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1176	1	While [San Joaquin] County appreciates the effort by the State Water Resources Control Board ("State Board") on the SED and Proposal, as prepared, the Proposal will continue to have significant impacts on San Joaquin County. The County respectfully submits that the Proposal is unlawfully based upon a flawed SED which fails to recognize the economic and water supply impacts of the Proposal. Specifically, the document does not evaluate the true impacts of the flow and salinity requirements, nor does it provide adequate analysis to support a decision by the State Board.	Please see Master Response 1.1, General Comments, for responses to comments that do not raise significant environmental issues or that make a general comment regarding the plan amendments, including those that questioned the adequacy of the environmental impact analysis but did not provide a rationale.
1176	2	The Proposal is Unlawful and Should be Revised The proposal violates California water right priorities: California water rights law is premised on an established priority system by which shortages among competing water right holders are resolved based on water right priorities. As written, the SED conflicts with the current law by ignoring the water right priority system and the relevant protective statutes. The possible violations are numerous due in part to the limitation of the SED to the three tributaries between the rim dams and the San Joaquin River resulting in high priority or protected water right holders being impacted while lower priority water right holders are either not impacted or impacted to a lesser extent. California's water rights operate under a dual system recognizing both riparian and appropriative water rights. "Appropriation rights are subordinate to riparian rights so that in times of shortage riparians are entitled to fulfill their needs before appropriators are entitled to any use of the water." (El Dorado Irr. Dist. v. SWRCB (2006) 142 Cal.App.4th 937, 961 (citing Racanelli at 102).) "And as between appropriators, the rule of priority is 'first in time, first in right.'" (Racanelli at 102; Irwin v. Phillips (1855) 5 Cal. 140, 147.) "The senior appropriator is entitled to fulfill his needs before the junior appropriator is entitled to use any water." (Racanelli at 102; Phelps v. SWRCB (2007) 157 Cal.App.4th 89, 118.) Thus, riparians take first and in the entire amount to fulfill the riparians' reasonable and beneficial uses, subject only to the correlative rights of other riparians. Then senior appropriators may take from any surplus, followed by more junior appropriators. Competing demands for water by water right holders are properly resolved by applying the priority system, not by "balancing" as is done in the Proposal and SED and which would not actually be done under California law. Any reductions in use of water from the affected area as required by the proposed flow and salinity objectives in the SED must adhere to this priority hierarchy. However, here, the Proposal does not address priorities and specifically leaves off any reduction of water use from the Friant Dam by citing other contractual arrangements. The SED analyses and Proposal thus both violate California water rights law and do not disclose to the decision makers what in reality would happen.	Please refer to Master Response 1.2, Water Quality Control Planning Process, for why arguments that the plan amendments violated the rules of priority under California water law are incorrect and premature.
1176	3	The SED Does Not Protect In-Delta Needs Before Allowing Exports In conjunction with the system of water right priorities, California has enacted statutes to protect the water rights of residents in areas of origin. The Watershed Protection Act was passed in 1933, and it ensures that water users within a watershed of origin will not be deprived "of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein." (Wat. Code § 11460.) The Delta Protection Act of 1959 was passed to ensure that water right holders within the legal Delta have an adequate supply of good quality water, and it requires that	None of the laws cited has been violated, because as explained in Master Response 1.2, Water Quality Control Plan Process, the plan amendments have yet to be implemented by a water right decision amending specific water right permits and licenses or by regulation. In the implementation process, the State Water Board will carefully examine and balance the competing uses of water and consider all applicable law in reaching its decisions about how to implement the water quality objectives.

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		the CVP and the SWP coordinate to provide "salinity control and an adequate water supply for the users of water in the Sacramento-San Joaquin Delta." (Wat. Code§ 12202.) Further, Water Code section 12203 provides that no person, corporation, public or private agency should divert from the Delta "to which the users within said Delta are entitled." No water shall be exported if needed to meet the above requirements. (Wat. Code§ 12204.) Thus, the Water Code prohibits exports if Delta water right holders cannot receive all the water of sufficient quality to which they are entitled. The Delta and the San Joaquin River System are specifically named protected areas, and under the "protected area" statutes, water exporters cannot deprive enumerated protected areas "of the prior right to all the water reasonably required to adequately supply the beneficial needs of the protected area, or any of the inhabitants or property owners therein." (Wat. Code§§ 1215.5, 1216.) The beneficial and reasonable uses of any water right holder in the Delta or on the tributaries to the San Joaquin River have priority senior to that of any exporter. Therefore, under the State's priority system, the SED should provide that any required reductions of Delta or tributary water use must first be borne by exporters before any Delta tributary water right holders are affected. The SED fails to recognize any of the above priorities.	
1176	4	The SED Does Not Satisfy CEQA Requirements The SED does not fully evaluate impacts: Although exempt from the EIR requirement of CEQA, the adoption of the water quality control plan is subject to the SED requirements of section 3777 of the California Code of Regulations. And though the CEQA Guidelines do not directly apply to the required SED, the SED is subject to the broad policy goals and substantive standards of CEQ A. (See City of Arcadia v. State Water Resources Control Board (2006) 135 Cal.App.4th 1392, 1422.) The SED provides that it performs a macroscopic programmatic analysis rather than a project-level analysis. While this is permissible, the SED must still include the rigorous environmental analysis required by applicable regulations. The SED must identify any significant or potentially significant adverse environmental impacts of the proposed project. (Cal. Code Regs., tit. 23, § 3777.) The SED must also include an analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant adverse environmental impacts. (Cal. Code Regs., tit. 23, § 3777; see City of Arcadia, 135 Cal.App.4th at 1422.) Throughout the SED inadequate environmental analysis is performed and the SED violates the obligations imposed by CEQA.	We agree with the commenter's summary of CEQA as it applies to this proceeding; however, we disagree that the SED fails to comport with CEQA related to analyzing environmental impacts of the plan amendments, mitigating significant environmental impacts, and analyzing a reasonable range of alternatives. Please see Master Response 1.1, General Comments, regarding the programmatic analysis in the SED, the difference between programmatic and project-level analyses, and for information regarding the impacts evaluated in the SED. Also, please see Master Response 1.1, General Comments, for a discussion of mitigation measures as it applies to the SED. Please see Master Response 2.4, Alternatives to the Water Quality Control Plan, regarding the alternatives evaluated in the SED.
1176	5	The SED Unlawfully Piecemeals the Project CEQA requires that the "lead agency must consider the whole of an action, not simply its constituent parts, when determining whether it will have a significant environmental effect." (Cal. Code Regs., tit. 14, § 15003 (citing Citizens Assoc. For Sensible Development of Bishop Area v. County of lnyo (1985) 172 Cal.App.3d 151).) Courts have recognized that CEQA forbids "piecemeal" review of the significant environmental impacts of a project. (See Communities for a Better Environment v. City of Richmond (201 0) 184 Cal.App.4th 70 (providing a history of "piecemeal" challenges).) "Rather, CEQA mandates that environmental considerations do not become submerged by chopping a large project into many little ones--each with a minimal potential impact on the environment--which cumulatively may have disastrous consequences." (Id. at pg. 989 (citing Bozung v. Local	Please see Master Response 1.2, Water Quality Control Planning Process, for a discussion of why the plan amendments and future amendments to the Bay-Delta Plan involving other watersheds are separate, distinct and independent from each other and serve different purposes, such that no "piecemealing" has occurred to underestimate environmental impacts. Chapter 9, Groundwater Resources, includes a discussion of historical groundwater use and overdraft in the groundwater basins underlying the plan area and evaluates and discloses the significant potential environmental impacts to groundwater levels as a result of water users choosing to increase groundwater pumping in response to reduced surface water supplies from the plan amendments. The SED proposes mitigation measures for local agencies to exercise their full authorities to address undesirable results to groundwater, including substantial depletion of groundwater, under the Sustainable Groundwater Management Act (SGMA) and their police powers, the latter of which has been underutilized to date. As stated in the SED, doing so would prevent groundwater depletion or mitigate impacts. Nonetheless, the SED

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		Agency Formation Com. (1975) 13 Cal.3d 263, 283-284).) The Board is phasing its current review of the Bay-Delta Plan with Phase 1 being the review of San Joaquin River flow and South Delta salinity objectives and Phase 2 being a comprehensive review of all other water quality objectives. The objectives developed in each phase will combine to make up the Bay-Delta Water Quality Control Plan. Performing the environmental review of the objectives in phases is the exact type of "piecemealing" that is prohibited under CEQA. In the Delta, with its connected hydrological system, the environmental impacts from one objective will combine with and influence the impacts of another. For example, by not evaluating the carryover storage requirements or groundwater impacts from future overdraft, the SED improperly evaluates and fails to provide the decision makers with the information necessary for an informed decision as required by CEQA.	concludes the impact would remain potentially significant and unavoidable given the inherent uncertainty in the degree to which the mitigation may be implemented by local authorities. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for more information on SGMA. The impacts related to reservoir carryover storage has been evaluated in the SED. Please also see Master Response 3.2, Surface Water Analyses and Modeling, on how carryover storage requirements were modeled in the SED.
1176	6	The SED's analysis of the biological objective for fish populations is entirely incomplete and defers calculations to future phases. Specifically, at the San Joaquin County Board of Supervisors meeting on November 15, 2016, State Board staff member Les Grober testified that Salsim model used in the SED "does not do a good job of calculating the number of fish." [Footnote 1: A video of the Public Board meeting is available here: http://sanjoagumcountvca.igm2.com/Citizens/SplitView.aspx?Mode=Video&MeetingiD=l040&Format=Minutes. Please refer to minutes 4:08 through 4:12 for the testimony referenced.] Mr. Grober also went on to say that "the model is not sophisticated enough" and that because of the State Board's use of Salsim, they "don't have good numbers . . . for what can be achieved." (Id.) In his final response to what the objectives for fish populations may actually be, Mr. Grober stated that the fish numbers are "a big unknown." (Id.) This is one specific example of State Board staff's own acknowledgement of the inadequate analysis that is included in the SED. The SED's use of Salsim and the staff's response fail to meet the CEQA requirements as a proper environmental review must thoroughly consider the Bay-Delta Plan as a whole with all of its component objectives and potential impacts.	As part of implementing the flow objectives, the program of implementation requires the development of biological goals, which will inform adaptive methods, evaluate the effectiveness of the program of implementation, the San Joaquin Reporting and Monitoring Program, and future changes to the Bay-Delta Plan. Such a requirement falls squarely within Water Code § 13241 pertaining to programs of implementation. Please refer to Master Response 2.2, Adaptive Implementation, for more information regarding biological goals and how adaptive methods may proceed with currently available information. See Chapter 19, Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30, which provides a use advisory for SalSim and specifically describes the limitations of SalSim. Please refer to Master Response 3.1, Fish Protection, for more information regarding how SalSim was used in light of the limitations, for discussion of the interpretation of model output results, and regarding biological goals.
1176	7	The SED makes no mention of the California WaterFix, which if approved and implemented, would further exacerbate water quality in the South Delta, among other places. Under CEQA, a project still in the application phase must, nonetheless, be included in the cumulative analysis. The SED makes no attempt to evaluate the potential cumulative impacts that the Proposal and WaterFix could create. The proffered SED is inadequate in that it "piecemeals" the environmental review of the Bay-Delta Plan.	Chapter 17, Cumulative Impacts, Growth-Inducing Effects, and Irreversible Commitment of Resources, evaluates the cumulative environmental impacts of the plan amendment and other projects with related environmental impacts, including California WaterFix.
1176	8	The SED Woefully Underestimates Economic Impacts The attached Stratecon, Inc. [Footnote 2: Stratecon, Inc. is a strategic planning and economics consulting firm specializing in water. The firm in combination with Eco Global Natural Resources prepared the attached report entitled "The Economic Consequences of the Proposed Flow Objective for the Lower San Joaquin River in Merced, San Joaquin and Stanislaus Counties" on behalf of the three counties. Both experts offer more than 30 years of experience each in agricultural and economic analysis, and the attached report provides a comprehensive review of the potential impacts from the Proposal and SED.] report estimates that the proposed flow objectives would reduce the three counties' reliable surface water supplies on average by 60% or about 600,000 acre-feet per year. (See	Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of economic analysis performed by Stratecon, Inc. Please also see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding increase in groundwater pumping costs as it relates to change in groundwater elevations. ts and SWAP, regarding the scope of the agricultural economic analysis and potential effects of reduced water supply reliability. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for discussion of the plan amendments and SGMA implementation. Please see Master Response 3.6, Service Providers, for discussion of municipal water supplies.

