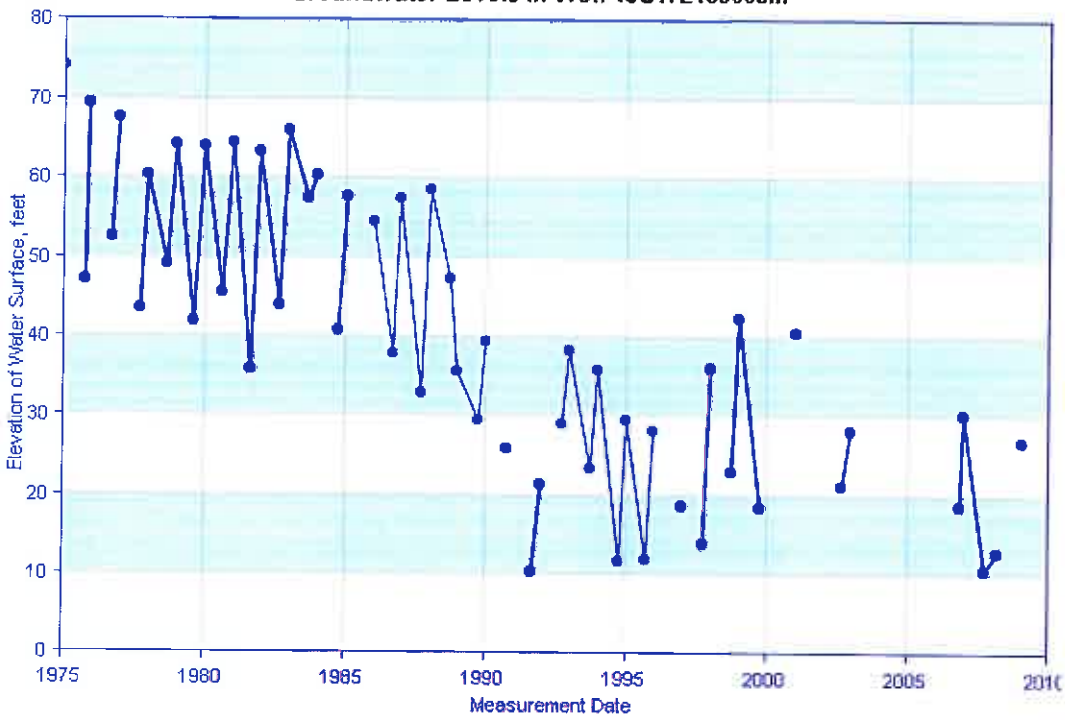
APPENDIX C

WELL HYDROGRAPHS

JAMES IRRIGATION DISTRICT
APPENDIX C - INDICATOR WELL HYDROGRAPHS

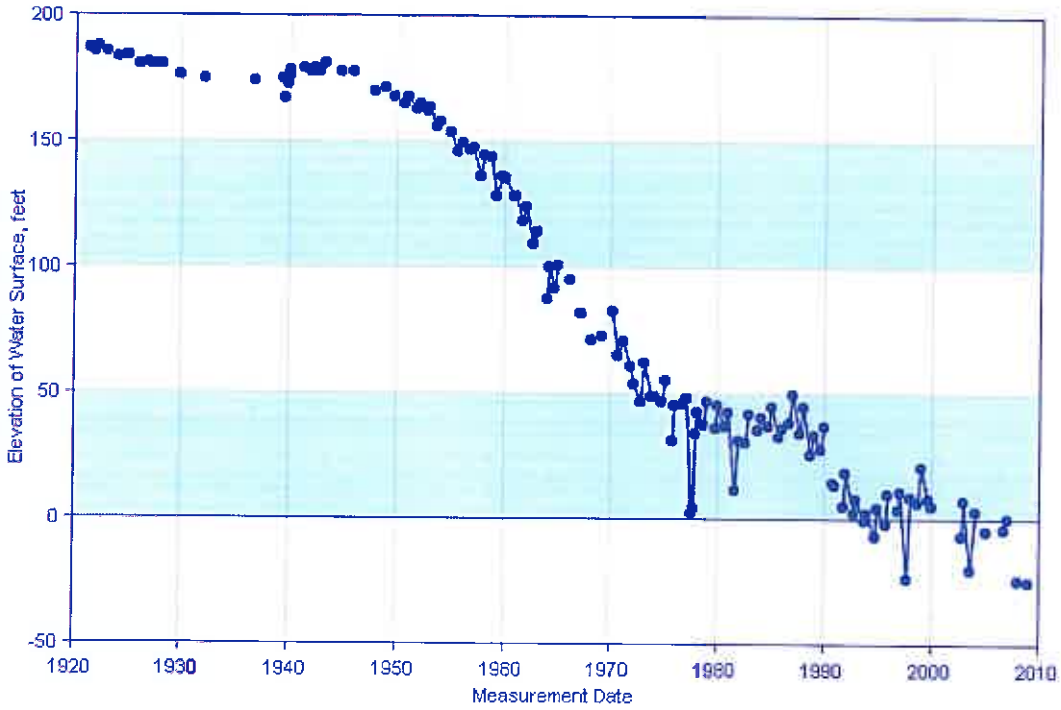
Kerman Line of Eastside Wellfield

Groundwater Levels in Well 15S17E15J003M



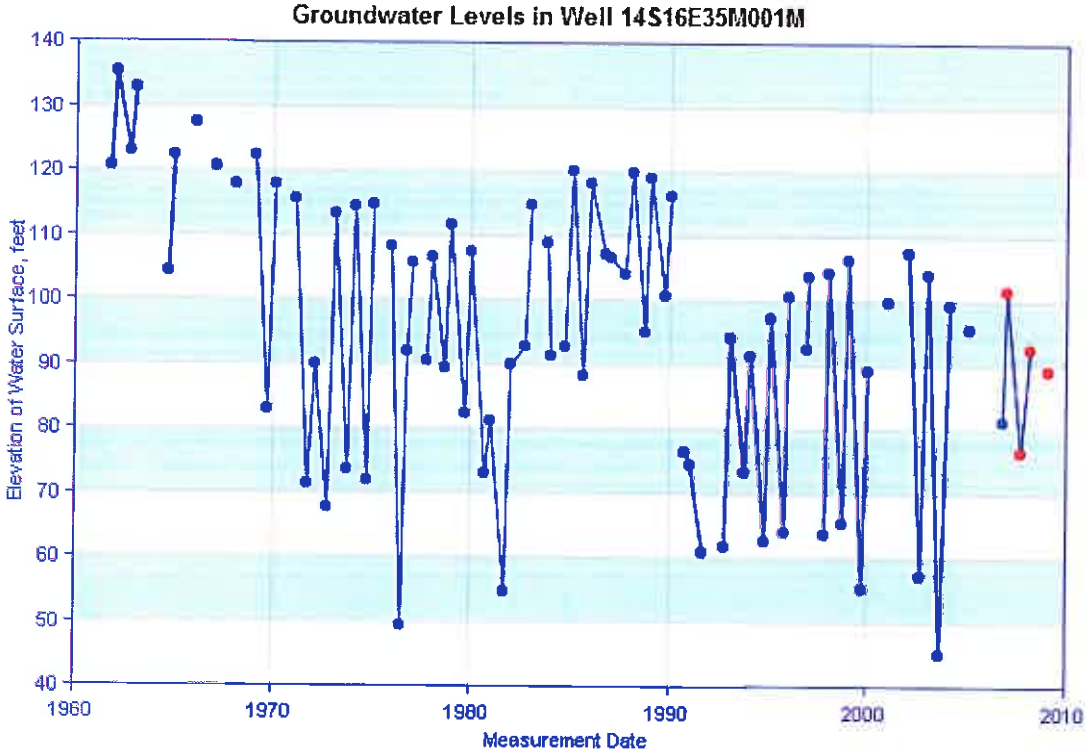
Along McMullin Grade in Eastside Wellfield

Groundwater Levels in Well 15S18E30L001M

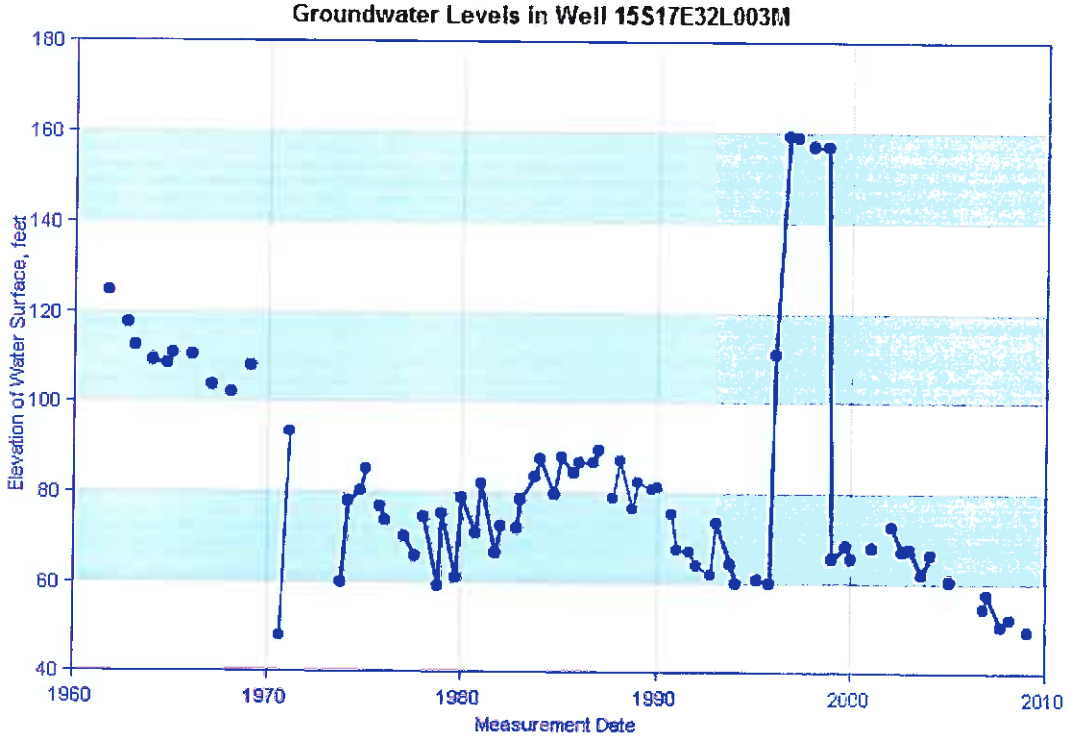


JAMES IRRIGATION DISTRICT
APPENDIX C - INDICATOR WELL HYDROGRAPHS

Northern Part of James Irrigation District

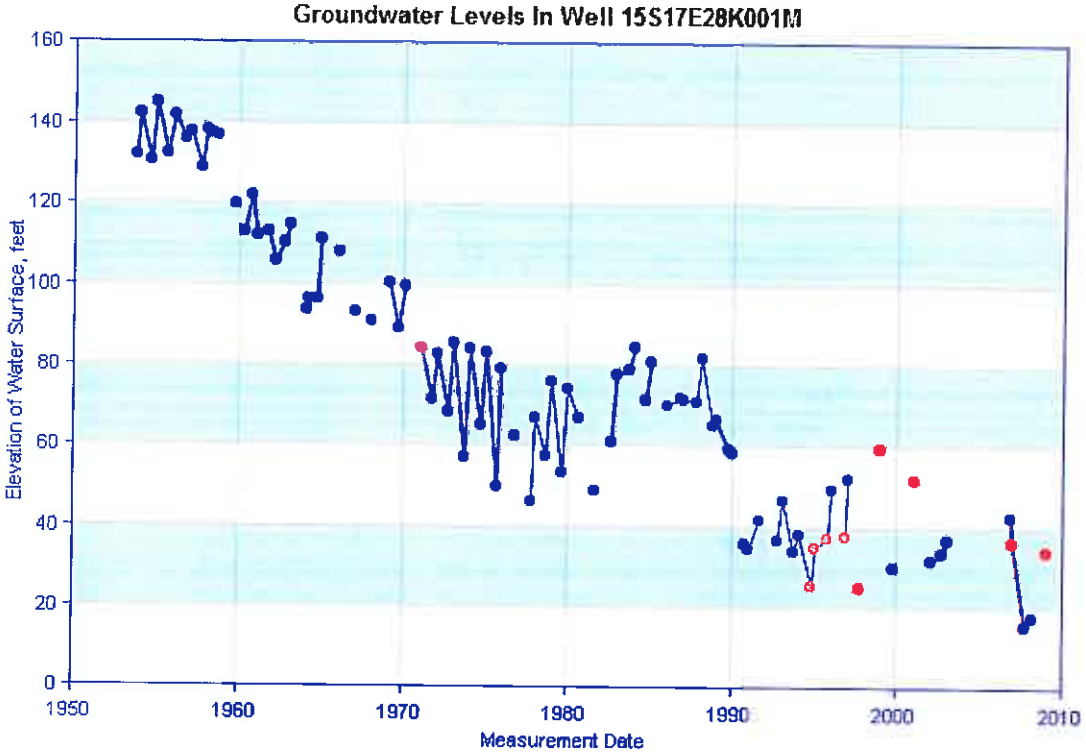


Southeast of the City of San Joaquin

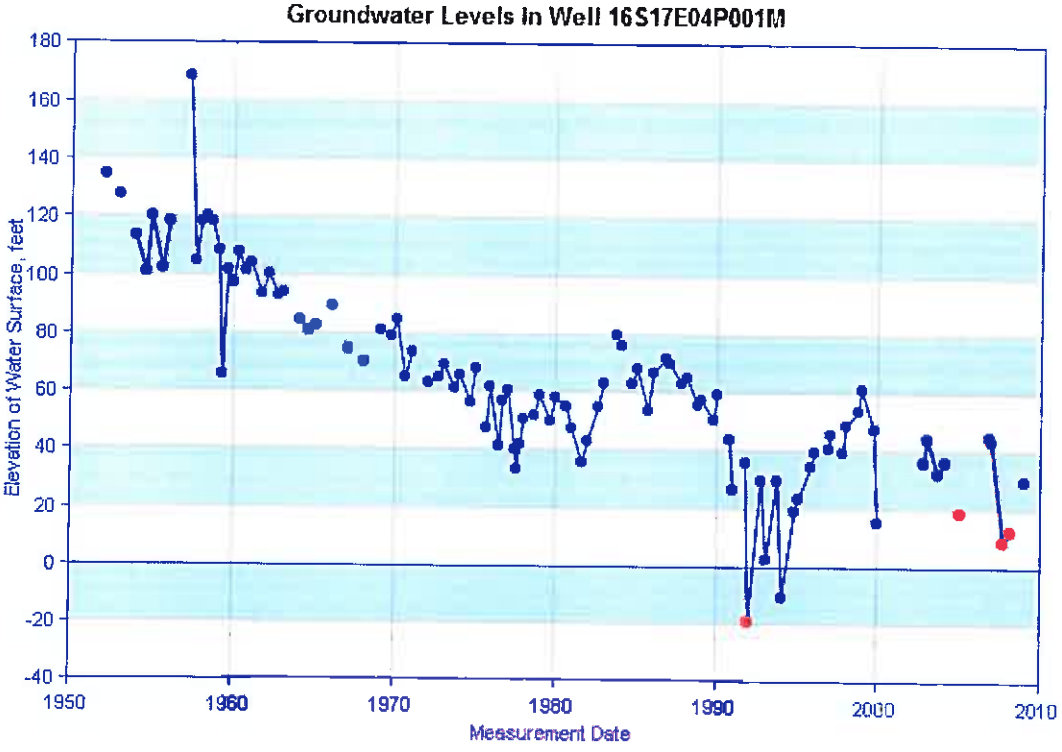


JAMES IRRIGATION DISTRICT
APPENDIX C - INDICATOR WELL HYDROGRAPHS

Along James Irrigation District Main Canal



Southern Boundary of James Irrigation District



JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX D

GROUNDWATER QUALITY DATA

JAMES IRRIGATION DISTRICT WELL PUMPS REPORT

WELL WATER QUALITY TESTS

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #		August 2009 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
COALINGA	ABANDONED	C-49	C-49																				A	1,025	1,000	800		775	700		700	625	650				784
COALINGA	ABANDONED	C-53	C-53													A	350	350				400		350	325	300	250		200	400		300	250	250				310
COALINGA	ABANDONED	C-54	C-54																	A	300			250		250	200		175	300		200	200	225				233
MAIN CANAL		C-55	C-55		1,200	1,275	1,200		1,325	1,200	1,100	1,300	1,200	1,300	1,300		1,300	1,275											1,100	1,050		1,100	1,125	1,150			1,250	1,197
MAIN CANAL		C-56	C-56		1,100	1,100	1,075		1,150	1,100	1,000	1,150	1,100	1,150	1,200		1,200	1,125			1,000	1,100	1,100	1,075	1,050	1,075			950	900		1,000	975	1,000			1,050	1,072
COALINGA	ABANDONED	C-57	C-57								A	1,275	1,300	1,400	1,500		1,000	550				450		425		500			300	300		225	250	225				693
KERMAN		C-58	C-58	820	650	650	575	900	800	575	550	575	625	625	650		900	850			250	575		525	550	775			800	800		800	500	900				670
KERMAN	ABANDONED	C-59	C-59			A	1,600	1,450	1,675	1,400	1,400	1,600	1,700	1,700	1,800		1,750	1,750			700	1,250		1,300	1,200	1,250	1,000		980	1,100		1,100	9,000	1,000				1,714
KERMAN		C-60	C-60	975	825	900	850	850	900	750	700	700	825	850	850		850	850			650	750		700	675	750			575	600		600	550	600				746
COALINGA		C-61	C-61		725	800	800	850	800	675	800	800	825	850	850		750	750			600	550		750	725	600	500		400	300		350	275	275				650
KERMAN		C-62	C-62	1,850	1,750	1,825	1,875	2,000	2,000	1,750	1,500	1,700	1,800	2,050	1,950		2,000	2,150			1,500	1,450		1,725	1,500	1,650			1,300	1,300		1,325	1,300	1,550				1,693
MAIN CANAL	ABANDONED	C-63	C-63													A	350				350	350		325	300	300	250	225	225	250		250	260	300			275	286
MAIN CANAL	ABANDONED	C-64	C-64																									A	1,400		1,400	1,380	1,380			1,200	1,352
MAIN CANAL		C-65	C-65		950	1,000	950		1,050	1,000	950	900	1,000	1,050	1,075		1,050	1,075			1,000	1,025		1,175	1,200	1,250			1,100	1,100		1,200	1,000	1,025				1,051
MAIN CANAL	ABANDONED	C-66	C-66																														A	1,090			1,025	1,058
KERMAN		C-67	C-67		850	1,100	850	1,225	1,000	850	1,250	825	1,100	1,350	1,300		1,500	1,500				975		950	925	1,300			925	1,200		1,275	1,000	1,300				1,116
MAIN CANAL		C-68	C-68		1,000	1,050	1,000		1,100	1,000	900	1,050	950	1,000	1,050		1,000	1,000			1,100	950		1,000	1,000	1,000	800					900	920	950			1,000	987
COALINGA		C-69	C-69		400	400	300	350	350	325	300	325	350	325	300		300	250			300	300		275	225	250	200		150	250		175	175	175				281
COALINGA		C-70	C-70	2,150	2,400	2,900	2,800		2,750	2,500	1,350	2,700	2,700	2,800	2,700		2,450	2,400				1,650		1,450		1,500			1,000	1,000		700	600	625				1,949
COALINGA		C-71	C-71	523	475	525	425		550	475	450	450	500	450	450		400	350				350		325		250	200		175	200		175	200	200				361
COALINGA		C-72	C-72	585	500	575	475		650	550	525	550	550	525	500		450	475				450		375		300	250		175	200		200	225	225				415
MAIN CANAL		C-73	C-73	544	500	500	375	500	550	450	450	475	475	500	500		550	600			600	500		475	500	450	400	350	400	400		400	400	425			450	468
COALINGA		C-74	C-74		575	575	450	500	525	450	500	500	500	450	450		400	375				400		300		850	800		150	250		175	200	180				434
MAIN CANAL	ABANDONED	C-75	C-75									A	750	1,000	1,025		1,000	1,025			900	900		900	650	850	800		700	700		700	800	780			900	848
MAIN CANAL		C-76	C-76		400	450	225	400	425	400	400	375	375	350	350		350	325			350	350		300	450	300	250	230	250	250		250	250	300			300	333
COALINGA		C-77	C-77		525	550	450		500	450	475	450	450	400	400		350	325			300	325		250	250	250	200		125	250		200	200	200				342
COALINGA		C-78	C-78		275	300	150	175	225	225	200	225	200	200	200		200	200			250	225		200	200	200			150	250		175	175	175				208
COALINGA		C-79	C-79	989	925	900	750	800	875	675	650	700	725	650	700		600	650				550		450	425	400	350		300	300		325	325	325				580
COALINGA		C-80	C-80	359	275	275	175	200	200	225	200	150	250	200	200		200	175			200	225		200	175	200			125	250		175	200					203
MAIN CANAL		C-81	C-81		1,000	1,025	950	1,000	1,100	950	900	1,000	950	950	900		850	850			600	900		900	900	850	800		875	700		700						893
COALINGA		C-82	C-82	782	675	700	575	600	650	625	550	600	600	525	500		500	475				450		350														558
COALINGA		C-83	C-83		300	375	250	200	225	275	250	250	250	200	225																								255
KERMAN		C-84	C-84		450	425	300	400	450	400	400	400	400	375	375																								398
COALINGA		C-85	C-85	469	750	900	650	750	750	500	400	375	350	275	275																								543
MAIN CANAL	ABANDONED	C-86	C-86		750	800	625	675	800	750		750	775	750																								742
MAIN CANAL		C-87	C-87		850	875	750		850	850	800	800																										825
COALING		C-88	C-88	431	375	350	200	250	225	275	200																											268
COALINGA		C-89	C-89		200	250	125	175	180	200																												188
MAIN CANAL	ABANDONED	D-04	D-04																			A	450	450	350	400	275	325	350		400	375	500			475	395
KERMAN	ABANDONED	D-06	D-06																	A	400		375	350	400	300		300	400		400	350	475				375
MAIN CANAL	ABANDONED	D-08	D-08						A	500	450	475	500	475	500		450	450			450	450		400		400	300	250	325	300		300	300	300			300	394
MAIN CANAL	ABANDONED	D-09	D-09													A	525				400			425	875	400	300	300	325	300		350	325	300			350	398