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		Attachment 2 [ATT2] which is hereby incorporated into these comments.) Stratecon estimates that the SED would reduce the economic value of surface water rights by 50% and drastically reduce the reliability of the region's water supplies, which will have far reaching adverse impacts on the region's long-term economic stability. A less reliable water supply will weaken the economy in San Joaquin County. This will limit the region's ability to attract employers, create higher paying jobs, and promote investments in sustainable development. Further, urban areas will also be impacted economically by the Proposal as the cities of Stockton and Manteca rely on groundwater and surface water which are both at risk under the SED and looming Sustainable Groundwater Management Act ("SGMA") reductions. In addition, Stockton East Water District ("SEWD") and Central San Joaquin Water Conservation District ("CSJWCD") both provide water for irrigated agriculture with SEWD also providing water for municipal uses to approximately 349,000 residents in the City of Stockton Metropolitan Area [Footnote 3: See the Urban Water Management Plan adopted June 28, 2016, available at: http://wuedata.water.ca.gov/uwmp_plans.asp, and as junior water right holders, they will be impacted to an even greater extent which is not considered in the SED.	
1176	9	The SED Does Not Analyze the Economic Impacts to Disadvantaged Communities within [San Joaquin] County. The SED woefully underestimates the economic impact of having less water available for the region, which already suffers from the State's highest unemployment rate. Underrepresented communities composed of poor and primarily minority residents, coupled with some of the worst unemployment rates in the nation, make the SED and Proposal a killer for our region. The State Board staff figures the increased flows would result in fallowing 23,000 acres and costing 433 jobs, which is grossly under-calculated. It appears that the SED only recognizes actual field jobs in agriculture and not the many related jobs in sectors such as processing, distribution, and related services.	Please see Master Response 2.7, Disadvantaged Communities, regarding the plan amendments as they relate to disadvantaged communities (DACs), consideration of DACs in the SED, and the State Water Board's technical and financial assistance programs for small public water systems serving DACs. Please see Chapter 20, Economic Analyses, regarding consideration of regional economic effects due to implementing the plan amendments, which includes jobs and fiscal analysis in Section 20.3. Please refer to Master Response 8.2, Regional Agricultural Economic Effects regarding potential effects of the plan amendments on employment.
1176	10	Stratecon, Inc. estimates that the impacts of the Proposal's 40% unimpaired flows in combination with SOMA implementation would result in land fallowing at a rate 60% higher than the State Board's calculation and an average regional decline in employment of about 1,100 jobs and in a peak year of surface water supply reduction potentially as much as almost 5,000 jobs. (See Attachment 2 [ATT2] at pgs. 8, 116.) These numbers are drastically higher than those anticipated in the SED. In the poorest and most impoverished areas, the Proposal's impacts will have far reaching consequences to those economically disadvantaged, and the SED fails to properly analyze the full extent of the impacts.	In providing the following response the State Water Board assumes the commenter is referring to "SGMA", the Sustainable Groundwater Management Act, and not "SOMA." Please see Master Response 2.5, Baseline and No Project and Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act regarding the appropriate consideration of SGMA in the SED and the reason why SGMA is not included in baseline. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural Economic Effects, regarding local agricultural economic effects and SWAP results, and the potential effects to jobs, respectively. As described in Master Response 8.1, this commenter questioned the underlying assumptions in the SWAP model and the underlying model input data and arrived at higher local economic effects using extreme assumptions compared to those made in the SED. For the reasons in Master responses 2.5, 3.4, 8.1, and 8.2, the State Water Board appropriately addressed and considered SGMA in the SED. Fallowing and conversion of farmland is also appropriately analyzed in Chapter 11. Please see Master Response 2.7, Disadvantaged Communities, regarding funding streams, sources, and assistance available to DACs outside of SGMA and under SGMA.
1176	11	The SED Significantly Undervalues Agricultural Production Agriculture is the leading sector in San Joaquin County and, at its peak, was valued at $3.2	Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, for discussion of why average results were presented. In addition, please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural

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		billion in 2014. Data that averages reduced agricultural production values only masks the true impacts. In addition to crop receipts, farm related economic fallout has the ripple effect of reduced property values, equipment sales, job losses, and the permanent loss of prime agricultural land. These impacts will decimate the San Joaquin region and limit future economic development. The County understands that the fate of its economy is tied to the long-term viability of agriculture and the multiplier effects of revenue tied to agri-business such as packing, processing, storage, marketing, distribution, and ancillary farm related equipment and supplies. The attached 2015 Agricultural Crop Map and Commodity List shows the immense variety and large volumes of agricultural products that are produced within San Joaquin County. [Footnote 4: This report was prepared in consultation with the San Joaquin County Agriculture Commissioner's office. It is based on information found in the 2015 San Joaquin County Annual Crop Report which is available at: https://www.sjgov.org/agcomm/annualrpts. (See Attachment 3 [ATT3] which is hereby incorporated into these comments.) Impacted areas in San Joaquin County have over 60% of their irrigated acreage planted in permanent crops according to the SED, a much higher share than other affected areas. Thus, the SED single-year analysis using the SWAP model is particularly problematic in the County because it fails to look at the long term impacts to agriculture. Specifically, Dr. Jeffrey Michael's analysis shows about 75% of South San Joaquin Irrigation District's ("SSJID") current crop production could be considered permanent and unable to be fallowed for a single year without a significant loss in capital investment. [Footnote 5: Dr. Jeffrey Michael is the director of the Center for Business and Policy Research at the University of the Pacific in Stockton, California and privately consults to produce economic forecasts for California and several Northern California metro areas. Dr. Michael performed an economic analysis of the Proposal and discussion of the SED analysis. Dr. Michael's comments are attached and provide insight into impacts and the proper procedures and tools that should have been used to complete the SED.] (See Attachment 4 [ATT4] which is hereby incorporated herein.) Under the 40% flows in the SED, the acreage in permanent crops would have to shift from 75% to approximately 50%. That means that roughly 47,000 acre feet of annual applied water demand would have to be redistributed from permanent crops to annual field crops. At the water demand used by the SED for almonds, that equates to 13,342 acres moving from almonds (the most common permanent crop) which earned $6,638 per acre in 2015 to com (the most common annual crop) which earned $731 per acre in 2015. That represents a loss of $78.8 million in annual revenue to SSJID farms alone in 2015 dollars. In addition, Dr. Michael's analysis found that there would be an annual average of $3.2 million in crop losses from lack of water supply and a $78.8 million in annual revenue loss from the shift from higher value permanent crops to lower value crops, which would equal a total annual loss of $82 million in crop revenue in 2015 dollars for SSJID. This amount for only one of the irrigation districts is over ten times the $6 million annual loss (2008 dollars) estimated in the SED. The SED inadequately calculates the agricultural losses because it does not properly account for the impacts on permanent crops or allow any minimal allowance for irrigated pasture or other forage crops to maintain animal production which plays a significant role in the total agricultural output in the County.	Economic Effects, for presentation of the results of the revised SWAP model run averaged by water year type. Also, please See Chapter 11, Agricultural Resources, and Master Response 3.5, Agricultural Resources, for discussion of conversion of prime farmland to non-agricultural uses and regarding potential effects on dairies and livestock operations. Finally, please see Master Response 8.2 for discussion of the potential economic impacts on diaries. Impacts to industries that support agriculture and provide supplies and equipment are accounted for in the Regional Economic analysis using IMPLAN multipliers that relate the change in economic output of one industry to other industries. Finally, please see Master Response 8.1 regarding the scope of the agricultural economic analysis. Please see response to comment 1176-326.
1176	12	The SED Does Not Analyze the Full Impacts to Agriculture	Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, for discussion of

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		The SED agriculture impacts model is inappropriate: The SED estimates the impact of the unimpaired flow on agriculture in San Joaquin County in Appendix G. However, the techniques used in Appendix G are only appropriate for a short-run water shortage, and this ignores and underestimates many important impacts that would be incorporated into a long-run analysis. (See Attachment 4 [ATT4].) While the SED reports impacts as annual averages from a one-year model, a closer look at the modeling results show that implementing the SED would cause the loss of most local production of critical forage crops in 1 out of 3 years, in addition to some elimination of water from permanent crops that would cause a loss of investment that far exceeds the loss of crop revenue included in the SED. Dr. [Jeffrey] Michael also re-analyzed the impacts of reduced reliability. Dr. Michael's findings suggest that the SED would result in a permanently reduced amount of high-revenue permanent crops, a reduction in cattle and dairy herd sizes because of frequent shortages of local pasture and forage, or a combination of both possibilities. Dairy is the second highest valued commodity in the County and cattle and calves are the sixth highest, therefore any impact on these sectors will dramatically impact the annual agricultural income. Based on this analysis included in Attachment 4 [ATT4], the agricultural impacts in the County are many times higher than the SED estimates and clearly insufficiently analyzed in the SED.	the SWAP model and assumptions about stress irrigation and permanent crops, as well as the presentation of data in Appendix G. Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies.
1176	13	Impacts to Permanent Crops and Livestock Are Not Properly Analyzed The SED ignores forward linkages of decreased crop production on the production of animal products and food processing. (See Attachment 4 [ATT4] at pg. 2.) The SED minimizes the cost of the regulation by estimating that almost all lost agricultural production will be in "low value" field crops and pasture. The SED analysis does not value the decreased reliability of water supplies and how the increased variability could affect the long-run viability of agricultural sectors where production in subsequent years requires maintaining crops and animal herds during years of severe water shortage. In addition to permanent crops such as nuts, the SED will create severe hardships for cattle and dairy products that depend on so called "low value" pasture and annual forage crops that would be virtually eliminated in many years according to the SED's modeling. Unfortunately, the SED only qualitatively discusses the cost this imposes through forward linkages to important associated industries, even though the consultants have made quantitative estimates of these effects in other industries. (See Attachment 4 [ATT4] at pg. 1.) The three counties impacted by the SED have over 500 dairy farms, nearly 1.2 million cattle, over 20% of the cattle in the state of California. In 2015, the three counties produced over $850 million in cattle, and over $1.9 billion in milk. (See Attachment 4 [ATT4] at pg. 2.) Even a 10% decrease in dairy and cattle production due to the SED modeling prediction of frequent years of near elimination of irrigated pasture and silage would be a loss exceeding $279 million per year. (See Attachment 4 [ATT4] at pg. 2.)	Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies and food processors. Please also see Master Response 8.2 for discussion of the limitations of IMPLAN for estimating downstream economic effects. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, regarding the scope of the agricultural economic analysis and potential effects of reduced water supply reliability.
1176	14	The SED Does Not Fully Analyze the Significant Impacts to Groundwater Cumulative impacts to groundwater pumping: The SED ignores the cumulative cost of increased groundwater pumping as a result of the 40% unimpaired flow requirement. In its analysis, Luhdorff and Scalmanini found that the SED estimates groundwater pumping increases substantially, but only estimates the increase in groundwater pumping costs in the first year. [Footnote 6: Luhdorff & Scalmanini, Consulting Engineers is a recognized leader in	Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, for clarification on additional groundwater pumping costs. The report prepared by Luhdorff and Scalmanini attached in the commenter's letter did not provide any discussion on increase in groundwater pumping cost as a result of the the LSJR flow objective. It is unclear which analysis the commenter was referring to.

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		groundwater resources investigation, planning, development, use, protection, and management. The Luhdorff & Scalmanini staff has over 30 years' experience with groundwater engineering, geology, and hydrology. Their services address groundwater supplies, quality, and impacts to regional and local scales. Luhdorff and Scalmanini performed an extensive analysis of the Proposal and SED and prepared comments outlining the impacts that were not addressed and the flaws found in the SED.] (See Attachment 5 [ATT5] which is hereby incorporated herein.) However, the increase in pumping costs will grow over time as groundwater levels fall. The SED makes no attempt to calculate the increase in pumping costs over time, and the overall cost of depleting this resource.	
1176	15	SGMA: In 2014, the California Legislature approved SGMA and required the California Department of Water Resources ("DWR") to develop Groundwater Sustainability Plan ("GSP") regulations. This legislation and subsequent GSP guidance from DWR provide a technical framework for evaluating groundwater conditions in priority groundwater basins in the state. [San Joaquin] County overlies subbasins which have been identified as having conditions of critical overdraft and are on an accelerated schedule to develop and implement GSPs to achieve sustainability of groundwater resources. (See Attachment 5 [ATT5] at pg. 2.) Groundwater Sustainability Agencies ("GSAs") in the Eastern San Joaquin Subbasin, a DWR designated basin in critical groundwater overdraft, must adopt a GSP by January 31, 2020. The magnitude of dry-year deficits, due to the SED Proposal, will result in a dire reduction of the water supply reliability in the affected area. The SED Proposal assumes that an increase in groundwater pumping will be the likely outcome to forgone surface water deliveries. The SED indicates that the Proposal could be offset by increased groundwater pumping. Such an action is infeasible for critically overdrafted subbasins under SGMA. Increasing groundwater supplies can be done by utilizing additional surface water in years when surface water is available; however, it cannot be done without significant investment borne by local stakeholders and without intrusion into modem agricultural practices of local farmers. SGMA legislation clearly allows for local agencies acting as GSAs to develop strategies that best fit their own abilities to implement actions that meet the long-term sustainability goals defined in SGMA and are also economical and practical to implement. Given SGMA, GSAs in Eastern San Joaquin County will have little desire to reduce groundwater pumping as the sole means of sustainability, and instead, will contemplate significant actions such as direct and in-lieu recharge projects. In short, any reduction in surface water deliveries only contributes to a greater imbalance in the Eastern San Joaquin Subbasins and will place a greater burden on GSAs to develop and implement projects and management actions that will lead to sustainability. The more likely impact of the SED Proposal would be extreme financial and economic harm in an attempt to meet sustainability under SGMA due to forgone surface water supplies. (See Attachment 5 [ATT5].) The SED should have taken SGMA into account and modeled the impacts without groundwater substitution as they did in the original2012 draft. In 2012, they estimated over 60,000 fallowed acres without groundwater substitution and we can expect a similar or higher result with SGMA. With fallowed acres more than doubled, more of the crop loss will cut into higher value crops over time. The SED should have modeled a post-SGMA scenario,	2012 Draft SED analyzed two extreme endpoints, full replacement by groundwater and no replacement, which are not realistic representations of what had happened historically. Therefore, as discussed in Executive Summary, Section ES11.3, Groundwater and Water Supply Assumptions, and the Associated Use of the SWAP Model, the change in groundwater substitution assumption in the 2016 Draft SED is intended to reflect more realistic level of groundwater replacement, surface water storage and reservoir reoperation, and quantity of surface water deficit not replaced by additional groundwater pumping. Under SGMA, groundwater sustainability agencies are required to develop and implement groundwater sustainability plans (GSPs) to sustainably manage local groundwater resources in the next 20 years. As of today, no GSP has been developed yet. Variables, such as the amount of water needed for groundwater recharge and banking, and the associated infrastructure needed, will be considered by GSAs as they develop GSPs. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, regarding SED consideration of SGMA, including why analyzing the plan amendments “with SGMA” is not possible or appropriate.