MAIN CANAL	ABANDONED	D-10	D-10						A	500	400	450	450	450	500		500	450				450		400	450	400	300	280	325	400		350	350	375			375	408
MAIN CANAL		D-15	D-15		900	900	850	850	950	850	700	800	850	850	900		950	900			800	750		750	750	700	700		625	700		700	600	690			650	787
KERMAN	ABANDONED	D-16	D-16													A	350	375			400	450		375	950	950	900		225	250		300	300	300				471
KERMAN	ABANDONED	D-17	D-17																								A		550	800		700	500	625				635
MAIN CANAL	ABANDONED	D-21	D-21																									A	1,000		1,000	900	980			900	956
KERMAN	ABANDONED	D-22	D-22																								A	825	800		800	1,000	850				855
KERMAN	ABANDONED	D-23	D-23																								A	875	850		900	750	875				850
MAIN CANAL	ABANDONED	D-24	D-24										A	850	900		1,000	1,050				1,300		975	1,200	900	900		625	1,000		1,100	850	1,150			925	995
MAIN CANAL	ABANDONED	D-25	D-25																														A	700	750			800	760
MAIN CANAL		D-29	D-29		1,200	1,250	1,250		1,400	1,250		1,400	1,350	1,400	1,400		1,400	1,400			1,300	1,300	1,400	1,350	1,350	1,375			1,200	1,200		1,200	1,225	1,250			1,350	1,313
MAIN CANAL		D-30	D-30		450	450	300		475	400	400	400	400	400	400		400	500				400		350	350	300	300	230	250	225		250	250	275			275	351
KERMAN		D-31	D-31	434	325	325	275	325	350	250	300	300	325	300	300		300	350				300		250	250	250	200		175	200		225	250	250				277
COALINGA		D-32	D-32		500	550	700	450	525	500	450	525	500	500	450		450	650				475		400	375	350	300		225	200		250	250	275				428
COALINGA		D-33	D-33	1,420	1,625	1,600	1,475		1,275	1,125	1,050	1,025	950	850	1,000		700	800				650		550	500	450	350		275	300		250	250	225				785
COALINGA		D-34	D-34	732	625	750	575	650	650	600	550	600	600	575	600		550	600				525		450	450	450	400		350	350		350	400	400				524
COALINGA		D-35	D-35	811	675	900	575	675	675	650	600		675	650	625		600	625				575		475	500	450	400		325	300		350	350	375				547
COALINGA	ABANDONED	D-36	D-36									A	400	350	400		350	275			300	300		300	225	250			200	250		175	175	200				277
INSIDE		D-37	D-37	1,210	1,000	1,075	1,100	1,100	1,250	1,150	1,050	1,050	1,050	1,000	1,000		850	950				950	775	725	700	1,200			900	600		1,200	675					975
MAIN CANAL		D-38	D-38		1,000	1,025	975		1,050	1,025	1,000	1,100	1,100	1,100	1,125		1,100	1,150			1,000	1,050	1,125	1,100	1,100	1,100			900	1,000		1,000						1,054
MAIN CANAL		D-39	D-39		1,000	1,050	1,000		1,075	1,025	1,000	1,150	1,100	1,125	1,175		1,200	1,200			1,400	1,175		1,425		1,700	1,500		1,500									1,211
MAIN CANAL		D-40	D-40		900	950	875	900	1,125	950	1,000	950	950	950	1,025		1,000	1,000			900	850		875	850	850			850									934
KERMAN		D-41	D-41	1,450	1,450	1,400	1,450	1,750	1,650	1,450	1,300	1,500	1,550	1,500	1,550		1,450	1,700			1,200	1,150		1,100	1,050	1,000	900											1,374
KERMAN	ABANDONED	D-42	D-42		A	1,225	1,000	900	975	950	850	925	1,050	1,000	1,050		1,000	1,000			900	975		900	875	1,175	700											969
KERMAN		D-43	D-43	1,150	1,100	1,075	950	900	1,100	1,025	1,050	1,100	1,075	975	800		750	750			700	750		600	550	550	500											858
INSIDE	ABANDONED	D-44	D-44											A	1,500		1,750	1,775				1,500	1,275	1,150	1,025													1,425
INSIDE	ABANDONED	D-45	D-45													A	2,500	2,500				1,725	1,675	1,725														2,025
INSIDE		D-46	D-46	413	325	375	275	325	325	325	300	300	300	350	350		350	350				350																329
INSIDE		D-47	D-47	900	900	750	650	700	900	650	600	650	600	600	625		600	800				500																680
MAIN CANAL		D-48	D-48		325	350	225	300	325	300	275	300	300	300	325		300	300			300	300																302
KERMAN	PENDING	D-49	D-49		P	P	1,250	1,200	1,425	1,300	1,300	1,325	1,325	1,250			1,100	1,225			1,250																		1,268
KERMAN		D-50	D-50		375	350	375	325	350	325	300	325	350	350	350		350	350			400																		348
COALINGA		D-51	D-51	408	350	400	250		350	325	300	325	325	300	300		300	275																					317
KERMAN		D-52	D-52	1,140	1,100	1,100	1,000	1,175	1,225	1,000	1,000	1,100	1,100	1,200			1,050	1,100																					1,098
COALINGA		D-53	D-53	1,090	1,200	1,450	1,350		1,550	1,000	1,250	725	750	900	1,000		600	400																					1,015

WELL WATER QUALITY TESTS

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #		August 2009 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
MAIN CANAL		D-54	D-54		375	350	225	325	425	350	300	325	325	325	350		400																				340
MAIN CANAL		D-55	D-55		400	400	275	325	375	350	300	350	350	350	375		400																				354
INSIDE		D-56	D-56		725	800	675	725	900	700	800	700	650																								742
KERMAN		D-57	D-57	577	525	575	450	500	650																												540
MAIN CANAL		D-58	D-58		375	400	300	350	375																												360
KBSN RECOVRY		D-59			350																																350
KBSN RECOVRY		D-60			800	850																															825
COALINGA		D-62		562	575																																575
COALINGA		D-63			525																																525
		16-16-3E1		8,490																																	
AVERAGE					739.407	807.456	731.466	690.476	833.28	736.776	691.364	770.089	772.8	784.1	793.8		817.2	824.6			710.6	713	1214	686.8	697.2	702.9	519.4	267.5	541.1	569.5		580.9	689.7	689.8			728.9	
TOTAL WELLS TESTED					59	57	58	42	58	58	55	56	58	58	56	0	58	58	0	0	33	54	7	53	44	51	36	8	50	60	0	51	50	49	0	0	19	
LEGEND:																																					
A = ABANDONED	24				1	1	0	0	2	0	1	2	1	1	0	1	2	0	0	0	2	0	1	1	0	0	0	3	2	0	0	1	1	0	0	0	23

JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX E

MOU BETWEEN JAMES IRRIGATION DISTRICT AND CITY OF SAN JOAQUIN

MEMORANDUM OF UNDERSTANDING
BETWEEN
JAMES IRRIGATION DISTRICT
AND
THE CITY OF SAN JOAQUIN

This Memorandum of Understanding (MOU) between the JAMES IRRIGATION DISTRICT, a California Irrigation District ("District") and the City of San Joaquin ("City") is intended to introduce a cooperative set of guidelines for the District and City to improve coordination of water management activities in the local area.

PURPOSE

The main objectives of this MOU is to introduce a set of guiding principles by which the District and City can more effectively manage water resources in the local area. This will be accomplished through the following general tasks:

- Identify common interests and goals
- Discuss and coordinate multi-agency projects of mutual benefit
- Work to understand the perspectives of the other parties
- Provide a more comprehensive view and approach towards water management in the area
- Improve overall water reliability and water quality in the area
- Attempt to reach consensus on water management issues wherever possible

GROUNDWATER MANAGEMENT PLAN

The District created a Groundwater Management Plan (GMP) in 1992. The District is currently updating the GMP to be compliant with California Senate Bill No. 1938 and California Water Code Section 10750 et. seq. The City and the District believe it is in their mutual interests to prepare a joint GMP covering both agencies. The GMP shall include specific provisions regarding the City's inclusion and role in the Groundwater Advisory Committee. In that regard Section 4 of the current Draft GMP shall be amended to reflect the City's position and role in the Groundwater Advisory Committee. After the GMP is completed, the District and City will work cooperatively to implement the goals and objectives outlined in the GMP.

WATER MANAGEMENT EFFORTS

The two agencies shall agree to cooperate on the following water management efforts to the benefit of both agencies:

1. The agencies shall share groundwater level and groundwater quality data. Copies of the data will be brought to an annual coordination meeting.
2. The agencies shall work to better understand the regional groundwater quality and

its potential for impacting local groundwater supplies.

3. The agencies shall cooperate to protect the groundwater quality for domestic, industrial and agricultural use.
4. The agencies shall work to find beneficial use for wastewater generated in San Joaquin, preferably within the boundaries of the James Irrigation District
5. The agencies shall work cooperatively to implement both urban and agricultural water conservation measures.
6. The agencies shall work to develop groundwater recharge basins in James Irrigation District and the City of San Joaquin using surplus water, floodwaters and stormwater runoff.
7. The agencies shall collaborate on water resources studies and planning documents and search for water resources projects that mutually benefit both agencies
8. The agencies shall work to develop consistent land use planning ordinances that are favorable to groundwater usage, groundwater quality protection, groundwater recharge, and surface water usage and quality and shall comment on land use plans and environmental documents that impact groundwater resources.
9. The agencies shall work to prevent groundwater adjudication by establishing local control of groundwater and work towards matching groundwater pumping, over the long term, with the groundwater safe yield.

FUNDING

The District and City have a joint interest in improving the water resources in the local area, and therefore shall work cooperatively to secure grants and low interest loans to fund water resources projects for both agencies. This shall be accomplished by notifying the other agency of funding opportunities, writing letters of support for applications, and, when feasible, teaming on funding applications for projects that will benefit both agencies.

ANNUAL COORDINATION MEETING

The City and District will meet annually and as needed to coordinate efforts and discuss relevant water management issues. The meeting shall be held in November of each year beginning in 2010. The District shall contact the City each year in October to discuss the agenda arrangements for the next meeting.

AREA OF PLAN

This MOU shall be effective in all areas within the City of San Joaquin, James Irrigation District, and District eastside well field. The MOU shall also be effective in any areas newly annexed by the agencies.

OBLIGATIONS

The participants in this MOU understand that final decisions in regard to any agreement or decision made as a result of this MOU, or efforts arising from coordination efforts, will be subject to approval by the James Irrigation District Board of Directors and San Joaquin City Council. The District and City expressly state herein that this MOU does not

constitute a joint powers agreement.

TERM

The initial term of the MOU shall commence on the date signed by both agencies, and continue for five (5) years, and shall continue year to year thereafter. This MOU can be terminated by either agency at any time including the initial term for any reason with 30 days written notice to the other party.

The City and District hereby acknowledge the potential benefits of pursuing the aforementioned water management actions and agree to work together to implement such actions. In WITNESS WHEREOF, the parties have executed this MOU as of the effective date.

JAMES IRRIGATION DISTRICT	CITY OF SAN JOAQUIN
By: _____	By: _____
Title: GENERAL MANAGER	Title: City Manager
Date: APRIL 13, 2010	Date: 4-21-2010
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX F

GROUNDWATER QUALITY MONITORING AND MITIGATION PLAN

JAMES IRRIGATION DISTRICT

GROUNDWATER QUALITY MONITORING AND MITIGATION PLAN

JULY 2010

PREPARED BY:

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

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Attachment 1 – Groundwater Quality Map

Attachment 2 – Groundwater Quality Graphs by Region

List of Abbreviations

AF	Acre-feet
DWR	Department of Water Resources
gpm	gallons per minute
JID	James Irrigation District
MP	Monitoring Plan
PVC	Poly-vinyl chloride
TDS	total dissolved solids

1 - INTRODUCTION

1.1 - Overview

This monitoring plan (MP) provides guidelines for monitoring the groundwater supply in the James Irrigation District.

This monitoring plan addresses the following topics:

- Monitoring well network
- Groundwater levels
- Groundwater quality
- Mitigation recommendations
- Annual monitoring reports

The following sections provide details of the monitoring plan including monitoring locations, monitoring frequency, water quality constituents, etc.

1.2 - Purpose of Monitoring Plan

The objectives of the monitoring plan are to provide the District with documented information to accomplish the following:

1. Evaluate short-term and long-term changes in groundwater levels to determine the extent of groundwater overdraft, or impact from groundwater recharge facilities.
2. Monitor western JID for shallow groundwater and characteristics typical of drainage impacted lands.
3. Evaluate groundwater quality in western JID for encroachment of poor water quality waters from the west.
4. Evaluate groundwater quality in the Eastside Wellfield for encroachment of saline waters from the Raisin City Oilfield.
5. Identify and monitor measures to mitigate the groundwater quality.

1.3 - Exiting Groundwater Quality

The groundwater quality in JID was evaluated through an analysis of long-term trends and spatial characteristics in total dissolved solids. Total dissolved solids (TDS) is often used as a general indicator of groundwater quality, and it is the only parameter that was consistently monitored in JID for the past 30 years. The analysis did not include a statistical evaluation because most wells lack a sufficient number of data points for a meaningful analysis. Rather, the evaluation is based on visual examination of TDS graphs. The TDS data and graphs used in the analysis can be found in **Appendix A**. The District was separated into six different areas based on 'Area B', thought to be impacted by the Raisin City Oilfield, and 'Area A', an area with little groundwater quality data that is experiencing growth in irrigation well development. These areas are shown

on the attached Groundwater Quality Map (**Attachment 1**). There is insufficient long-term data in Area C to form any conclusions. Note that not all District wells were used in the analysis, but instead representative wells with long-term data in each area were used. The results are summarized in **Table 1** below.

Table 1 – Groundwater Quality Evaluation for James Irrigation District (TDS)

Area	Average*	Range*	Long-Term trend		GW Quality vs. Perforated Interval
			ppm/year*	Remarks	
A	700	300-1,000	+10	Mixed	All perforations similar (~260 to 500 feet)
Vicinity of Area A	375	325-500	Stable	Stable except for slight increase in last 2 years	All perforations similar (~250 to 500 feet)
Area B	1,200	500-2,500	+30	Wells used to have similar water quality but now there is a wide range. All wells increasing in TDS. Well C-70 went up 2,000 ppm in 17 years.	Improves with depth. Wells perforated from 360 to 780 feet have best water quality.
North of Area B	1,100	500-1,750	+2	Mixed but overall slight increase.	Most wells perforated in the same interval but there appears to be a slight improvement with depth
West of Area B	650	375-1250	+10	Most wells increasing each year	Wells perforated in approximately the same depths
East of Area B	400	200-750	+ 7	Wells used to have similar water quality but now there is a wide range. Big jump in 2007 to 2008. Worst near Well C-62 with water quality improving north and south.	No pattern of water quality with depth.

* The average, range and long term trend (ppm/year) were based on a visual examination of graphs and are considered approximate.

2 - MONITORING WELL NETWORK

The monitoring network will include a combination of JID recovery wells (operational and abandoned), JID monitoring wells, and some private wells (operational and abandoned).

Due to a constantly evolving well network a thorough well canvass is recommended to inventory all existing wells. A well canvass would provide helpful information for planning new well sites and evaluating impacts to wells from existing and new JID wells. The well canvass would document the following information for each well:

- Well location (address and section, township and range)
- Well ID number
- Well owner
- Type of well
- Well status (active, abandoned, etc.)
- Well casing diameter
- Well depth
- Perforated interval
- Foundation
- Power supply
- Horsepower
- Discharge pipe diameter
- Discharge direction
- PG&E Tag No.
- Ground surface elevation
- Reference point elevation
- Digital image of well site

3 - GROUNDWATER LEVEL MONITORING

Existing Groundwater Level Monitoring

Groundwater level monitoring in JID includes the following:

Bi-annual Monitoring. PG&E pump tests are performed at each production well every other year, and water levels are measured as part of the tests.
Semi-annual Monitoring. Seventeen production and monitoring wells scattered throughout the District are monitored semi-annually (January and October) and the data is reported to DWR.
Monthly Monitoring. Five monitoring wells scattered throughout the District are monitored monthly.
Weekly Monitoring. Several monitoring and recovery wells at the Lateral K Recharge Basin are monitored weekly. In addition, several wells have data loggers for collecting continuous data.

A thorough well canvass (see Section 2) is recommended to list and inventory all the wells that are monitored.

Monitoring Recommendations for New Wells

The following recommendations are provided for monitoring new wells:

New production wells. Any new production well should be monitored semiannually.
New shallow monitoring wells in Westside of JID. New shallow wells on the Westside of JID should be monitored monthly.
New deep monitoring wells in Central Portion of JID. New deep monitoring wells should be monitored at least semiannually.

4 - GROUNDWATER QUALITY MONITORING

The purpose of groundwater quality monitoring is to identify impacts to the local groundwater supply, and characterize the quality of the water that is pumped and delivered to local growers.