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		and calculated cumulative loss over a transition period as was done in the Stratecon report included as Attachment 2 [ATT2].	
1176	16	Water Agency Contracts: SEWD and CSJWCD service areas comprise approximately half of the irrigated acreage in the Eastern San Joaquin Subbasin. Under an existing water supply contract with the Bureau of Reclamation, SEWD provides municipal water to the Stockton Metropolitan Area and both districts provide water for irrigated agriculture. Constituents in both districts rely on groundwater to a significant degree to meet demand. Under the SED, these districts will be disproportionately impacted by reduced surface water deliveries in any year they occur. Because the subbasin is currently under critical conditions of overdraft, this disproportionate impact would directly affect the agricultural economy in the [San Joaquin] County due to the inability to rely further on groundwater to make up shortfalls in supply.	Please refer to Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for a discussion regarding historical groundwater uses and overdraft in the plan area, the Sustainable Groundwater Management Act (SGMA), and SGMA implementation and agricultural resources. Please refer to Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, for a discussion on potential effects of the plan amendments related to groundwater resources and agricultural economy.
1176	17	Water Quality: Historically, there has been an ancient groundwater depression under the Delta which results in saline water migration along the western fringe of the Eastern San Joaquin Subbasin. In response to ongoing saline intrusion and stricter drinking water quality requirements, the City of Stockton, California Water Service Company and the County maintained Lincoln Village and Colonial Maintenance Districts have reduced groundwater pumping in favor of treated surface water use. Under the Proposal, reduced surface water supplies will impact the ability of local agencies to continue this management action and result in increased pumping, consequently exacerbating salinity and other water quality issues in the Eastern San Joaquin Subbasin and specifically in the Stockton Metropolitan Area. A direct consequence of lowered groundwater elevations in the region would be to induce greater flow into wells from lower groundwater units. This alteration of the vertical flow may increase concentrations of naturally occurring contaminants such as arsenic, uranium, and other metals. [Footnote 7: See the 2014 Eastern San Joaquin IRWMP update pgs. 6-40 to 6-43 available at: http://www.gbawater.org/Portals/0/assets/Pages%20from%20Eastem%20San%20Joaguin%202014%20IRWMP%20(FINAL)-%20pages%206-32%20through%2043.pdf?ver=2014-12-09-115016-937.] The increases have the potential to exceed the drinking water maximum contaminant level and therefore increased cost (for treatment) and reliability of the groundwater supply. The SED does not address the potential metal contamination, and it fails to provide an analysis of potential water quality effects beyond stating that for Alternatives 3 and 4 deleterious effects will be significant and unavoidable (Chapter 13, Table 13-1).	The SED programmatically analyzes that the plan amendments could potentially deplete groundwater supplies and affect groundwater quality in the subbasins analyzed. (See Chapter 9.) It proposes mitigation measures, including for local agencies to exercise their police powers and groundwater management authority under the Sustainable Groundwater Management Act (SGMA) to protect groundwater resources. Under the Act, groundwater sustainability agencies are required to manage their groundwater to avoid undesirable effects, including significant and unreasonable chronic lowering of groundwater levels and degradation of water quality. Implementation of these mitigation measures would prevent or mitigate groundwater depletion and water quality impacts. Salinity intrusion is also an undesirable result required to be addressed under SGMA. The proposed plan amendment will help with seawater intrusion by providing more flows in the Delta. Chapter 13, Service Providers, also analyzes and discloses that, absent mitigation, substantial groundwater depletions could occur from increased pumping which could affect the direction of groundwater flow and localized groundwater contamination could move in undesirable directions and affect groundwater quality. Such result would, however, not necessarily violate drinking water quality standards such that drinking water quality from public water systems would be affected for several reasons, including the fact that there was not a greater number of drinking water standard violations during the recent drought when pumping greatly increased as compared to a wet year. In addition, drinking water quality exceedances would have to be addressed before it is served to the public under the Safe Drinking Water Act. Chapter 13 also includes a mitigation measure for local agencies to implement SGMA to prevent water quality degradation at drinking water wells.
1176	18	Sustainable Yield: Under the SED, historical estimates of sustainable yield will no longer apply because the alternatives will impose a new set of water management actions limiting the ability of local agencies to apply historical measures of sustainability to future projections under SGMA and GSP development. The SED explains that there are high levels of uncertainty and speculation in evaluating sustainable yield and overdraft conditions in the subbasins within the plan area. Difficulty calculating the future impacts has never been an acceptable justification for failing to estimate the required sustainable yields, and is not satisfactory in this instance.	Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act for discussion on the approach to the groundwater impact analysis, groundwater recharge, SED consideration of SGMA, and compliance with SGMA in the context of the plan amendments. This response reiterates some of the points made therein and responds to this and other comments made by the commenter in its letter. SGMA was passed by the Legislature in 2014 to address overdraft issues and associated negative impacts to groundwater basins from over extraction. SGMA requires local public agencies in the plan area form groundwater sustainability agencies (GSAs) by June 30, 2017 and draft groundwater sustainability plans (GSPs) by 2020 for critically overdrafted basins and 2022 for all other basins. GSAs have 20 years to implement GSPs and achieve sustainability. GSAs are now formed in the plan area, but GSPs have yet to be

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			drafted or implemented. The State Water Board acknowledges reaching sustainability in these overdrafted basins will be challenging, but the plan amendments do not conflict with SGMA. Instead, knowledge of the plan amendments during the GSP drafting phase allows for integrated planning of scarce water resources that does not trade impacts between surface and groundwater. SGMA was not included in the baseline or in the alternatives analysis, because as noted above, SGMA GSPs are not yet written and groundwater sustainability could be implemented through projects and programs in a number of ways. For example, groundwater sustainability agencies could implement projects to increase recharge in wet years and programs to decrease groundwater extraction through conservation and other means. Therefore, any future-condition baseline "with SGMA" is purely speculative. However, SGMA was properly included in the analyses as an existing legal requirement to prevent further degradation of the groundwater basins and as a potential cumulative limit on future irrigation supplies (Chapter 9, Section 9.4.3, Impacts and Mitigation Measures; Chapter 22, Section 22.4.1, Potential Impacts of LSJR Alternatives). The SED and plan amendments do not require or encourage increased groundwater pumping. The SED analyses reflect that the historical local response to reduced surface water availability has been to choose to increase groundwater pumping; therefore, the SED was required to analyze this reasonably foreseeable impact on the groundwater basin from this local response. The SED does not assume that all reductions in surface water supplies can be met with increased groundwater pumping. Rather, if local water users choose to replace reduced surface water with groundwater, maximum groundwater pumping could reach the levels associated with 2009 and 2014 infrastructure. The level of detail in the SED is reasonable and appropriate for a program-level analysis and is not meant to be, nor required to be, a site-specific analysis of, for example, each cone of depression or potential cone of depression in each basin. Determining the sustainable yield is a highly technical analyses that requires location-specific information such as geology, hydrology, and local water use, and is beyond the scope of the programmatic analyses in the SED. Undertaking such an analysis for all the basins in the plan area is neither reasonably feasible nor necessary for the SED to adequately analyze and disclose groundwater impacts. For example, the analysis of sustainable yield is so complex that SGMA, which was adopted in 2014, gives GSAs tasked with determining their basins sustainable yield until 2020/2022 to complete GSPs. It is speculative to assume how pumpers in each area will respond to implementation of the flow objectives, because it will depend on many individual and collective decisions including, but not limited to, the discrete actions of local water users in response to reductions in surface water, crop choices in response to markets and other factors, and implementation of SGMA. The State Water Board strived to use best available science and information for the SED, and wrote the SED as objectively and completely as possible, following the appropriate legal process and in compliance with State CEQA Guidelines. A wide range of published literature, official reports and personal communications is cited to reasonably and objectively disclose the environmental setting of the plan area. For discussion on the scope and programmatic nature of the SED, adequacy of the approach, and State CEQA program-level review, please see Master Response 1.1, General Comments. For discussion on the basis for establishing the baseline, please see Master Response 2.5, Baseline and No Project. For discussion on modeling assumptions of the level of pumping associated with 2009 and 2014 infrastructure in the WSE model, please see Master Response 3.2, Surface Water Analyses and Modeling. Please see Master Response 3.5, Agricultural Resources, for discussion on the impacts of the plan

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			amendments on agricultural resources. Please see Master Response 3.6, Service Providers, for discussions regarding groundwater resources and service providers, and municipal water supply. Please see Master Response 2.7, Disadvantaged Communities, for discussion on the plan amendments as they relate to disadvantaged communities. For discussions on potential economic impacts, please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural Economic Effects. Master Response 8.2 also includes information regarding the differences between the SED assumptions and analyses and those made in commenter's economic analyses (i.e., Stratecon). Please also see Master Response 8.1, regarding potential increases in groundwater pumping costs. For a discussion regarding effects on rate payers, please see Master Response 8.4, Non-Agricultural Economic Considerations.
1176	19	A public agency may not divide a single project into smaller individual subprojects to avoid responsibility for considering the environmental impact of the project as a whole. (Orinda Ass'n v. Board a/Supervisors (1986) 182 CA3d 1145, 1171.) The SED and State Board's explanations that "this is hard" and the "analysis is programmatic" as a justification for not analyzing all impacts directly violates the requirement to review a project as a whole. These explanations call in question the adequacy of the SED to assess impacts from the alternatives on groundwater conditions in either a programmatic or project specific basis and relying upon SGMA and GSPs to prevent future overdraft from happening is entirely unlawful and does not examine the harm to the region that will occur.	Please see Master Response 1.1, General Comments, explaining the SED's programmatic approach to analysis. Just because the SED does not conduct a project-level review does not mean the SED's analysis of environmental impacts is inadequate. The State Water Board has analyzed and disclosed all that it reasonably can considering the programmatic nature of the plan amendments.
1176	20	Salinity Analysis and Response is Insufficient The SED support is not adequate. The SED fails to evaluate the impacts of increased salinity in the Southern Delta and improperly relies on one flawed analysis. The SED's conclusion that weakening south 7 Delta salinity standards will not affect agricultural production ignores peer-reviewed research with field level data from the Delta that shows salinity losses to south Delta agriculture occurs even under the current standards. (See Attachment 4 [ATT4].) The SED relies solely on the Hoffman report which was a modeling exercise that does not include any relevant data from the south Delta. However, there has been other peer-reviewed research conducted to understand salinity impacts in the Delta that strongly oppose the Hoffman Report. The Delta Protection Commission Economic Sustainability Plan, the Department of Water Resources published economic studies of the BDCP, and the report done by Michelle Linefelder-Miles for the South Delta Water Agency [Footnote 8: See the South Delta Water Agency's presentation from the State Water Resources Control Board Public Hearing on the SED, December 16, 2016 in Stockton, California.], all research that strongly rejects Hoffman's hypothesis that Delta agriculture is not adversely affected by salinity values below 1.0 EC. All other field work performed in the South Delta discredits the Hoffman modeled results. This peer-reviewed research is not cited by the SED which solely relies on findings from the single, unsupported report. Thus, the SED fails to justify its requirements.	Please see Master Response 3.3 Southern Delta Water Quality for responses to comments regarding the basis for the salinity objectives and the Leinfelder-Miles study.. Appendix E used the current state of knowledge on crop salt tolerances along with available input information such as leaching fractions, crops, and water quality from the Delta. Information presented in this comment refers to a statistical modeling effort that is inconsistent with the analysis provided in Chapter 11, Section 11.4.2, Methods and Approach. The Hoffman approach (described in Chapter 11 and Appendix E, Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta) used cited literature that relates physical relationships among salinity in the water, soil, and crops.
1176	21	The Proposal Provides No justification for Averaging Water Quality	Please see Master Response 3.3, Southern Delta Water Quality, for information regarding implementation of the SDWQ alternatives and evaluation of crop salinity tolerances. As explained therein, changing the

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		The Proposal's shift from compliance points to averages along sections of rivers is not justified. The hydrodynamic complexity of the Delta results in areas of poor water quality and better water quality as measured for specifically, salinity and dissolved oxygen. Additionally, farmers divert in specific locations and do not mix water across locations to average water quality. Assuring adequate water quality should be most concerned with compliance points that have water quality problems and averaging obscures these areas of non-compliance. (See Attachment 4 [ATT4] at pg. 7.) Given that the SED proposes to increase salinity standards to levels that will increase crop damage (or to the threshold of significant crop damage if accepting Hoffman's estimates), compliance points should intentionally be in diversion locations that have water quality problems--not averaged across zones of worse and better water quality. Therefore, the SED does not support a finding that the salinity measurements should use averages rather than specific compliance points.	compliance locations from specific points to river segments does not mean that compliance would be assessed based on the average salinity over the river segment. As stated in Appendix K, DWR's and USBR's water rights will be conditioned to require completion of the Comprehensive Operations Plan, Monitoring Special Study, Modeling, and Monitoring and Reporting Plan and 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. In addition, the analysis presented in Chapter 5, Surface Hydrology and Water Quality, shows that the range of salinity during the irrigation season of April–September at Vernalis and in the southern Delta channels under LSJR Alternative 3 would generally be reduced when compared to baseline. It concludes that agricultural beneficial uses therefore would not be impaired because crops are not harmed by application of water with lower salinity.
1176	22	Lack of Stakeholder Input or Consideration of Settlements The SED and State Board have repeatedly professed their desire for settlements and alternative implementation proposals. However, in the public comment at the hearings, several agencies made numerous pleas that they had presented settlement options to the State Board and their proposals were rejected. The State Board denied ever receiving the submitted alternatives and settlement offers. There is clearly a disconnect between the agencies and the State Board, and this limits the ability for those impacted to reach desirable solutions. As a comparison, looking at the stakeholder involvement between local and DWR in regard to SGMA is drastically different. The high degree of planning, technical detail, coordination, and stakeholder involvement in the SGMA process appears to be markedly advanced compared to the SED, though both seek to address groundwater subbasin hydraulics at their core. It seems appropriate that GSPs and this phase of the Bay-Delta Plan be well-coordinated in their technical detail and completeness.	Please see Master Response 1.1, General Comments, for regarding voluntary agreements and the public outreach process. The State Water Board has yet to receive any voluntary agreements for its consideration.
1176	23	The Proposal is inadequate and unlawful and the State Board cannot rely upon the SED to support a final decision. Because of these deficiencies, [San Joaquin] County asks the State Board not to certify the SED, but rather direct staff to perform a complete analysis of the impacts. The County also asks that the State Board revise the Proposal to correctly comply with legal requirements and to balance potential harms as required under the State Board statutory obligations.	We have considered and responded to the issues raised by the commenter and disagree with the commenter that the plan amendments are unlawful and that the State Water Board cannot rely on the SED due to deficiencies.
1176	24	[ATT1: 2013 San Joaquin County letter opposing the 2012 SED.]	This attachment is a set of comments on the 2012 Draft SED. A lead agency need only respond to those comments submitted in response to a recirculated revised environmental document and is not required to respond to comments previously received during the earlier circulation period on a previous draft. In its September 15, 2016 notice of filing, recirculation, and opportunity for public comment on the revised SED, the State Water Board made clear that since, "the SED is being recirculated in its entirety, new oral and/or written comments must be made and submitted for the SED. Previous comments to the 2012 Draft SED will be part of the administrative record, but do not require a written response. The State Water Board will only respond to those timely comments made and submitted in response to the recirculated SED." Therefore, this attachment is already part of the administrative record and will not receive a written response.
1176	25	[ATT2: "The Economic Consequences of the Proposed Flow Objective for the Lower San Joaquin River in Merced, San Joaquin, and Stanislaus Counties." Prepared by Rodney T.	The commenter provided this attachment for reference purposes in support of their comments. Those