The following recommendations are provided for monitoring groundwater quality in JID

1. Continue to test each new well for an Agricultural Suitability Analysis.

2. Perform Agricultural Suitability Analysis every 5 years (2015, 2020, 2025, etc.) in selected wells in areas of concern. This will be timed with the submission of 5-Year Water Management Plans to the USBR.

3. Test for Additional Constituents in Wells near the City of San Joaquin. If funding from the City of San Joaquin is available, perform more detailed water quality sampling in JID wells near the City of San Joaquin. This information could be useful in determining the quality of groundwater than may be migrating toward the City. Constituents that could be tested include arsenic, gross alpha, Total Organic Carbon, and other constituents important to drinking water quality.

4. Continue to measure Total Dissolved Solids in each well annually. Perform the testing during the same month each year, and document the month in the summary spreadsheet.

5. Regularly calibrate the hand-held TDS meter used to test wells each year, to help ensure that measurements are accurate and trends are properly identified.

Testing Laboratory

Water quality testing should preferably be performed by the same laboratory each sampling period for consistency. Samples will be collected by JID staff or their engineering consultant. In the past, JID has typically used Fruit Grower's Laboratory of Visalia, California.

Modifications to Water Quality Monitoring

Overtime, there may be a need to add or remove sampling sites and to adjust the timing of the sampling events. This monitoring plan will be updated with changes to the locations and schedule as needed. If more sampling sites are needed then monitoring wells can be purged and samples collected, or the District could seek permission to collect water quality samples from private agricultural or domestic wells in the area.

5 - MITIGATION RECOMMENDATIONS

The following measures are recommended to mitigate groundwater quality problems in the James Irrigation District.

WELL DRILLING

Continue Drilling Test Holes. Currently, before production wells are drilled, a test hole is installed to determine the lithology and perform en E-log. The E-log is used as a relative measure of groundwater salinity. These test holes have shown that groundwater quality is usually, but not always, better beneath the Corcoran Clay. Continued use of test holes will help to identify the best depth for groundwater quality in new JID wells.

Drill New Wells in Areas with Low TDS. New wells can be drilled in areas that have historically had low TDS values and/or are not showing a temporal increase in TDS. *Currently, the best location for groundwater quality is the northeast portion of the JID wellfield easement.*

Install Wells in Undeveloped Portion of JID Wellfield. A portion of the JID eastside wellfield remains undeveloped with no canals or wells, in particular the area east of Dickenson Avenue on alignments along Bishop Avenue and Adams Avenue. No information is readily available on the groundwater quality in this area, but just to the west the wells produce the best groundwater quality of any JID wells.

Install New Wells in Groundwater Recharge Areas. New production wells can be installed in or near groundwater recharge areas so they can extract some of the lower TDS surface water that was recharged.

GROUNDWATER RECHARGE

Increase Groundwater Recharge. An increase in groundwater recharge, either through construction of new facilities or diversion of more surface water, will help to improve the groundwater quality by diluting the lower TDS surface water with the higher TDS groundwater. Hence, groundwater recharge can be an effective form of salt management.

Install Injection Wells for Groundwater Recharge. Install injection wells (also known as aquifer-storage-recovery wells) in areas that do not have suitable soils for surface infiltration. This will also help to improve groundwater quality.

Groundwater Recharge along McMullin Grade. JID has numerous wells along McMullin Grade, but no dedicated recharge basins are operated in the area. JID's

groundwater recharge facilities are all located long the Fresno Slough Bypass. The McMullin Recharge Group has investigated potential recharge sites in the area, but no good sites were identified. Due to the potential benefits to the groundwater quality, JID should continue to investigate potential recharge sites along McMullin Grade.

WATER MANAGEMENT AND USAGE

Blend Water Supplies to Improve Water Quality. Blend surface water and groundwater supplies so the water delivered to farms is not too high in salts or other constituents. This could be maximized by extending surface water deliveries as long as possible during the irrigation season (i.e. avoid groundwater only periods). This goal can be met with development of additional surface and subsurface storage, and delaying use of surface water when practical.

Pump Lower TDS Wells when Feasible. When feasible, particularly when only some of the District wells are being used, pump water from wells with the best water quality.

Purchase Surface Water Supplies. JID can purchase surplus or unused water supplies from other water agencies, such as the Fresno Irrigation District, and use the water in-lieu of groundwater pumping. The surface water would have better water quality than the groundwater, and any water that percolates will help to improve the groundwater quality.

OTHER

Reduce Seepage in Westside of District. Minimize seepage from conveyance facilities to prevent buildup of shallow groundwater on the Westside of the District. This can be accomplished by compacting canal banks, lining canals, or pipelining canals. The amount of seepage on the District's west side is not accurately known. Therefore, a study and field tests may be needed to evaluate the merits and economics of any seepage control measures. Shallow monitoring wells constructed in 2010 showed groundwater levels were about 80 feet below ground surface, indicating there were no drainage problems. These wells should continue to be monitored.

Prepare a Salt Management Plan. Salt levels in JID area steadily rising, as evidenced from 30 years of continuous groundwater quality data. Under current practices, salts will continue to accumulate in the groundwater and soil, and reduce the beneficial use of the groundwater for crop irrigation. JID should prepare a Salt Management Plan as the initial step in identifying the salt loading sources as well as remedial and preventative measures. The State Water Resources Control Board is encouraging every region in California to develop salt/nutrient management plans by 2014, and it is possible that Salt Management Plans or salt monitoring will be required in the future.

Reformed Land Practices. Groundwater quality generally declines with an increase in pumping. Therefore, water conservation efforts can help to preserve the groundwater quality. Water usage can be reduced by shifting to less thirsty crops, and improving irrigation efficiencies with the installation of drip and micro-irrigation systems. JID will encourage growers to take these steps and will facilitate efforts to secure grants and low interest loans on behalf of the growers.

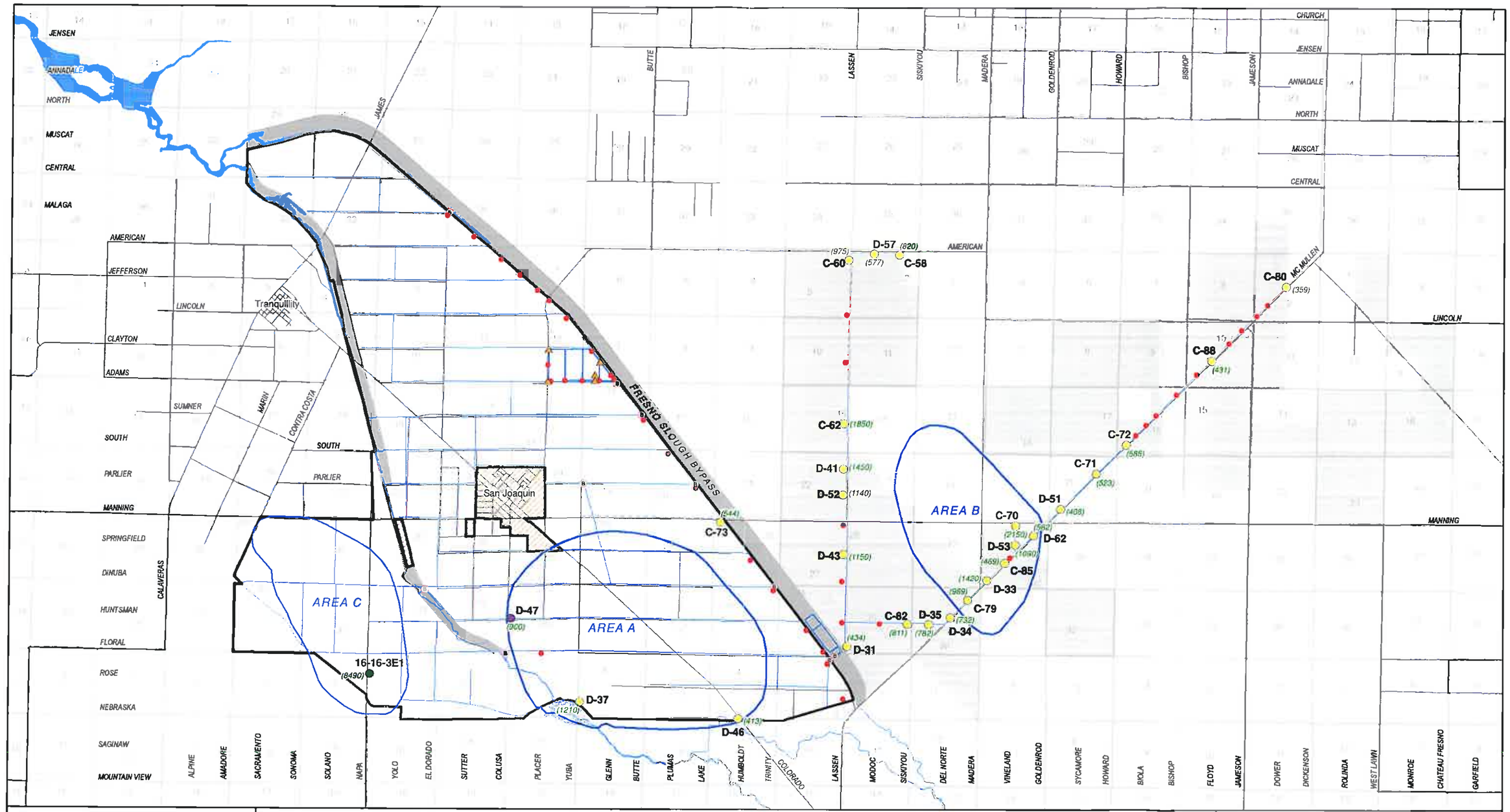
- REFERENCES

Water Resources, *San Joaquin Valley Drainage strict Report*, September 2003.

s, *Oil Field Waste Water Disposal, Raisin City Oil* 1955.

eering Group, Inc., *James Irrigation District 5-Year 03-2004*, December 2005.