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		Smith of Stratecon, Inc. and Jason M. Bass of EcoGlobal Natural Resources for the Counties of Merced, San Joaquin, and Stanislaus. January 6, 2017. Slide presentation of condensed report info also submitted as ATT1 of Letter WQCP1.0969, testimony from December 20, 2016 public hearing.]	comments are addressed in these responses to comments; therefore, no additional response is required.
1176	26	[From ATT2:] The Substitute Environmental Document ("SED"), recently issued by the California State Water Resources Control Board ("SWRCB"), proposes substantial increases in the unimpaired flows of the Merced, Stanislaus and Tuolumne Rivers that will fundamentally alter the water supply portfolios of Merced, San Joaquin and Stanislaus counties (collectively the "Study Area"). The SWRCB's assessment, however, of the potential economic impacts of the SED is narrow in scope and completely fails to account for the water supply reliability, sustainability and volatility challenges that will confront the counties. Stratecon estimates that the proposed flow objectives would reduce the counties' reliable surface water supplies on average by 60% or about 600,000 acre-feet per year, from 1.0 million acre-feet to just short of 400,000 acre-feet. Stratecon estimates that this loss of reliable water supply is partially offset by an increase in the expected annual yield of unreliable surface water supplies from 290,000 acre-feet per year to 656,000 acre-feet per year. The partial offset is no bargain. The SED would reduce the economic value of surface water rights by 50% and drastically reduce the reliability of the region's water supplies, which will have far reaching adverse impacts on the region's long-term economic stability and growth.	Please see Master Response 8.2, Regional Agricultural Economic Effects, regarding the State Water Board's evaluation of potential regional economic effects associated with change(s) in agricultural production, and a discussion on surface water supply reliability. Also included in Master Response 8.2 are responses to commenter prepared analyses regarding agricultural economic considerations. As discussed in Master Response 8.2, while the 2016 Recirculated Draft SED's analyses and conclusions differ from the commenters, the SED's analysis are supported by reasonable assumptions and substantial evidence, and reflect an appropriate level of analysis for considering economic effects. This master response addresses this and other related comments made by the commenter in this attachment. Please also see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, for a discussion of the scope of the agricultural economic analysis, the use of SWAP and local agricultural effects.
1176	27	[From ATT2:] The SWRCB severely understates the potential regional economic impacts of the proposed SED flow objectives. It presumes that the surface water supply reductions would be largely offset by unsustainable increases in regional groundwater pumping. Before implementation of the Sustainable Groundwater Management Act ("SGMA"), when groundwater pumping may increase to partly offset reductions in surface water supplies, Stratecon estimates that land fallowing in response to the SED proposal for a 40% increase in the unimpaired flows of the Merced, Stanislaus and Tuolumne Rivers ("SED 40") would reduce crop revenues in the Study Area [Merced, San Joaquin, and Stanislaus Counties] an average of $58 million per year (2015$), which is about 45% higher than estimated by the SWRCB after accounting for inflation. Furthermore, SWRCB's focus on average annual impacts masks the expected volatility in Study Area annual crop revenues under the SED. Annual revenues losses frequently exceed $100 million and, at their peak, reach as high as $260 million (2015$).	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector. Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, for discussion of how average results were presented in the SED.
1176	28	[From ATT2:] SGMA implementation will effectively preclude additional groundwater pumping to offset SED surface water supply reductions. Stratecon estimates that resulting land fallowing would reduce regional crop revenues by an average of $100 million per year (2015$), or more than 2.5 times the amount estimated by SWRCB after accounting for inflation. In addition, Stratecon estimates that single year crop revenue losses in the Study Area [Merced, San Joaquin, and Stanislaus Counties] may frequently exceed $200 million and, at their peak, could reach as high as almost $450 million.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for discussion of SGMA implementation.
1176	29	[From ATT2:] The economic impacts within the Study Area [Merced, San Joaquin, and Stanislaus Counties] of the proposed SED flow objectives is substantial and derives from a combination of: A) reduced crop production; B) reduced output by enterprises relying on	Please see response to comment 1176-55 regarding economic considerations related to the agricultural sector. Please also see Master Response 8.4, Non-Agricultural Economic Considerations, for responses regarding economic considerations related to recreation and hydropower.

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		that crop production as key inputs, most notably dairies and livestock producers, as well as enterprises further downstream such cheese production using milk produced locally and beef slaughter and packing using locally produced cattle, as key examples; C) increased costs of pumping incurred by irrigators and communities due to potentially substantial increases in regional ground water depths as a result of increased pumping to offset surface water supply reductions (only before SGMA); D) reduced lake recreation visitor spending; and E) reduced hydropower generation values.	
1176	30	[From ATT2:] Tables EX-1 [ATT2:ATT1] and EX-2 [ATT2:ATT2] summarize the estimated economic output and employment impacts within the Study Area. [Footnote 1: It should be noted that the estimated "upper bound" impacts presented in the tables do not account for additional capital investment in groundwater pumping and treatment infrastructure by irrigators, irrigation districts and municipal water users due to SED-related declines in groundwater elevations and associated expected declines in groundwater quality. They, therefore, may be considered conservative.] Table EX-1 summarizes the average annual estimated impacts were implementation of the SED 40 proposal overlaid on the historical hydrology of the San Joaquin River system from 1922 through 2003 ("Study Period"). Table EX-2 summarizes the estimated peak annual economic output and employment impacts after SED 40 implementation. The tables present what are termed "upper bound" estimates of both the economic output and employment effects of: A) Reductions in the regional production of intermediate and end-market dairy and livestock commodities such as raw milk, fluid milk, cheese, cattle and processed meat, among others, due to anticipated SED-related reductions in regional feed grain (particularly corn silage), hay and pasture crops, primary inputs to the region's dairy and livestock sectors; and B) Estimated increases in the costs incurred by the Study Area's [Merced, San Joaquin, and Stanislaus Counties] farmers and communities to pump groundwater due to potential SED 40-related increases in Study Area groundwater depths, accounting for both current pumping and additional potential pumping in response to SED-related reductions in regional surface water supplies. There is no debate with the SWRCB that the SED's implementation will have economic impacts within the Study Area. However, there is also no crystal ball as to the eventual full nature and extent of those impacts. SWRCB chose to focus its quantification of economic impacts primarily on agricultural production adopting sophisticated models for that purpose while providing cursory or no consideration of numerous other potential impacts including, among others, the impacts of reduced regional agricultural production on regional dairy-related activities. Dairy product production and manufacturing are very large and important components of the Study Area's economy. SWRCB's underlying argument for failing to address many of the SED's potential impacts, including the impacts on the region's dairy sectors, is that there is a lack of information necessary for pinpoint quantification. Stratecon has taken a different tact. There will be a wide a range of potential regional economic impact outcomes based on: A) alternative considerations for how regional businesses and communities may mitigate the potential impacts of reduced regional agricultural production and increased	Please see responses to comments 1176-55 and 1176-58 regarding responses related to economic considerations and the agricultural sector and responses related to hydropower and economic considerations. Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please also see Master Response 8.2 for discussion of the potential economic effects on dairies.

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		depths to groundwater; B) how groundwater depths in different areas may be effected by projected increases in groundwater pumping; and C) the incremental costs of pumping water from greater depths. As such, the probability of specific outcomes within that range are extremely difficult to pinpoint. Accordingly, Stratecon doesn't attempt to produce an exact answer as to the potential output and employment impacts of SED effects on the dairy and livestock production or farmer and community water costs. Instead, Stratecon focuses on developing economic impact estimates assuming that limited opportunities are available to regional dairy and livestock businesses for mitigating reduced local crop production and the high end of estimated potential increases in regional aquifer groundwater depths and observed cost of pumping groundwater, to provide an "upper bound" assessment of the SED 40's potential regional economic impacts. Stratecon finds these impacts highly instructive for the SED evaluation process as to the potential magnitude and severity of the impacts that could occur. Table EX-1 [ATT2:ATT1] shows, for example, that the estimated upper bound average annual total lost economic output and employment within the Study Area that may result from the SED 40 before SGMA is approximately $607 million (2015$) and 2,976 jobs, respectively. Table EX-2 [ATT2:ATT2] shows that in the expected peak year of SED 40 impacts before SGMA, the region's total economic output and employment may fall as much as an estimated approximately $2.75 billion (2015$) and 12,739 jobs, respectively. The tables do not account for recreation or hydropower-related impacts. Stratecon was unable to obtain the data necessary to effectively quantify potential impacts on Study Area recreation spending and associated economic impacts because of SED-related reductions in regional reservoir elevations. However, those impacts are material, particularly during drier hydrologic years. Stratecon did not evaluate the potential economic impacts related to anticipated SED effects on Study Area hydropower generation as Stratecon believes those impacts are relatively small in comparison. The expected present value of total lost output in the Study Area equals $14.5 billion over a 40-year horizon (2017-2056). The time profile of lost output reflects the pre-SGMA scenario for 2018 and 2019, a mix of the pre-SGMA and post-SGMA scenarios during the statutory SGMA implementation period (2020-2039) and solely the post-SGMA scenario thereafter. SED implementation will fundamentally transform the investment landscape for agriculture and related industries within the Study Area. Lost water supplies reduce locally produced inputs for livestock and dairy operations. The volatility in locally produced inputs will more than triple the risk of shortfalls in available local inputs (from 18% to 61%). For operations relying on hay and pasture, expected unused capacity increases from 4% with baseline conditions to 23% under SED implementation before SGMA and 29% after SGMA implementation. For operations relying on grains, expected unused capacity increases from 1% with baseline conditions to 7% under SED implementation before SGMA and 11% after SGMA implementation. This increased risk in unused capacity reduces the economic incentive for investment. The consequences from reduced investment are not quantified in this study.	

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1176	31	[ATT2:ATT1: Table EX-1. Average Annual Estimated Economic Impacts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	32	[ATT2:ATT2: Table EX-2. Peak Year Estimated Economic Impacts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	33	[ATT2:ATT3: Stratecon Inc. and EcoGlobal Natural Resources report, Table of Contents.]	This attachment was included with the comment letter. Responses to comments contained in the attachment are responded to in this letter.
1176	34	[From ATT2:] Reliable and affordable water service is a critical foundation for a community's economic sustainability and growth. Accordingly, the water policy and financial communities widely recognize water supply reliability as fundamental to water system success. Correspondingly, abrupt and unmitigated cutbacks in water service due to drought, regulatory restrictions on water sources or from inadequate infrastructure undermine the vitality of communities.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.
1176	35	[From ATT2:] Study Area [Merced, San Joaquin, and Stanislaus Counties] groundwater resources are stressed due to overdraft. In 2014, the Department of Water Resources ("DWR") ranked all four sub-basins in the Study Area as "high priority" for action under the Sustainable Groundwater Management Act ("SGMA"). Accordingly, the existing and growing challenge of overdraft needs to be a front-and-center consideration in the evaluation of the proposed SED flow objectives as the costs associated with increasing depths to groundwater and declining groundwater quality have already imposed significant financial burdens on regional communities. The potentially large cost impacts of any definitive cutbacks in regional surface water supply availability on the region's households, commercial enterprises and school districts, who have already been hit hard by high drought-related increases in their water costs, will prove untenable in the long run.	See response to Comment 1176-18 and 1176-55.
1176	36	[From ATT2:] Groundwater Pumping and Lost Surface Water Supplies A critical component of any study of the impact of the proposed flow objective involves specifying how water users may respond to the loss of surface water supplies. The SWRCB analysis is based on a critical assumption: Users of Lower San Joaquin River surface water will fully offset their loss of surface water by increasing groundwater pumping until groundwater pumping capacity is exhausted. That is, only that portion of lost surface water supplies that exceeds currently unused groundwater pumping capacity will represent lost local water supplies. The fallowing of crop land only occurs after groundwater pumping capacity is exhausted. Stratecon turns to evidence of how a reduction in the availability of surface water supplies generates land fallowing and increased groundwater pumping. The almost quarter century of experience of the Westlands Water District provides evidence on how a reduction in an irrigation district's surface water supplies may impact land fallowing, cropping patterns, groundwater pumping and groundwater elevations (see Attachment 1 [ATT2:ATT124]). The Westland's record indicates that increased groundwater pumping offsets half the loss of surface water for a wide range of reductions in available surface water. Therefore, Stratecon's analysis is driven by a different assumption than the SWRCB's: Users of Lower San Joaquin River surface water will offset half of their loss of surface water by	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector. Please also see Master Response 8.2, Regional Agricultural Economic Effects for why it is inappropriate to apply what occurred in the Westlands Water District to the plan area and for a discussion on how the SED economic analyses was conducted, the factors considered, and the differences between the SED assumptions and those made by Stratecon. As explained therein, Stratecon's assumptions and modeling conclusions are neither reasonable nor credible. Please see response to Comment 1176-18 regarding SGMA implementation.

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		increasing groundwater pumping until groundwater pumping capacity is exhausted. Accordingly, in many instances land fallowing within the Study Period will occur even before groundwater pumping capacity is exhausted. SGMA implementation will further limit the ability of increased groundwater pumping to offset any loss of surface water supplies. The Study Area [Merced, San Joaquin, and Stanislaus Counties] is already in a condition of groundwater overdraft. With the need to reduce groundwater pumping under SGMA, the prospect of increasing groundwater pumping in response to SED will prove illusionary.	
1176	37	[From ATT2:] Volatility of Impacts Like any area, the Study Area [Merced, San Joaquin, and Stanislaus Counties] faces variable hydrologic conditions. Using the history of hydrologic conditions within the Study Area for the period 1922 through 2003, SWRCB staff estimated the availability of surface water for the Study Area irrigation districts reliant on surface water by "water year" type. Generally, the SWRCB projects that the proposed flow objective will only reduce surface water available to the irrigation districts in "critical," "dry" or "below normal" water years. SWRCB staff looked at each water year separately and then took averages over all the years. In contrast, Stratecon argues that the volatility of impacts has consequences and must be explicitly considered. There are two ways a hiker can perish in the desert: die from thirst or drown in a flash flood. Volatility in available surface water relates directly to supply reliability. Thus, Stratecon considers the implications of reduced supply reliability. The SWRCB staff did not. Increased levels and variability in groundwater pumping raise issues about the sustainability of that pumping. Stratecon considers the impact of the proposed flow objective before and after SGMA implementation. The SWRCB staff did not.	Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, regarding a discussion of the groundwater analysis. Groundwater impacts depend on the overall trend in how groundwater recharge and pumping affect the groundwater balance; a decline in groundwater levels in any given year is unlikely be problematic unless there is an overall downward trend. Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, for a discussion of presentation of data and results. Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector and Master Response 8.2, Regional Agricultural Economic Effects, for a discussion of economics analyses performed by commenters. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, for a discussion of water supply reliability and agriculture.
1176	38	[From ATT2:] Impacts on Well Elevations The SWRCB acknowledges that the proposed flow objective will have significant and unavoidable impacts on groundwater resources. It does not quantify those impacts. Therefore, the SWRCB staff implicitly assumes that regional well depths will remain unchanged despite forecasted substantial expansion in groundwater pumping to offset reduced surface water supplies. Stratecon uses evidence from the observed impact of the large variability in the annual delivery of surface water to the Central San Joaquin Water Conservation District on well elevations within the District to assess the potential effect of the proposed flow objective on Study Area [Merced, San Joaquin, and Stanislaus Counties] well elevations and pumping costs.	Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding increase in groundwater pumping costs as it relates to change in groundwater elevations.
1176	39	[From ATT2:] Downstream Linkages from Farm Sector The Study Area's [Merced, San Joaquin, and Stanislaus Counties] economies have significant dairy and livestock operations. Stratecon examines how the SED impact on crop production impacts downstream dairy and livestock operations. The SWRCB did not.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector. Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please also see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies.
1176	40	[From ATT2:] Surface Water Supply Reliability The proposed flow objective reduces the reliable surface water supply of the Study Area [Merced, San Joaquin, and Stanislaus Counties] by 60%, from 1 million AF per year to 399 thousand AF ("TAF") per year. The expected annual yield of the Study Area's unreliable surface water increases from 290 TAF to 656 TAF. Partially offsetting the loss of reliable surface water supplies with an increase in unreliable surface water supplies is not an	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

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		attractive bargain. The proposed flow objective undercuts severely the reliable water supply that is foundational to the region's long-term capital investment and economic development landscape. The SED would reduce the economic value of surface water rights by 50%.	
1176	41	[From ATT2:] Groundwater Sustainability The proposed flow objectives would significantly reduce groundwater recharge from distribution losses and deep percolation in the Study Area [Merced, San Joaquin, and Stanislaus Counties]. The average annual loss of groundwater recharge is 77,000 AF with greater impacts the drier the hydrologic condition. When SGMA is implemented, the proposed flow objective would reduce allowed groundwater pumping. The expansion of groundwater pumping allowed before SGMA implementation would no longer be viable.	See response to Comment 1176-18 and response to comment 1176-55.
1176	42	[From ATT2:] Well Elevations The proposed flow objective would reduce regional well elevations significantly and especially in dry and critical years before SGMA implementation. Well depths can easily double. This will significantly increase pumping costs for agricultural and municipal water users.	Please see response to comment 1176-67 regarding responses related to economic considerations and the agricultural sector.
1176	43	[From ATT2:] Agriculture Before SGMA implementation, when groundwater pumping can increase to partly offset lost surface water supplies, land fallowing will reduce crop revenues by an average estimated annual amount of $52 million in 2008 dollars, $58 million in 2015 dollars, or about 45 percent higher than estimated by SWRCB staff. (Consistent with the SWRCB's economic impact evaluation of the SED, all economic impact estimates in this section are presented in 2008 dollar terms ("2008$") in addition to 2015 dollar terms ("2015$") to facilitate comparison to the SWRCB's estimates, which are in 2008$. All inflation adjustments are made based on the Consumer Price Index for the western United States published by the U.S. Bureau of Labor Statistics.) Average annual impacts mask the volatility of lost annual crop revenues, where estimated annual revenue losses often exceed $100 million and may peak as high as $235 million in 2008$, $260 million in 2015$. After SGMA implementation, land fallowing will reduce crop revenues by an estimated average annual amount of approximately $91 million in 2008$, $101 million in 2015$, or 2.5 times the amount estimated by SWRCB staff. Annual revenue losses will then often exceed $200 million and peak at as high as $413 million in 2008$, $457 million in 20015$.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector..
1176	44	[From ATT2:] In addition to lost crop revenues, SED 40%-related increases in regional groundwater depths in the absence of SGMA implementation will potentially cause a significant increase in farmer irrigation costs and associated decreases in incomes due to increased pumping costs. These costs are estimated at their "upper bound" to average as much as $31 to $89 million in 2008$, $34 to $98 million in 2015$, with an upper-bound peak of as much as $117 to $336 million in 2008$, $129 to $372 million in 2015$, reflecting a range of observed electrical costs regionally to pump one acre-foot of water one foot in elevation. The estimates on irrigator cost impacts are deemed "upper bound" as they reflect the assumption that the region's irrigators will face the high end of potential regional groundwater basin depth increases due to the SED in conjunction with the high end of	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

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		observed regional incremental costs per foot of lift for pumping groundwater.	
1176	45	[From ATT2:] SWRCB chose not to quantify the impacts on economic sectors other than farming and simply ignored the potential farmer and community cost impacts of increased groundwater depths due to SED implementation. SWRCB's underlying argument is that there is a lack of information available to provide pinpoint quantifications of the effects of reduced crop production on other sectors of the regional economy like dairy as well as the potential groundwater depth impacts of the SED and associated regional cost effects.	Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies and food processors. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, regarding the scope of the economic analysis and groundwater pumping costs.
1176	46	[From ATT2:] Stratecon has taken a different tack [than SWRCB]. There would be a wide range of potential regional economic impact outcomes due to SED implementation based on: A) alternative considerations for how regional business and community may mitigate the resulting potential impacts of reduced local agricultural production and increased depths to groundwater; B) how groundwater depths in the region's aquifers may be effected by projected increases in groundwater pumping; and C) the incremental costs of pumping water from greater depths. As such, the probability of specific outcomes within that range are, in truth, extremely difficult to pinpoint. Accordingly, Stratecon doesn't attempt to produce an exact answer as to the potential output and employment impacts of SED effects on regional dairy and livestock production or farmer and community water costs. Instead, Stratecon focuses on developing economic impact estimates assuming there to be limited opportunities available for local dairy and livestock businesses to mitigate for reduced local crop production, and the high end of estimated potential increases in groundwater depths and the observed cost of pumping groundwater, to provide an "upper bound" assessment of the SED 40's potential regional economic impacts.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector and response to comment 1176-74 regarding potential effects to livestock and dairies.
1176	47	[From ATT2:] Dairy Sectors Before SGMA implementation when groundwater pumping can increase to partly offset lost surface water supplies, land fallowing will result in reduced Study Area [Merced, San Joaquin, and Stanislaus Counties] dairy-related output and, thus, revenues (including revenues from both milk production and downstream dairy product manufacturing sectors) potentially on the upper bound by as much as $151 million on average annually in 2008$, $173 million on average in 2015$. SWRCB staff did not estimate any dairy sectors impacts. Estimates of average annual impacts mask the volatility of lost annual dairy-related revenues, where upper bound annual revenue losses may often exceed as much as $200 million and peak at as much as $763 million in 2008$, $844 million in 2015$. After SGMA implementation, land fallowing will reduce dairy-related revenues potentially on the upper bound by as much as $212 million on average annually in 2008$, $237 million in 2015$. Annual upper bound revenue losses will then often exceed $200 million and may peak at over $1.0 billion in a single year in 2008$, $1.1 billion in 2015$.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector and response to comment 1176-74 regarding potential effects to livestock and dairies.
1176	48	[From ATT2:] Livestock Sectors Before SGMA implementation, when groundwater pumping can increase to partly offset lost surface water supplies, land fallowing will result in reduced Study Area [Merced, San Joaquin, and Stanislaus Counties] livestock-related output and, thus, revenues (including revenues from both livestock production and associated livestock product packing and	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector and response to comment 1176-74 regarding potential effects to livestock and dairies.

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		processing) potentially at the upper bound by as much as $36 million on average annually in 2008$, $41 million in 2015$. SWRCB staff did not estimate any livestock sectors impacts. Average annual impacts mask the volatility of lost annual livestock revenues, where annual revenue losses may often exceed $50 million and peak at the upper bound at as much as $180 million in 2008$, $199 million in 2015$. After SGMA implementation, land fallowing will reduce livestock-related upper bound revenues by as much as $50 million on average annually in 2008$, $56 million in 2015$. Annual revenue losses may often exceed as much as $70 million and on the upper bound peak at about $239 million in 2008$, $265 million in 2015$.	
1176	49	[From ATT2:] SED decreases in regional crop production will not only have downstream impacts on dairy-related and livestock-related revenues but also on other food manufacturers such as tomato processors and snack food producers as well as regional crop and commodity transportation companies. While these impacts may be significant, limitations in available data on these sectors within the region precluded any quantification of these impacts.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector and response to comment 1176-74 regarding potential effects to livestock and dairies.
1176	50	[From ATT2:] Communities The SWRCB does little to evaluate the potentially significant impacts on the region's domestic, commercial, industrial and municipal water users (collectively "urban" water users) of the SED. The principal anticipated effects of the SED on regional communities in addition to surface water supply losses for those communities such as Modesto and Stockton that rely on surface water from the region's Irrigation Districts for a portion of their water supplies, are the potential impacts to all urban water users of increased groundwater depths. All of region's urban water users rely in some part, or entirely on, groundwater for their community water supplies. Already regional urban water service providers and businesses, households and municipal service providers such as schools operating their own wells are facing significant water cost escalation and reduced access to water due to steadily increasing well depths accelerated by the recent drought. The estimated average annual upper bound direct effect on the region's urban water users due to SED-related increases in groundwater depths is increased annual water costs of about $7.2 million to $21.0 million on average in 2008$, $8.0 to $23.0 million in 2015$. In the peak year of SED-related surface water supply reductions, annual region community water costs are projected at their upper bound to increase by as much as $28.0 to $81.0 million in 2008$ due to increased groundwater depths, $31.0 to $89.0 million in 2015$. This translates to about $56.0 to $160.0 annually in 2008$, $62 to $177 in 2015$, per Study Area [Merced, San Joaquin, and Stanislaus Counties] household and must be considered conservative as they only account for increased power and maintenance expenses associated with anticipated SED-related increases in regional groundwater depths. The estimates do not account for the anticipated necessary investment in new well infrastructure by communities and individual businesses and households to reach water at greater depths and address anticipated worsening groundwater quality.	As explained in Chapter 13, Service Providers, the extent to which water suppliers (including municipal suppliers) are affected by a reduction in surface water depends on many factors, including the mechanisms by which they obtain water, contracts, policies, the type of water use they supply, and their ability to rely on or obtain alternative water supplies. The Recirculated SED's analysis is necessarily programmatic, not project specific, because among other reasons, the details to conduct a project-level analysis are not yet known. Please see Master Response 1.1, General Comments, regarding the programmatic nature of the analysis in the SED, and the general methods and modeling used in the SED. Please see Master Response 3.2, Surface Water Analyses and Modeling, regarding the Water Supply Effects (WSE) model as an appropriate tool to evaluate water supply effects and potential environmental impacts for the programmatic analyses contained in the Recirculated SED. Please see Master Response 8.2, Regional Agricultural Economic Effects, regarding the State Water Board's evaluation of potential regional economic effects and groundwater as it relates to those effects. As discussed in Master Response 8.2, while the 2016 Recirculated Draft SED's analyses and conclusions differ from the commenters, the SED's analysis are supported by reasonable assumptions and substantial evidence, and is an appropriate level of analysis for considering economic effects. With respect to economic considerations, a qualitative evaluation of potential changes to rates associated with municipal uses as a result of infrastructure needs is in Chapter 20, Economic Analyses, Section 20.3.3, Effects on Municipal and Industrial Water Supplies and Affected Regional Economies, M&I Water Supply Conditions in the Plan Area and Potential Water District and Ratepayer Effects. This includes a discussion of rate structures and facility improvement plans for different example districts (i.e., SSJID, SEWD, MID). In addition, Chapter 16, Evaluation of Other Indirect and Additional Actions, Section 16.2.2, Substitution of Surface Water with Groundwater, Table 16-6, Example New Groundwater Well Projects Funded by the California Department of Water Resources Integrated Regional Water Management Implementation Grant Program, Phase I, identifies project costs of developing municipal wells. Please see Chapter 22, Integrated Discussion of Potential Municipal and Domestic Water Supply Management Options, and Master Response 2.7, Disadvantaged Communities, regarding funding and assistance programs related to water supply infrastructure
1176	51	[From ATT2:] Recreation	In Chapter 20, Economic Analyses, the State Water Board uses changes in reservoir elevation levels and information regarding recreation contained in Chapter 10, Recreational Resources and Aesthetics. Section