ineering Group, Inc., *Groundwater Management or Local Groundwater Assistance Grant*, December



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James Irrigation District
Groundwater Quality - Vicinity of Area A

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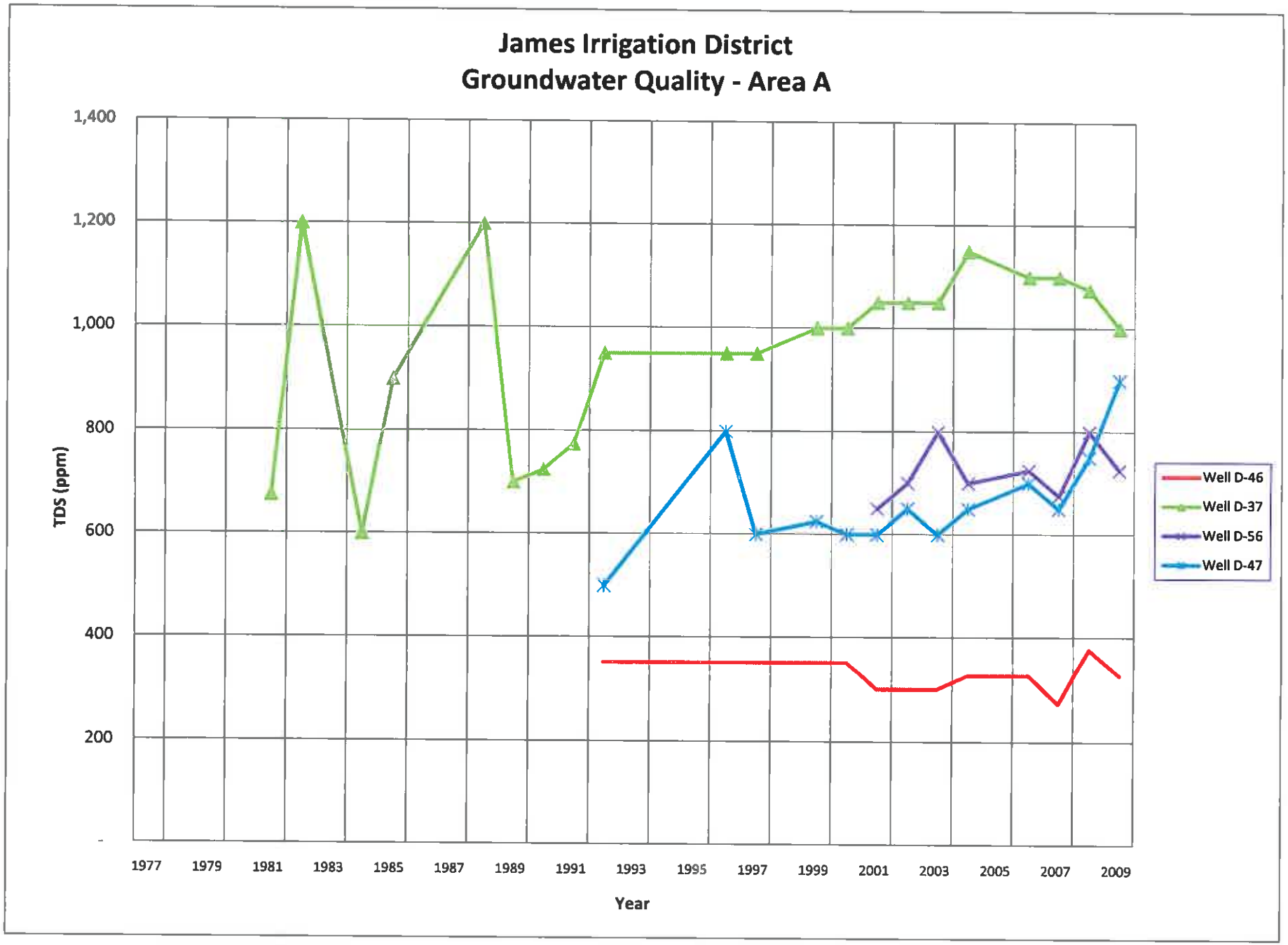

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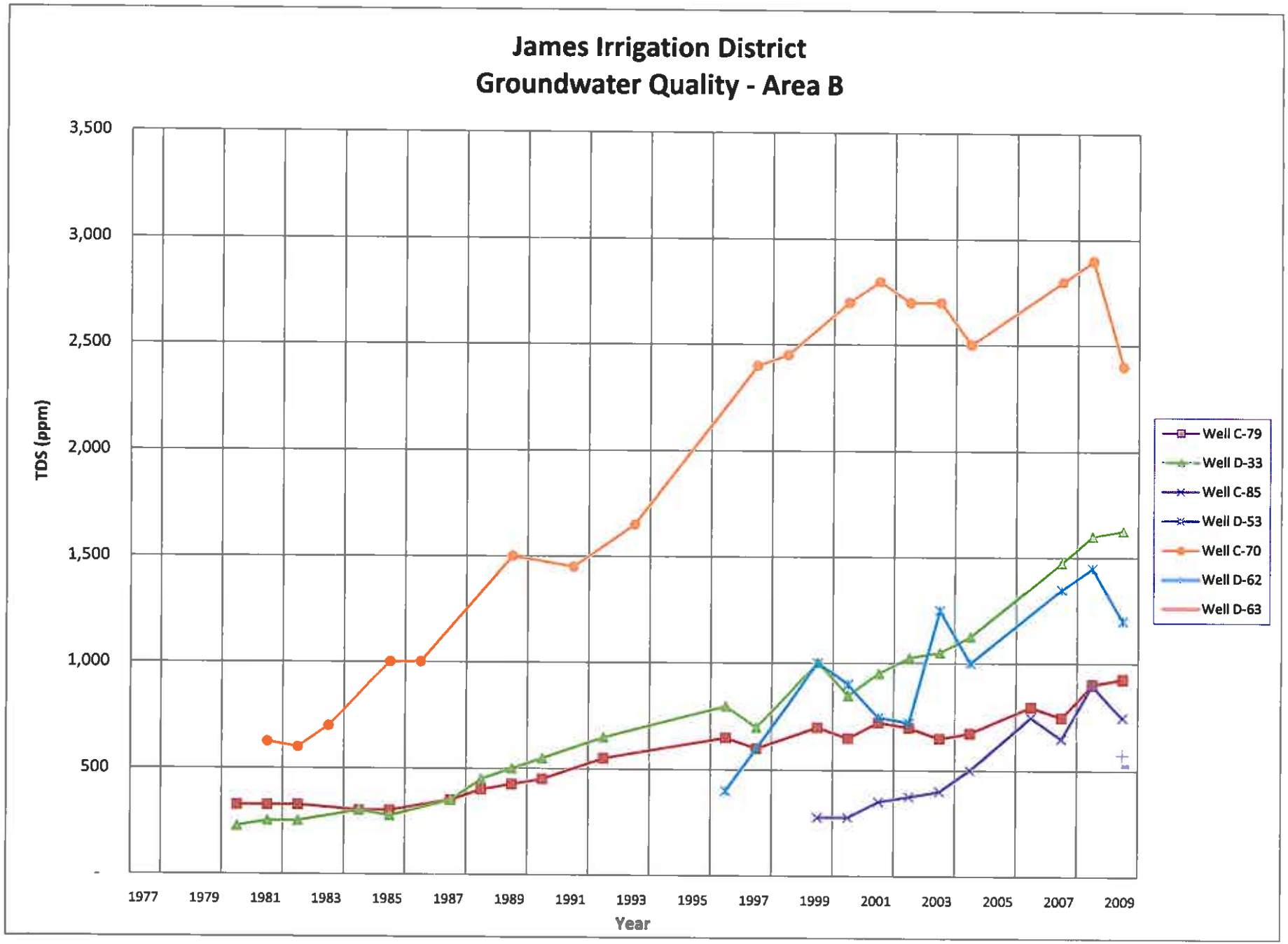
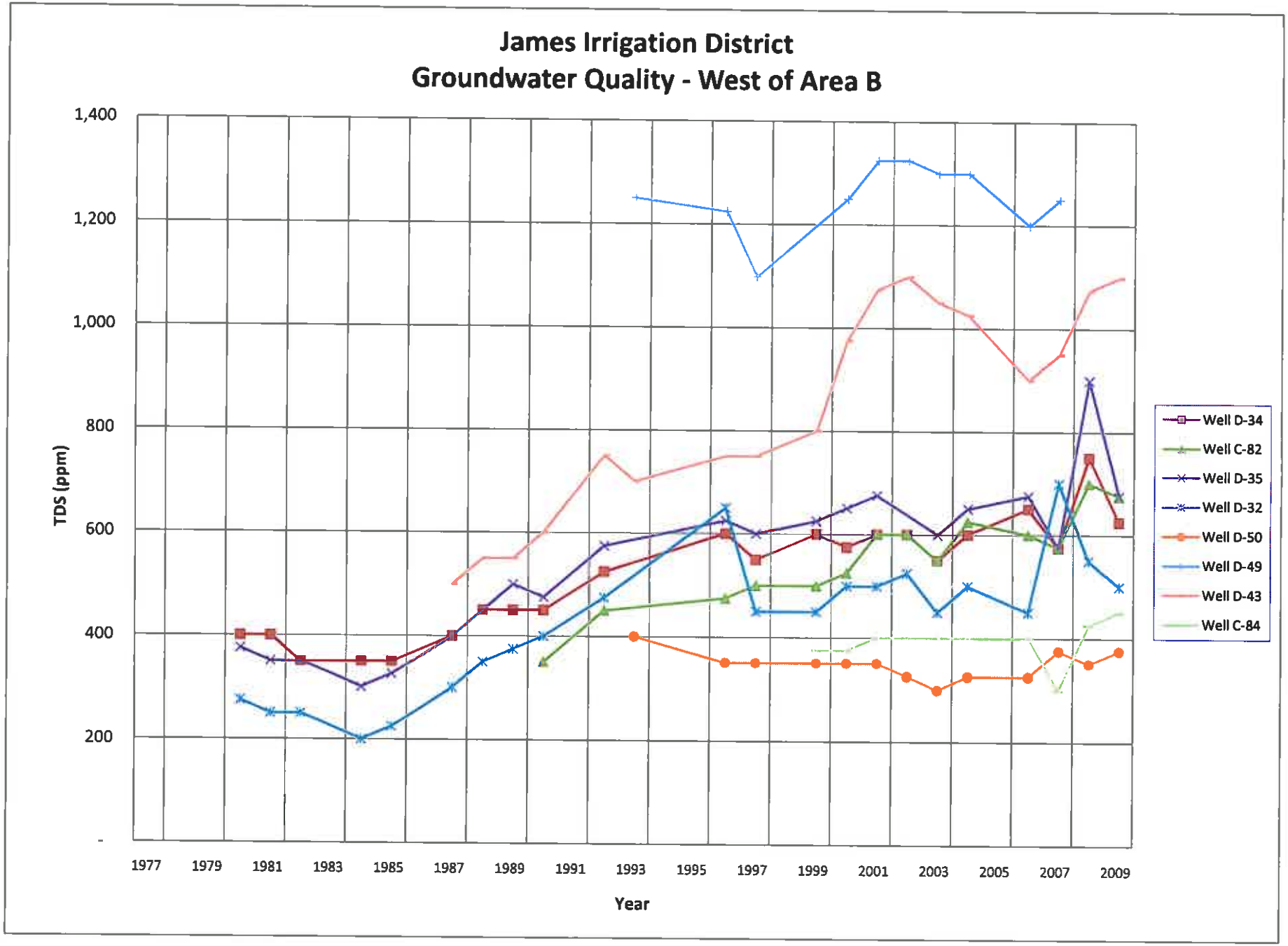