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		The SED would negatively impact regional reservoir/lake elevations that will in turn be expected to reduce recreation visitation and associated recreator spending within the Study Area [Merced, San Joaquin, and Stanislaus Counties]. This reduction in spending would, in turn, have negative regional economic output and employment impacts that begin with visitor serving business sectors such as food & beverage, lodging and fuel services. SWRCB acknowledged these potential impacts but dismissed them as minor. While Stratecon was unable to obtain the data necessary to quantify the potential regional recreation activity effects and associated economic impacts of reduced reservoir elevations from the SED, Stratecon believes that those impacts are material. An excellent case in point is Woodward Reservoir, an important lake-based recreation destination in Modesto County that will experience SED-related reductions in its surface elevations, particularly during the peak recreation summer months. Woodward has strict water quality standards in place that terminate body contact in the reservoir when elevations decline to their lows following the irrigation season in late summer and early fall. With the recent drought this threshold has most recently been reached in September as opposed to the typical sometime in October. The SED, in drier hydrologic years, would be expected to trigger this body contact threshold earlier than otherwise, all else being equal, which would have a marked impact on recreation at the reservoir and, accordingly, regional recreation-related spending and associated economic output. Other of the region's reservoirs that would see their surface elevations and associated recreation adversely impacted, include Lake Don Pedro in Tuolumne County and Lake McClure in Mariposa County. While Don Pedro and McClure do not have the same body-contact usage thresholds as Woodward, Don Pedro and McClure would be expected to experience visitation reductions as reservoir visitation is strongly correlated to lake surface levels due to aesthetics and access, the latter particularly important for boating.	20.3.6, Effects on Recreational Opportunities, Activity, and the Regional Economy, Table 20.3.6-1, Estimated Use (in Visitor Days) of Affected Recreation Areas by Watershed, presents information for Don Pedro and McClure, which are subsequently evaluated in this section of Chapter 20. The potential effects on the regional economy are determined to be relatively minor, due in part to the fact that the region supports both reservoir and river recreation. Please see Master Response 8.4, Non-Agricultural Economic Considerations, for further information regarding recreational-related economic effects in the plan area and extended plan area. There is no Woodward Reservoir in Modesto County because there is no Modesto County in California. Woodward Reservoir is located in Stanislaus County. Please see response to comment 1176-205 for more information regarding Woodward reservoir elevation levels.
1176	52	[From ATT2:] Hydropower Hydropower generation on the Merced, Stanislaus and Tuolumne Rivers will also be adversely impacted by the SED. These impacts will be attributed both to generation timing and generation production effects. With respect to the former, lower flexibility to manage reservoir releases for generation under the SED will reduce the ability of regional power system operators to maximize higher valued power generation during peak demand periods (peaking power) over lower valued base load power demand periods. As hydropower can be generated instantaneously with the opening of gates releasing water through generation facilities, it is a superior source for peaking power compared to other electrical generation sources. The SWRCB estimates that under the SED 40, the reduction in hydropower production/timing is valued at less than $1.0 million per year. Accordingly, the resulting impacts on regional power service prices for households and businesses should be small. The underlying assumption is that the cost of the replacement power for the power lost will be reasonable and, accordingly, have little effect when passed through to ratepayers. Stratecon was unable to acquire the necessary data to assess the impact of SED on hydropower.	Please see Master Response 8.4, Non-Agricultural Economic Considerations, related to hourly fluctuations for peak pricing. While the SED analysis did not including hourly modeling, the selection of price at 80th percentile of hourly prices accounts for losses associated with reduced production capacity. With respect to the commenter's statement regarding the impact on ratepayers, as noted on page Section 20.3.4, Effects on Hydropower Generation, Revenues, and the Regional Economy, the decrease in annual power generated under LSJR Alternative 3 is 0.0003 percent of California's electricity generating system, an amount too small to have a measurable effect on ratepayers.
1176	53	[From ATT2:] Economic Impacts The impacts of the SED on agricultural production, dairy, livestock and other production	Please see response to comment 1176-55, regarding responses related to economic considerations and the agricultural sector, and response to comment 1176-74, regarding potential effects to livestock and dairies. Please also see Master Response 8.2 regarding IMPLAN and the limitations of using IMPLAN to estimate

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		activities reliant on that agricultural production, agricultural water costs, urban water costs, recreation spending and hydropower values will all have impacts on the Study Area's [Merced, San Joaquin, and Stanislaus Counties] economic output and employment. These impacts, other than recreation and hydropower, are evaluated using the standard modelling tool IMPLAN. The IMPLAN dataset for the three counties was acquired for the year 2010 consistent with the modelling year used by the SWRCB. The model was then adjusted to reflect certain specific conditions within the Study Area to account for the potential economic impacts on business sectors that operate downstream of, and rely on, production by the region's farm sector such as grain and hay/pasture production for the region's dairy and livestock sectors. These downstream affects were not quantified by the SWRCB but will comprise a substantial component of the total potential economic impacts of the SED due to those sectors' importance to the regional economy and reliance on locally produced feed crops.	downstream economic effects. Please see Master Response 8.4, Non-Agricultural Economic Considerations, for discussion of economic considerations related to hydropower generation and recreation.
1176	54	[From ATT2:] Crop Production Stratecon estimates that the impacts of the SED 40% prior to SGMA implementation on crop production in the Study Area [Merced, San Joaquin, and Stanislaus Counties] irrigation districts that rely on surface water ("Irrigation Districts") would result in an average regional decline in economic output of $91 million in 2008$, $101 million in 2015$, and in a peak year of surface water supply reductions, potentially as much as $413 million in 2008$, $457 million in 2015$, representing about 3.5% and 16.5% of estimated baseline regional economic output generated directly and secondarily by crop production within the Irrigation Districts, respectively. Stratecon further estimates that the impacts of the SED 40 on agricultural production in the Irrigation Districts would result in an average regional decline in employment of about 632 jobs and in a peak year of surface water supply reductions, potentially as much as approximately 3,060 jobs, representing 3.3% and 16.6% of estimated baseline employment generated directly and secondarily by crop production within the Irrigation Districts, respectively. Stratecon estimates that the impacts of the SED 40 with SGMA implementation on crop production in the Irrigation Districts would result in an average regional decline in economic output of $159 million in 2008$, $176 million in 2015$, and in a peak year of surface water supply reduction potentially as much as $712 million in 2008$ and $788 million in 2015$, representing about 6.1% and 27.4% of estimated baseline economic output generated directly and secondarily generated by crop production within the Irrigation Districts, respectively. Stratecon further estimates that the impacts of the SED 40 with SGMA implementation on crop production within the Irrigation Districts would result in an average regional decline in employment of about 1,100 jobs and in a peak year of surface water supply reduction potentially as much as almost 5,000 jobs, representing about 5.8% and 26.2% of estimated baseline employment generated directly and secondarily by crop production within the Irrigation Districts, respectively.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.
1176	55	[From ATT2:] Dairy Sectors Stratecon estimates that the impacts of the SED 40 prior to SGMA implementation on the	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

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		dairy sectors in the Study Area (including milk production and dairy product manufacturing sectors), which rely heavily on regional grain and hay feed production could result in an upper bound average regional decline in economic output of as much as $273 million in 2008$, $303 million in 2015$, and in a peak year of surface water supply reductions, potentially as much as $1.33billion in 2008$, $1.48 billion representing about 3.6% and 17.7% of estimated baseline economic output generated directly and secondarily by the dairy sectors within the Study Area [Merced, San Joaquin, and Stanislaus Counties], respectively. The upper bound represents the assumption that the region's dairies would not be able to substitute reductions in available local feed with outside of region sources due to lack of available supply, unsupportable pricing and high transportation costs. The region's dairies are already grappling with extremely tight margins due to the challenges of ever increasing environmental and other regulatory constraints along with the cost of labor and transportation. According to the owner of one dairy in the region, any material increase in his operation's cost of feed will result in him having to shut down because the economics of the operation will no longer be viable. Stratecon further estimates that the impacts of the SED 40 on dairy activities in the Study Area would result in a upper bound average regional decline in employment of as much as about 1,015 jobs on average and in a peak year of surface water supply reductions, potentially as much as approximately 4,944 jobs, representing about 3.2% and 15.4% of estimated baseline employment generated directly and secondarily by the dairy sectors within the Study Area, respectively. Stratecon estimates that the impacts of the SED 40 with SGMA implementation on the dairy sectors in the Study Area would result in a upper bound average regional decline in economic output of as much as $374 million in 2008$, $414 million in 2015$, and in a peak year of surface water supply reductions, potentially as much as $1.77 billion in 2008$, $1.96 billion in 2015$, representing about 5.0% and 23.6% of estimated baseline economic output generated directly and secondarily by the dairy sectors within the Study Area, respectively. Stratecon further estimates that the impacts of the SED 40 on dairy activities in the Study Area would result in an upper bound regional decline in employment of as much as about 1,386 jobs on average and in a peak year of surface water supply reductions, potentially as much as approximately 6,576 jobs, representing approximately 4.3% and 20.5% of estimated baseline employment generated directly and secondarily by the dairy sectors within the Study Area, respectively.	
1176	56	[From ATT2:] Livestock Sectors Stratecon estimates that the impacts of the SED 40 prior to SGMA implementation on the livestock sectors in the Study Area [Merced, San Joaquin, and Stanislaus Counties] (including livestock production and livestock packing and processing sectors), which rely heavily on regional grain and hay crop production would result in a upper bound regional decline in economic output of as much as $65 million on average in 2008$, $72 million in 2015$, and in a peak year of surface water supply reductions, potentially as much as almost $317 million in 2008$, $351 million in 2015$, representing about 3.6% and 17.7% of estimated baseline economic output generated directly and secondarily by the livestock sectors within the Study Area [Merced, San Joaquin, and Stanislaus Counties], respectively.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

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		Stratecon further estimates that the impacts of the SED 40 on livestock output in the Study Area would result in an upper bound regional decline in employment of as much as about 255 jobs on average and in a peak year of surface water supply reductions, potentially as much as approximately 1,244 jobs, representing 3.3% and 15.8% of estimated baseline employment generated directly and secondarily by the livestock sectors within the Study Area, respectively. Stratecon estimates that the impacts of the SED 40 with SGMA implementation on the livestock sectors in the Study Area would result in an upper bound average regional decline in economic output of as much as about $88 million in 2008$, $98 million in 2015$, and in a peak year of surface water supply reductions, potentially as much as $422 million in 2008$, $466 million in 2015$, representing about 4.9% and 23.3% of estimated baseline economic output generated directly and secondarily by the livestock sector within the Study Area, respectively. Stratecon further estimates that the impacts of the SED 40 on livestock production in the Study Area would result in an upper bound average regional decline in employment of about 349 jobs on average and in a peak year of surface water supply reductions, potentially as much as approximately 1,654 jobs, representing approximately 4.4% and 21.1% of estimated baseline employment generated directly and secondarily by the livestock sectors within the Study Area, respectively.	
1176	57	[From ATT2:] Increased Water Costs In the case of the SED 40 before SGMA, not only will the associated crop production losses adversely impact regional output and employment so will the higher anticipated water costs incurred by the region's irrigators and communities due to increased groundwater depths and associated pumping costs. The increases in Study Area [Merced, San Joaquin, and Stanislaus Counties] water costs will reduce farm and other business incomes as well as household disposable incomes resulting in a regional decline in consumption and associated impacts on output and employment. Stratecon estimates that the increased cost of water for regional irrigators could result, at their upper bound in average output and job losses within the region of as much as about $96 million in 2008$, $106 million in 2015$ and 866 jobs, respectively, and peak year output and job losses within the region on the upper bound of as much as about $363 million in 1998$, and 3,269 jobs, respectively. Stratecon further estimates that the increased cost of water for regional communities (households, businesses, etc.) due to increased SED-related groundwater depths could result, at their upper bound, in average output and job losses within the region of as much as about $23 million in 2008$, $25 million in 2015$, and 203 jobs, respectively, and peak year output and job losses within the region on the upper bound of as much as about $87 million in 2008$, $97 million in 2015$ and 787 jobs, respectively. Due to a lack of data, Stratecon did not estimate the potential additional costs due to groundwater depth and potential additional pumping that may be incurred by region communities reliant on surface water of reduced surface water supplies resulting from the SED 40's implementation.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, regarding the scope of the economic analysis and groundwater pumping costs.