James Irrigation District
Groundwater Quality - Area B
TDS (ppm)
3,500
3,000
2,500
2,000
1,500
1,000
500
-
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
Year
Well C-79
Well D-33
Well C-85
Well D-53
Well C-70
Well D-62
Well D-63

James Irrigation District
Groundwater Quality - West of Area B



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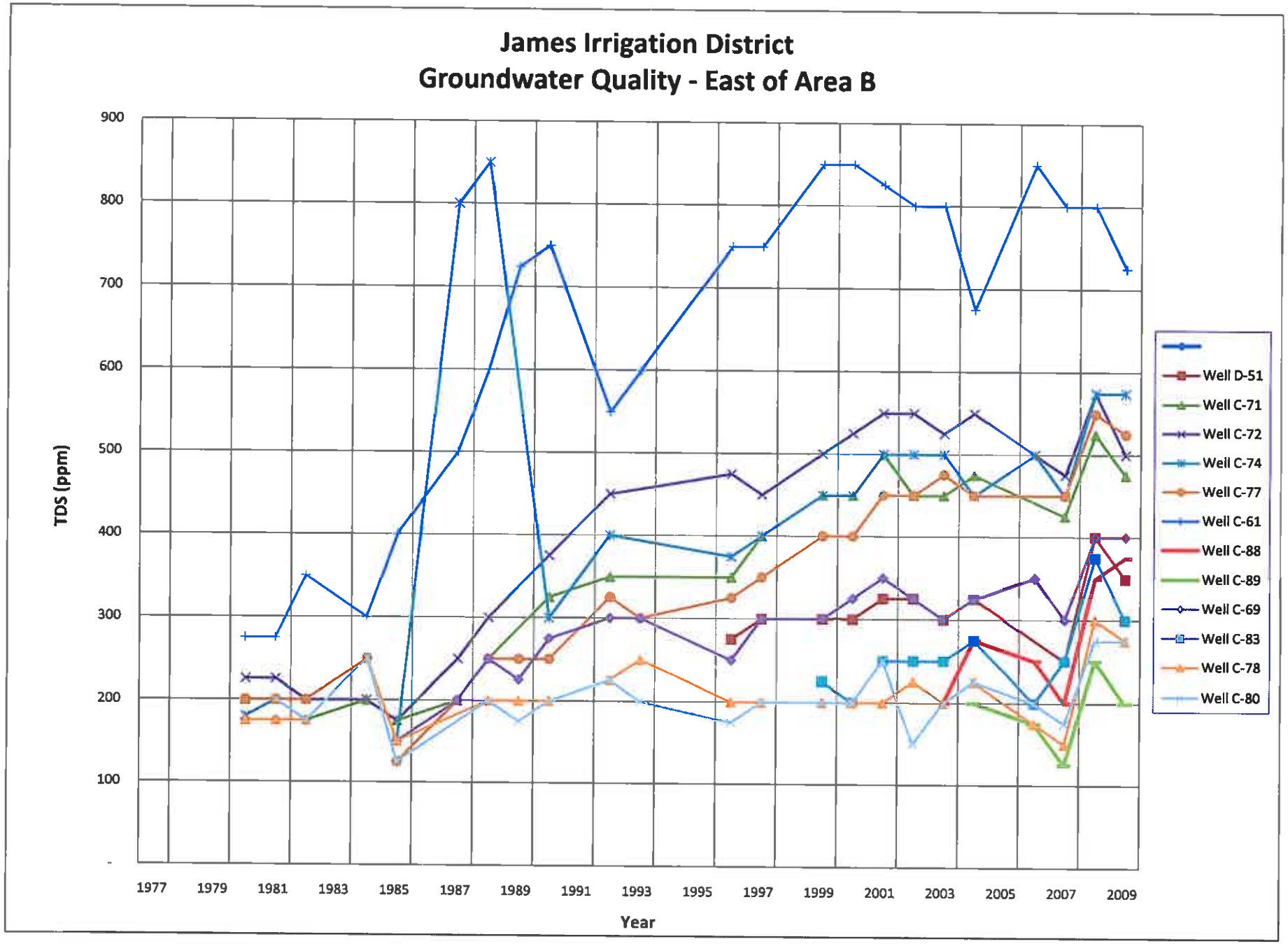

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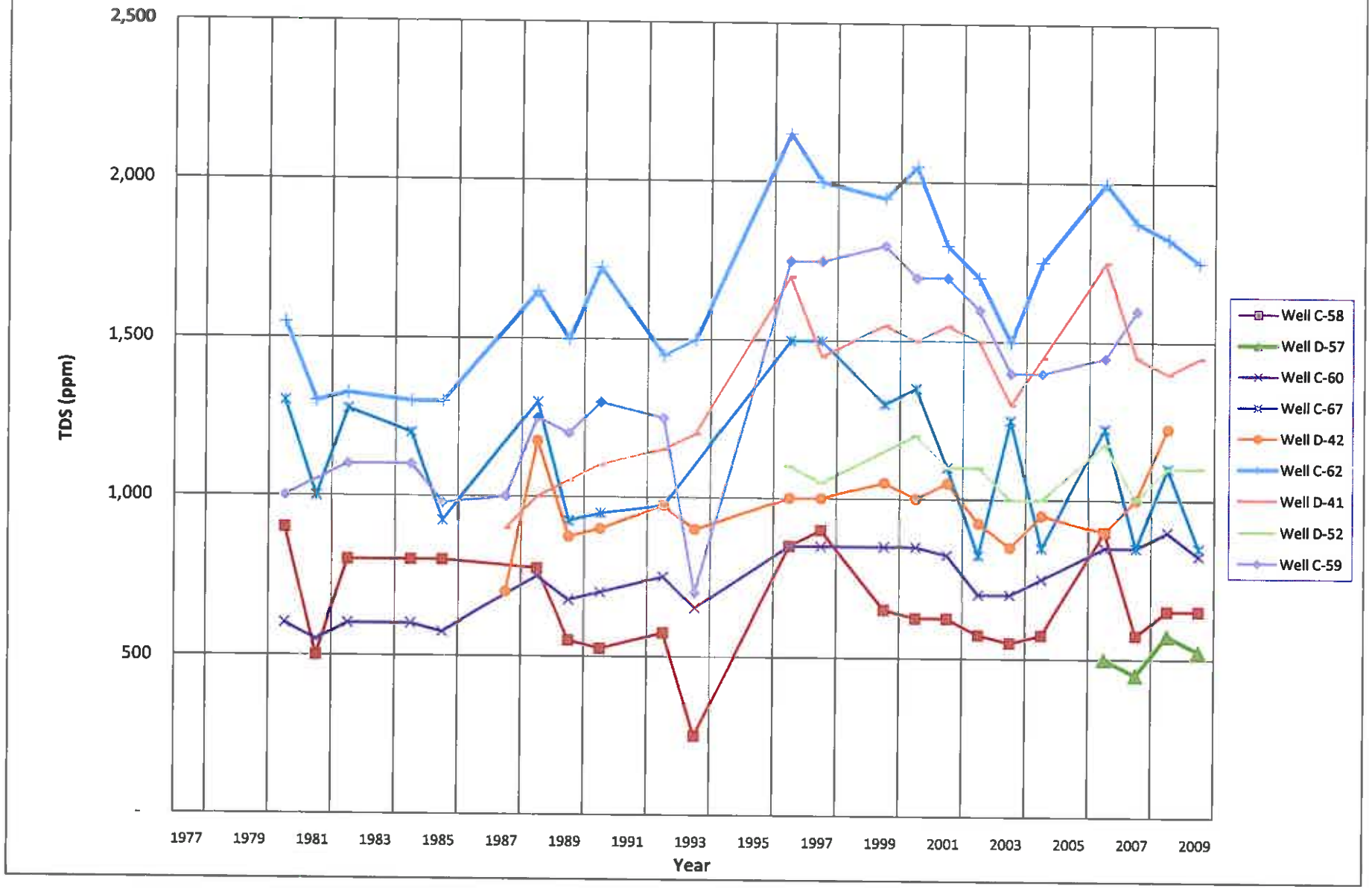
James Irrigation District
Groundwater Quality - North of Area B



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JAMES IRRIGATION DISTRICT

CITY OF SAN JOAQUIN

GROUNDWATER MANAGEMENT PLAN

APPENDIX G

GROUNDWATER MONITORING PROTOCOLS

GROUNDWATER MONITORING PROTOCOLS

GENERAL SCOPE

The purpose of this document is to insure that the sampling and analytical methods are adequately documented and appropriate for the project scope and purpose by individuals responsible for implementing the monitoring program. Examples of all required forms are presented at the end of this section.

In general, measurements of the static water level will be taken from the top of each casing, and then the monitoring wells will be purged and sampled. A detailed description of these procedures follows.

EQUIPMENT USED DURING SAMPLING

Water level sounding equipment and field meter probes (pH, dissolved oxygen, conductivity, temperature, and turbidity) will be thoroughly rinsed with de-ionized/distilled water before and after each reading. All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use.

The monitoring wells will be equipped with a dedicated sampling well pump or sampling activities will utilize disposable bailing equipment. All non-dedicated sampling equipment (in contact with sample) shall be thoroughly cleaned prior to each sampling event to prevent cross-contamination between samples and to ensure accurate representation of analytes of interest in each sample. All sample containers and sampling equipment shall be sterilized and transported to the field under conditions to preserve its sterility. Personnel performing decontamination shall wear gloves, eye-protection, and such other safety equipment as needed. The analytical laboratory as part of their agreement shall provide all sample containers, container preparation services, preservatives, and field blanks.

EQUIPMENT DECONTAMINATION PROCEDURES

All equipment that comes into contact with potentially contaminated water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. The following, to be carried out in sequence, is the recommended procedure.

- Non-phosphate detergent and tap water wash, using a brush if necessary;
- Tap water rinse; and

- Deionized/distilled water rinse.

WATER LEVEL MEASUREMENT PROCEDURES

Water levels will be measured in wells that have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

If wellheads are accessible, all wells will be sounded for depth to water from top of casing and total well depth prior to purging. An electronic sounder, accurate to the nearest +/- 0.01-ft, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column, the graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering the weighted probe to the bottom of the well and recording the depth to the nearest 0.1-ft. Depth to water and total well depth will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section.

WELL PURGING

The wells will be sampled no sooner than 48 hours after well development. All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump, if present, or a bailer, hand pump, or submersible pump depending on the diameter and configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. Pumps will be placed 2 to 3 ft from the bottom of the well to permit reasonable draw down while preventing cascading conditions.

Water will be collected into a measured bucket to record the purge volume. Casing volumes will be calculated based on total well depth, standing water level, and casing diameter. One casing volume will be calculated as $\mathbf{V} = \pi\ \mathbf{r}^2\ \mathbf{h}\ \mathbf{7.48}$ where **V** is the volume of one well casing of water in gallons ($1ft^3 = 7.48$ gallons); $\pi = 3.14$; **r** is the radius of the inner well casing (in ft); and **h** is the total height of the water column in the well (in ft).

It is most important to obtain a representative sample from the well. Stable water quality parameter field measurements (temperature, pH, and specific conductivity [EC]) indicate representative sampling is obtainable. Water quality is considered stable if for three consecutive readings:

- Temperature range is no more than +1/C;
- pH varies by no more than 0.2 pH units; and
- EC readings are within 10% of the average.

If the well casing volume is known, measurements will be taken before the start of purging, in the middle of purging, and at the end of purging each casing volume. If the well casing volume is NOT known, measurements will be taken every 2.5 minutes after flow starts. If water quality parameters are not stable after 5 casing volumes or 30 minutes, purging will cease, which will be noted in the field notes, and ground water samples will be taken. The depth to water, water quality field measurements, and purge volumes will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section.

If a well dewaters during purging and three casing volumes are not purged, that well will be allowed to recharge up to 80% of the static water column and dewatered once more. After water levels have recharged to 80% of the static water column, groundwater samples will be collected.

WATER LEVEL MEASUREMENT AND WELL PURGING RECORDS

During the collection of each sample, the following information will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section:

- Well identification;
- Sampler's name(s);
- Date and time of sample collection;
- Designation of sample as composite or grab, if applicable;
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of samples (e.g., conditions in nearby waterways, weather conditions, noticeable odors, colors, etc.);
- Preliminary sample descriptions (e.g., clear with strong ammonia-like odor);
- Time of arrival/entry on site and time of site departure; and
- Deviations from sampling plans.

PURGED WATER DISPOSAL

Purged and excess groundwater collected for sample container filling may be disposed on site or in the sampling area by dispersing onto the ground, or at the owner's direction.

ANALYTICAL METHODS AND REPORTING LIMITS

Requested analytes are provided in the following table. Reporting limits are laboratory specific based on the type of equipment each laboratory uses. Analytical methods and holding times are listed by analyte below.

Analyte	Standard Method	EPA Method	Holding Time
PH	4500H-B	150.1	24 hours
EC	2510B	120.1	28 days
Alkalinity	2320B	310.1	14 days
Ammonium	4500NH4	350.1	28 days
Bicarbonate	2320B	310.1	14 days
Carbonate	2320B	310.1	14 days
Chloride	4500Cl	300.0	28 days
Iron	3120B	200.7	6 months
Magnesium	3120B	200.7	6 months
Manganese	3120B	200.7	6 months
Nitrate as N	4500NO3	353.2; 300.0	48 hours
Nitrite as N	4500NO2	353.2; 300.0	48 hours
Phosphorus	4500P	365	28 days
Potassium	3120B	200.7	6 months
Sodium	3120B	200.7	6 months
Sulfate	4500SO4	300.0	28 days
TDS	2540C	160.1	7 days
TKN	4500-NH3	351	28 days

SAMPLE CONTAINERS AND PRESERVATIVES

Sample containers are generally available directly from the laboratory. All containers will be one-liter polyethylene, precleaned, and analyte specific. Groundwater samples for TKN and ammonia will be collected in containers containing H_2SO_4 as a preservative. The remaining samples need not be preserved. If a preservative is present, the bottle will be capped and lightly shaken to mix in the preservative. Samples from each location that require the same preservative may be placed in the same bottle if being analyzed by the same laboratory. Samples to be analyzed for dissolved metals must be filtered prior to preservation and analysis.

SAMPLING PROCEDURES

Water samples will be collected from each well and placed into laboratory prepared containers, sealed with tight fitting caps, labeled, and stored in a cool ice chest. Water

used for field measurements of temperature, pH, and EC shall not be used as sample water. The following are the recommended sample collection procedures:

- Rinse the tubing with one liter of sample prior to sample collection;
- If no preservative is present, rinse sample bottles three times with a small amount of sample;
- Collect sample directly into the sample bottle;
- Allow sample containers to be open for the shortest time possible to prevent contamination;
- Do not touch the inside of bottles, lids, or tubes. Hold the bottle lid with the inside facing down to prevent contaminating the inside of the lid;
- Allow the sample water to flow into the bottle from above;
- Close bottle tightly,
- Samples will be chilled to 4 C° immediately upon collection; and
- Transport samples to the lab as soon as possible.

At each sampling location, all bottles designated for a particular analysis will be filled sequentially before bottles designated for the next analysis are filled. If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis will be filled sequentially before bottles for another analysis are filled.

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Every sample, including samples collected from a single location but going to separate laboratories, will be pre-assigned an identifiable, unique sample number. The following is an example sample label:

Sample #:	**Well ID:**
Analytes:	**Date:**
Collected by:	**Time:**

It will be possible to identify each unique sample by recording the following information on the Monitoring Well Purging and Sampling Record:

- Sample identification numbers and any explanatory codes;
- Sample date and time;
- Lot numbers of the sample containers;
- Chain-of-custody form numbers;
- Shipping arrangements (overnight air bill number); and
- Name(s) of recipient laboratory (ies).

CHAIN-OF-CUSTODY

A chain-of-custody (COC) record will be completed and accompany all sample shipments for each laboratory and each shipment. If multiple coolers are sent to a

single laboratory on a single day, COCs will be completed and sent with the samples for each cooler. Generally, the laboratory will supply blank COCs. An example COC is included at the end of this section.

The COC will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. The sampling team leader or designee will sign the COC in the "relinquished by" box and note date, time, and air bill number.

SAMPLE HANDLING AND TRANSPORT

The following outlines the packaging procedures for sample delivery to a California Certified Environmental Laboratory Accreditation Program (ELAP) laboratory:

- Pack ice in zip-locked, double plastic bags. Seal the drain plug of the cooler with tape to prevent melting ice from leaking out;
- Line the bottom of the cooler with bubble wrap to prevent breakage during shipment;
- Check screw caps for tightness;
- Seal all container tops with tape;
- Secure sample labels onto the containers with clear tape;
- Wrap all glass sample containers in bubble wrap to prevent breakage;
- Seal all sample containers in heavy-duty plastic zip-lock bags with the sample numbers written on the outside of the bags with indelible ink;
- Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid;
- Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment;
- Double seal ice in two ziplock plastic bags and place on top and around the samples;
- Secure each ice chest with strapping tape; and
- Secure address and shipping labels to cooler.

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Monitoring Well Purging and Sampling Record

Client: _____ Date: _____
Project Name: _____ County: _____
Project Address: _____
Project Manager: _____ Job No: _____ Phase(s): _____
Regulatory Contact: _____ Telephone: _____
Sample Containers: _____ Air Temp (F): _____
Preservatives: _____ Precipitation: _____
Instrumentation: _____ Wind (dir/speed): _____
Date Last Calibrated/By: _____ Sampler Signature: _____

Well Number						
Well Elevation (ft)						
Well Diameter (in)						
Slotted Interval (ft)						
DTW (ft)						
GW Elevation (ft)						
Sounding Depth (ft)						
Well Volumes (gal)						
Notes:						
Well Volume Purged (1st)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Well Volume Purged (2nd)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Well Volume Purged (3rd)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Sample Depth (ft)						
Sample Time						

Equipment used:

Remarks:

2" Well Volume = 0.163 x height of water column

4" Well Volume = 0.653 x height of water column