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1176	58	[From ATT2:] Recreation The SED 40 is expected to adversely impact surface elevations of many of the Study Area's [Merced, San Joaquin, and Stanislaus Counties] reservoirs such as Woodward and Modesto Reservoirs as well as reservoirs just adjacent to the area, such as Lake Don Pedro and Lake McClure, that are important outdoor recreation destinations for both residents within and outside the Study Area. These recreators make an important contribution to the Study Area economy, particularly those visitors from outside the area, through local recreation-related spending on lodging, food & beverage and fuel services. Correspondingly, recreation visitation to reservoirs tend to be sensitive to variability in lake water levels. As the SED 40 will have noteworthy impacts on reservoir elevations along the Merced, Stanislaus and Tuolumne Rivers, particularly during peak recreation summer months, it is likely for there to be material reductions on recreation at those reservoirs and associated impacts on regional economic output and employment. Though Stratecon was unable to obtain the visitation and other data necessary to quantify these impacts they may prove to be notable, particularly in years with drier hydrologic conditions when the SED's impacts on reservoir surface elevations could provide most significant.	Please see response to comment 1176-80 regarding recreational-related economic effects associated with reservoir elevation levels.
1176	59	[From ATT2:] Hydropower Though the SED 40 will reduce the flexibility in management of the affected San Joaquin River tributaries for hydropower generation, the resulting anticipated impacts on power generation values and quantity are estimated by SWRCB to be small, less than $1.0 million. While the SWRCB analysis did not specifically analyze the implications for electricity costs incurred by regional power consumers of replacement power supplies, Stratecon agrees that the economic impacts of the SED 40 associated with hydropower effects are likely to be minimal and defers to the SWRCB hydropower impact analysis.	The commenter agrees that hydropower economic effects associated with the plan amendments are likely to be minimal. The volume of change in power generation is so small relative to California's electricity generating system that even if a more expensive replacement power source is assumed, there will be no measurable effects on ratepayers (see Section 20.3.4, Effects on Hydropower Generation, Revenues and the Regional Economy, and response to comment 1176-81).
1176	60	[From ATT2:] Population and Housing Figure 2.1 [ATT2:ATT4] shows the current and past population within the Study Area [Merced, San Joaquin, and Stanislaus Counties]. Estimated total population within the region in early 2016 was about 1.5 million, up from about 1.0 million in 1990. The graphic shows steady recent historical population growth in all three counties. This has had important implications for past growth in regional urban and commercial/industrial water demand, water conservation measures notwithstanding. Figure 2.2 [ATT2:ATT5] compares the Study Area's historical and projected future population to that of the State of California. To facilitate the comparison the projected population figures are translated to an index value with each of the Study Area's and the State's 2016 estimated population set to a value of 1.0. The graphic shows not only that the region's historical population growth has significantly outpaced that of the state but also that future population growth out through the year 2060 is projected to do as well. This will have very important implications for the region's already stressed groundwater supplies as the region's communities rely primarily on groundwater for their water supplies. Figure 2.3 [ATT2:ATT6] compares the Study Area's historical and projected future housing inventory to that of the State of California. To facilitate the comparison, the projected population figures are translated to an index value with each of the Study Area's and the state's 2016 estimated population set to a value of 1.0. The figure reveals that while the	The population and housing trend identified in the comment is occurring regardless of the plan amendments. As noted in Master Response 8.4, Non-Agricultural Economic Considerations, economic growth and associated housing and development are influenced by many external factors. Managing for water supply through a combination of planning, infrastructure, portfolio strategies do prevent water supply from being a barrier to growth. In addition, as noted in Master Response 8.4, urban water providers already plan for anticipated growth (to the year 2030 and beyond) while ensuring that water supplies would be sufficient to meet demand, through their required Urban Water Management Plan (UWMP). This master response also provides information regarding water rates and fiscal effects. Communities facing impending shortages or without an assured water supply in the future would already be in planning stages of pursuing options to close the shortages. They are continually in the process of removing water-based barriers to housing development, and would do so regardless of the plan amendments. Please see Master Response 6.1, Cumulative Analysis, regarding growth inducing effects and housing factors. As discussed in that master response the need for and development of housing is influenced by many factors unrelated to the plan amendment. As the experience during the drought has indicated, reduced water supply did not limit population growth and housing development.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		region's historical growth in its housing inventory has somewhat kept pace with its population growth and outpaced the state, future projected housing growth for the region out through the year 2030 is at a pace that is much slower than projected population growth for that same period. This suggests a tightening of the region's housing market, and associated increases in household size (i.e., the number of occupants per household), and occupancy rates (a declining rate of housing vacancy). This trend would be expected to result in rising housing prices for a region that has a disproportionate share of its communities compared to the state that are already designated as economically disadvantaged by the state. Rising housing prices will only exacerbate community affordability challenges with any actions such as the SED that are likely to cause a future material rise in water service cost both for households and businesses.	
1176	61	[ATT2:ATT4: Figure 2.1. Graph showing historical populations for Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	62	[ATT2:ATT5: Figure 2.2. Graph comparing historical and projected future population growth for Merced, San Joaquin, and Stanislaus Counties to that of California.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	63	[ATT2:ATT6: Figure 2.3. Graph comparing historical and projected future housing inventory for Merced, San Joaquin, and Stanislaus Counties to that of California.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	64	[From ATT2:] Regional Economy Generally, the economies of the three Study Area counties [Merced, San Joaquin, and Stanislaus] are characterized by relatively high rates of unemployment, large agricultural and agricultural-dependent sectors, low household incomes and associated high rates of poverty, helping to explain why so many are designated as economically disadvantaged by the state. Figure 2.4 [ATT2:ATT7] compares the average unemployment rate for the Study Area as compared to the state's for the period 1990 through 2016 and the unemployment rate for 2015. The figure shows that Study Area unemployment rate has long been high and continues to be quite a bit higher than the unemployment rate for the state. There are a variety of reasons for the disparity including the region's lack of economic diversity (i.e., reliance on a relatively limited number of sectors). Such a lack of diversification translates to an economy that has greater potential sensitivity/vulnerability to events and regulatory actions that adversely impact specific primary economic sectors on which the regional economy relies such as agriculture. Figure 2.5 [ATT2:ATT8] compares the share of current employment in the Study Area within the agricultural sector as compared to the State. The table illustrates the relative importance of that sector to the Study Area's economy, particularly that of Merced County. It is also important to emphasize that the graphic substantially understates the relevance of the agricultural sector to the region's employment base as many related businesses and associated employment in agricultural product transportation, manufacturing (such as dairies, which are a significant contributor to the regional economy) and trade, are down stream of and rely directly on crop and livestock production of the region's agricultural sector.	Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of employment and unemployment within the plan area including as employment relates to the agricultural sector. Please also see Master Response 8.4, Non-Agricultural Economic Considerations, regarding growth and development within the plan area. Please also see Master Response 1.1, General Comments, for responses to comments that do not raise significant environmental issues or that make a general comment regarding the plan amendments.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	65	[ATT2:ATT7: Figure 2.4. Graph comparing unemployment rates for Merced, San Joaquin, and Stanislaus Counties to those of California.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	66	[ATT2:ATT8: Figure 2.5. Graph showing farm employment as percentage of total private sector employment.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	67	[From ATT2:] Median Household Income Median household income ("MHI") is frequently used to evaluate community economic conditions within a defined geographic area. In fact, the California Department of Water Resources ("CDWR") for the purposes of water resource development and management planning uses MHI to determine if communities are considered economically disadvantaged and, thus, warrant certain special considerations in the spatial allocation of limited natural and financial resources, mitigating actions or in how cost burdens are allocated ("Disadvantaged Community" or "DAC"). Communities are considered economically disadvantaged by CDWR if their MHI is lower than 80% of the state's MHI and considered severely economically disadvantaged if community MHI is less than 60% of the state's MHI. Figure 2.6 [ATT2:ATT9] compares the percentage of households in the Study Area that are within DAC communities based on 2014 MHI data. The figure shows that a much larger share of the region's population resides in DACs than for the state. Merced County has a significant portion of its populace living in DACs, over 80%. DACs in the region include the cities of Merced, Modesto and Stockton, which are the largest incorporated communities in each of the Study Area counties based on population. The extent of lower incomes in the region has important implications for the presumed ability of households in the region to pay (the affordability of) any potential additional costs for water that may result from SED-related reductions in available surface water supplies. In the case of the region's communities, for those that rely entirely on groundwater, these costs will be expected to derive from increased depths to groundwater as the region's irrigators that rely on surface water are anticipated to pump more groundwater from the regions already depleted aquifers to offset SED-related reductions in surface water supplies. And, some communities, such as the City of Modesto, which relies on both surface and ground water, may not only face the cost burden of SED-related increases in groundwater depths but also a large decline in their existing water supplies. On average, Modesto receives about half of its water supplies from the Stanislaus River by way of agreement with and delivery from the Modesto Irrigation District. The remainder of the City's water supplies are groundwater.	As described in Master Response 2.7, Disadvantaged Communities, the concerns of disadvantaged communities (DACs) and environmental justice issues are important to the State Water Board. As acknowledged in Chapter 22, Integrated Discussion of Potential Municipal Water Supply Management Options, the effects of reduced surface water supplies are not felt by communities equally, with "communities of color and low-income people living in tribal, rural, and farming communities often disproportionately [experiencing] impacts on drinking water." The recent drought highlighted this historical problem, which has been exacerbated by the expansion of permanent crops and increased number of groundwater wells in the areas near these communities in the plan area. Please see Master Response 2.7, regarding the assessment of potential impacts of the plan amendments on DACs, human right to water as it relates to DACs, and the State Water Board's technical and financial assistance programs for small public water systems serving DACs. Please refer to Master Response 8.4, Non-Agricultural Economic Considerations, regarding the potential rate increase to municipalities in the plan area, including DACs, as well as case studies presented in Chapter 20, Economic Analyses, Section 20.3.3, Effects on Municipal and Industrial Water Supplies and Affected Regional Economies.
1176	68	[ATT2:ATT9] Figure 2.6. Graph showing percent of households in DACs for Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	69	[From ATT2:] Poverty Concurrent with the relatively low MHIs [median household incomes] within the Study Area [Merced, San Joaquin, and Stanislaus Counties] are high rates of poverty, which also brings to the forefront concerns regarding the affordability for regional communities to pay for anticipated increases in water costs resulting from SED implementation.	Please refer to response to comment 1176-96.

Table 4-1. Responses to Comments			
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1176	70	[ATT2:ATT10: Figure 2.7. Graph comparing poverty levels of Merced, San Joaquin, and Stanislaus Counties to those of California.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	71	[From ATT2:] Regional Farm Economy Agriculture is a fundamental component of the Study Area's [Merced, San Joaquin, and Stanislaus Counties] economy and employment base, and the primary user of the region's surface water supplies. Accordingly, the direct effects of SED surface water supply cutbacks on the regional economy are expected. Farm sector may adjust to SED-related reductions in surface water supply availability and reliability by adopting efficiency and conservation measures and pumping more groundwater. Study Area farmers have already made significant investments over time in response to water supply challenges in irrigation and other technologies to improve water management efficiencies and meet conservation objectives. They have also generally invested in less water consuming crops. Additional efforts on this front may increasingly prove to have diminishing returns. Furthermore, growing plants need a certain amount of water and no amount of technology can change this immutable fact.	Please see Master Response 3.5, Agricultural Resources, for discussion of crop management and irrigation efficiency.
1176	72	[From ATT2:] Increased groundwater pumping in a region with already severely over-drafted and declining aquifers provides the same challenges faced by the region's urban communities; rising costs due to increasing well depths. Additional groundwater pumping, which has been the short-term response of many of the region's irrigation districts to drought-related reductions in surface water supplies with the current drought, is not a sustainable model for offsetting SED reductions in surface water supplies. The costs associated with such pumping may rise quickly. Figure 2.8 [ATT2:ATT11], which shows the historical trend in elevations for a number of wells in the Merced Irrigation District, is an illustrative example of what has happened already with well depths in the region over time. Significant SED-driven increases in agricultural pumping will only make matters worse and, regardless, will run full stop into pending regulations to stop these types of declines.	See response to Comment 1176-18.
1176	73	[ATT2:ATT11: Figure 2.8. Graph showing Merced ID average elevations over time.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	74	[From ATT2:] County Level Agriculture Table 2.1 [ATT2:ATT12] summarizes the contribution of the Study Area [Merced, San Joaquin, and Stanislaus Counties] to California's agricultural economy. The table shows that in 2014 the three Study Area counties were the 5th, 6th and 7th largest producers of farm commodities in the State based on total value of production. Table 2.2 [ATT2:ATT13] provides a summary of cropping over the past ten years for Merced County. The table show that acreage in production has consistently increased over time driven by increasing production of corn silage and other field crops for livestock feed and growing investment in permanent crops, most notably almonds. Vegetable crop acreage in the County has also shown strong increases. At the same time water intensive irrigated pasture acres have shown a significant decline over time. Merced County's most important commodities based on gross value are milk and almonds.	The comment provides general description of agricultural production in the three county study area. Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

Table 4-1. Responses to Comments			
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		The table shows for example an over 20% increase in the County's production of milk over the past ten years and an almost 20% increase in the acreage of almonds. Almonds account for a significant share of the County's cropping pattern. These levels and trends have important implications for the challenges faced by County's famers with the substantial SED reductions in surface water supplies. The investment in almond orchards and milk production infrastructure, including cows is substantial. Accordingly, this limits the flexibility of regional farmers to respond to changes in their water surface water supplies putting at great risk these investments as foundations of the County's agricultural economy. Table 2.3 [ATT2:ATT14] provides a summary over the past ten years of cropping for San Joaquin County. The table shows a similar trend as with Merced County with respect to the steady expansion of acreages of almonds and walnuts. However, acreages in the County over the past five years have been declining for a number of other crops including, in particular, vegetables, resulting in a substantial decline in the region's overall farmed acreage. Table 2.4 [ATT2:ATT15] provides a summary over the past ten years of cropping for Stanislaus County. Trends in farmed acreage in Stanislaus County has also been like the other Study Area counties with respect to nut acreage. In 2015, Almonds and walnuts accounted for about 40% of the County's overall cropping pattern. Increases in nut acreages over the past five years have been more than offset by declines in vegetable and field crop acres resulting in an overall decline in the County's acreage.	
1176	75	[ATT2:ATT12: Table 2.1. California County Agricultural Rankings.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	76	[ATT2:ATT13: Table 2.2. Merced County Cropping Pattern.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	77	[ATT2:ATT14: Table 2.3. San Joaquin County Cropping Pattern.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	78	[ATT2:ATT15: Table 2.4. Stanislaus County Cropping Pattern.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	79	[From ATT2:] The Water Supply Impact of Proposed Flow Objectives The proposed flow objectives for the San Joaquin River will fundamentally change the character of surface water rights to the Stanislaus, Tuolumne and Merced rivers. The SWRCB discussion focuses on the average annual impact of the flow objectives by type of water year. The focus on those averages provides, at best, an incomplete characterization of the potential impact of flow objectives on surface water rights. A critical impact of the flow objectives is a major reduction in the reliability of surface water supplies. Figure 3-1 [ATT2:ATT16] compares average annual applied surface water in the Study Area [Merced, San Joaquin, and Stanislaus Counties] under the Baseline versus the 40% dedication of unimpaired flows. [Footnote 5: Applied surface water measures the useable yield from surface water rights. Data from SWRCB Spreadsheet "GW and SW Use Analysis 09142016," tab "Applied SW."] The impact on applied surface water is more severe, the more severe are hydrologic conditions.	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector, including water supply reliability.

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		Supply reliability relates to the amount of water available from a water right with a certain frequency. In assessing the water delivery reliability of the State Water Project, California's Department of Water Resources defines "water delivery reliability" as "the likelihood (probability) that a certain amount of water will be delivered by the SWP in a year." [Footnote 6: "The State Water Project, Final Delivery Reliability Report 2013," State of California, Natural Resources Agency, Department of Water Resources, at p. 1.] From this perspective, the reliable supply from a water right is measured by the amount of water available with an acceptably small likelihood of interruption. Stratecon quantifies the reliable supply of surface water rights at the volume of surface water available with only a 10% likelihood of interruption. In other words, the volume of available water will fall short of the reliable supply at an expected frequency of once a decade. Unreliable supply is the volume of water available above the reliable supply. The 40% dedication of unimpaired flows reduces both the volume of available surface water and its reliability. Figure 3-2 [ATT2:ATT17] compares the reliable and (expected) unreliable annual applied surface water for the Study Area under the Baseline versus the 40% dedication of unimpaired flows. [Footnote 7: Applied surface water will exceed reliable supply in 90% of the years. Analysis based on data from SWRCB Spreadsheet "GW and SW Use Analysis 09142016," tab "Applied SW." Under the Baseline, almost 80% of the average annual amount of applied surface water would be a reliable supply. With 40% dedication of unimpaired flows, less than 40% of the average amount of applied surface water would be a reliable supply. In comparison to the Baseline, the 40% dedication of unimpaired flows reduces the Study Area's annual reliable applied surface water from 1 million AF to 400 thousand acre-feet ("TAF") AF, a 60% reduction. The loss of an annual reliable supply of 600 TAF is partly offset by an increase in (expected) annual unreliable supply of 366 TAF. The focus on only the average impact on available applied surface water ignores the significant shift from reliable to unreliable surface water supplies. Table 3-1 [ATT2:ATT18] shows the reliable and (expected) unreliable annual applied surface water for the three rivers in the Study Area. For the Stanislaus River, the 40% dedication of unimpaired flows reduces average annual applied surface water by 62 TAF, with a reduction of annual reliable supply by 218 TAF partly offset by an increase in (expected) annual unreliable supply by 156 TAF. For the Tuolumne River, the 40% dedication reduces the average annual applied surface water by 111 TAF, with a reduction of annual reliable supply of 253 TAF partly offset by an increase in (expected) annual unreliable supply of 142 TAF. For the Merced River, the 40% dedication reduces the average annual applied surface water by 138 TAF, with a reduction of annual reliable supply of 253 TAF partly offset by an increase in (expected) annual unreliable supply of 68 TAF. The significant reductions in supply reliability means that owners of water rights from the three rivers will face frequent, severe, and sustained losses of surface water--see Figure 3-3(a) [ATT2:ATT19] to Figure 3-3(c) [ATT2:ATT21]. [Footnote 8: Analysis based on data on applied surface water under the Baseline versus 40% dedication from SWRCB Spreadsheet "GW and SW Use Analysis 09142016," tab "Applied SW."] The reduction in applied surface water has multi-year successive losses more than 150 TAF on the Stanislaus River, 250 TAF on the Tuolumne River, and 150 TAF on the Merced River.	

Table 4-1. Responses to Comments			
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		Water losses occur in about half the years included in SWRCB's study (48% on the Stanislaus River, 51% on the Tuolumne River and 52% on the Merced River). [Footnote 9: The frequencies in the text calculated by the proportion of years in Figure 2-3(a) through Figure 2-3(c) with water losses.] The focus on average annual losses even by water year hydrologic conditions as in Figure 3-1 [ATT2:ATT16] masks how much the 40% dedication of unimpaired flows increases the underlying volatility in available surface water supplies.	
1176	80	[ATT2:ATT16: Figure 3-1. Graph showing average annual applied surface water for the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	81	[ATT2:ATT17: Figure 3-2. Graph showing annual reliable and (expected) unreliable applied surface water for the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	82	[ATT2:ATT18: Table 3-1. Graph showing annual reliable and (expected) unreliable applied surface water (TAF).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	83	[From ATT2:] Assessing the economic consequences of the changes in the surface water rights on the Stanislaus, Tuolumne and Merced rivers requires more than (i) looking at each water year in isolation and (ii) averaging over the different water years. Using SWRCB's own analysis of available surface water under the Baseline versus a 40% dedication of unimpaired flows, the flow objectives for the San Joaquin River will reduce the volume and more significantly reduce the reliability of surface water supplies. Partially offsetting the loss of reliable surface water supplies with an increase in unreliable surface water supplies is not an attractive bargain. The reduction in the value of surface water rights is significant. Depending on the relative value of reliable water supplies to unreliable water supplies, implementation of SED 40 reduces the value of surface water rights by 40% to more than 50% due to the loss of reliable water supplies even though partly offset by increased unreliable water supplies (see Table 3-2 [ATT2:ATT22]). [Footnote 10: The percentage reduction in the value of surface water rights from the substitution of unreliable for reliable water supplies depends on the relative value of reliable versus unreliable water supplies. Lost Economic Value equals the Economic Value under the Baseline less the Economic Value under SED 40, expressed as a percentage of the Economic Value under the Baseline. See Figure 3-2 [ATT2:ATT17] for the quantities of reliable and expected unreliable water supplies under the Baseline and SED 40. In calculating Table 3.2, the value of unreliable supplies was set at $1 and the value of reliable supplies set at the multiple specified in the first column.] With little if any Central Valley Project ("CVP") water available in 2015 and 2016, the prices Westlands Water District paid for transfer water exceeded $1,000/AF, three times the amount Westlands paid in 2013 (when CVP Allocation was 20%) and five times the amount paid during 2000-2012 (when water was more plentiful as CVP Allocations averaged 60%). [Footnote 11: "Westlands Again Pays High Price for Supplemental Water Due to Drought," Journal of Water, March 2016, http://journalofwater.com/jow/westlands-again-pays-high-price-for-supplemental-water-due-to-drought/.] The annual value of reliable water supplies year in and year out, of course, is less than the value of water in years of peak values. Assuming the annual value of reliable water supplies is in the range of a 10% to 20% discount off the annual value of water in peak years, the	Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector.

Table 4-1. Responses to Comments			
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		relative value of reliable water supplies to unreliable water supplies is about 4x to 5x--near the bottom of Table 3-2.	
1176	84	[ATT2:ATT19: Figure 3-3(a). Annual reductions in applied surface water from Stanislaus River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	85	[ATT2:ATT20: Figure 3-3(b). Annual reductions in applied surface water from Tuolumne River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	86	[ATT2:ATT21: Figure 3-3(c). Annual reductions in applied surface water from Merced River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	87	[ATT2:ATT22: Table 3.2. Impact of SED 40 implementation on value of surface water rights.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	88	[From ATT2:] Groundwater Resources There are two impacts of the proposed flow objective on groundwater resources: increased groundwater pumping and reduced groundwater recharge from the use of surface water. Each impact translates into increased stress on the Study Area's [Merced, San Joaquin, and Stanislaus Counties] groundwater basins. Groundwater Pumping SWRCB staff project that implementation of the proposed flow objective will significantly increase groundwater pumping, especially when hydrologic conditions are critical, dry, or below normal (see Figure 4.1 [ATT2:ATT23]). Under the baseline, groundwater pumping hovers around 200,000 AF per year in all hydrologic conditions other than critical water years, when groundwater pumping increases to almost 500,000 AF per year. Under the proposed flow objective, groundwater pumping exceeds 600,000 AF per year in critical water years, 500,000 AF per year in dry water years, and almost 400,000 AF per year in below normal water years. SWRCB staff project increased volatility in groundwater pumping (see Figure 4.2 [ATT2:ATT24]). Under the Baseline, groundwater basins are subjected to increased pumping only in years of critical hydrologic conditions. Under the proposed flow objective, the stress from spikes in groundwater pumping are more frequent. This increased frequency of spikes in groundwater pumping intensifies existing overdraft conditions and will not be viable once the Sustainable Groundwater Management Act is implemented. The above structure of how the proposed flow objective transforms the nature of groundwater pumping cascades down to all three rivers. For users of surface water from the Stanislaus River, groundwater pumping increases by 25% during critical years (when groundwater basins are already stressed by spikes in pumping), doubles in dry years and increases by 23% in below normal years (see Figure 4.3 [ATT2:ATT25]). As with the Study Area generally, there is a greater frequency of spikes in groundwater pumping by users of Stanislaus River surface water (Figure 4.4 [ATT2:ATT26]). For users of surface water from the Tuolumne River, the increases in groundwater pumping are largest during years of dry conditions (49% increase) and below normal conditions (40% increase)--see Figure 4.5 [ATT2:ATT27]. Where baseline average annual groundwater	See response to Comment 1176-18.

Table 4-1. Responses to Comments			
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		pumping ranges between 80 TAF and 100 TAF under hydrologic conditions other than critical years, average annual groundwater pumping exceeds 130 TAF in below normal conditions and jumps to 150 TAF in critical and dry conditions. SWRCB staff project increased frequency in spikes in groundwater pumping (see Figure 4.6 [ATT2:ATT28]). The projections are similar for users of surface water from the Merced River. Under the Baseline, annual groundwater pumping averages less than 50 TAF under all hydrologic conditions other than critical conditions (see Figure 4.7 [ATT2:ATT29]). Average annual groundwater pumping more than triples to 170 TAF in critical years. Implementation of the proposed flow objective increases average annual groundwater pumping by an additional 47% in critical years, 414% in dry years and 222% in below normal years. The proposed flow objectives increase the frequency and spikes in projected groundwater pumping (see Figure 4.8 [ATT2:ATT30]). In sum, SWRCB projects that the proposed flow objective increases groundwater pumping by surface water users on all three rivers. Under the Baseline, groundwater pumping hovers around relatively low levels in all hydrologic conditions other than critical years. Average annual groundwater pumping spikes during critical years reflecting conjunctive use of groundwater to back stop reductions in available surface water. With the proposed flow objective, groundwater pumping steps up further to offset the loss of available surface water in critical, dry and below normal years.	
1176	89	[ATT2:ATT23: Figure 4.1. Average annual groundwater pumping by surface water users in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	90	[ATT2:ATT24: Figure 4.2. Groundwater Pumping by Surface Water Users in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	91	[ATT2:ATT25: Figure 4.3. Average annual groundwater pumping by surface water users from Stanislaus River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	92	[ATT2:ATT26: Figure 4.4. Groundwater pumping by surface water users from Stanislaus River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	93	[ATT2:ATT27: Figure 4.5. Average annual groundwater pumping by surface water users from Tuolumne River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	94	[ATT2:ATT28: Figure 4.6. Groundwater pumping by surface water users from Tuolumne River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	95	[ATT2:ATT29: Figure 4.7. Average annual groundwater pumping by surface water users from Merced River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	96	[ATT2:ATT30: Figure 4.8. Groundwater pumping by surface water Users of Merced River.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	97	[From ATT2:] Reduced Groundwater Recharge The use of surface water results in groundwater recharge from distribution seepage losses and deep percolation of water applied to crops. By reducing available surface water supplies, the proposed flow objective reduces groundwater recharge. For the entire Study	See response to Comment 1176-18.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		Area, average annual recharge over all hydrologic conditions declines from 598 TAF to 522 TAF (see Figure 4.9 [ATT2:ATT32]). The loss of recharge is greatest during critical and dry years where the average annual loss of recharges is almost 200 TAF and more than 150 TAF respectively. Given the distribution losses and percolation rates from applied water, the lost groundwater recharge is proportional to the amount of lost surface water (see Table 4.1 [ATT2:ATT31]). [Footnote 12: The proportional impact in Table 4.1 is the estimated coefficient of statistical models relating annual losses of groundwater recharge for water years 1922-2003 to the annual loss of applied surface water.] The volatility in lost recharge mirrors the volatility in lost surface water supplies.	
1176	98	[ATT2:ATT31: Table 4.1. Proportional impact of losses in applied surface water on groundwater recharge.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	99	[ATT2:ATT32: Figure 4.9. Average annual recharge from distribution losses and deep percolation in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	100	[From ATT2:] Agriculture The SWRCB analysis of the impact of the proposed flow objective is driven by the reduction in farming caused by the reduction in available water supplies. Given the assumption that groundwater pumping increases to offset the loss of surface water until groundwater pumping reaches maximum capacity, SWRCB staff assumes that the proposed flow objective only results in a loss of water supplies when groundwater reaches maximum capacity and cannot expand sufficiently to fully offset the loss of surface water supplies. Significant reductions in crop acreage only occur during critical years under SWRCB's analysis (see Figure 4.10 [ATT2:ATT33]). In critical years, the average annual crop acreage in the Study Area [Merced, San Joaquin, and Stanislaus Counties] declines from about 490,000 acres under the baseline to about 410,000 acres under the proposed flow objective. In dry years, the average annual crop acreage in the Study Area declines from about 517,000 acres under the baseline to about 486,000 acres under the proposed flow objective. As was the case with lost surface water supplies, focus on averages even by hydrologic condition obscures the underlying variability in SWRCB's estimated impact of the proposed flow objective on crop acreage (see Figure 4.11 [ATT2:ATT34]). The reduction in acreage is concentrated in grains, alfalfa, pasture and other field crops (see Table 4.2 [ATT2:ATT35]). [Footnote 13: The percentages in Table 4.2 show the reduction in acreage for a crop relative to the total reduction in crop acreage (the last column) for the hydrologic condition (the first column). For example, during critical years the average annual reduction in crop acreage is 79,104 acres. The annual reduction in alfalfa acreage during critical years averaged 16.2% of 70,104 acres.] The reduction in acreage in vegetables and tree nuts is minor. This response is consistent with the findings from the Westlands Case Study (see Attachment 1 [ATT2:ATT124]).	Please see response to comment 1176-18 and response to comment 1176-67 regarding the approach to the groundwater analysis in the SED and economic considerations related to groundwater. Please see response to comment 1176-55 regarding responses related to economic considerations and the agricultural sector, including related information about groundwater. Please see Chapter 11, Agricultural Resources, Figures 11-15 to 11-22 to see acreage impact exceedance curves.
1176	101	[ATT2:ATT33: Figure 4.10. Crop acreage by hydrologic condition in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	102	[ATT2:ATT34: Figure 4.11. Crop acreage in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	103	[ATT2:ATT35: Table 4.2. Distribution of acreage reductions by crop and hydrologic condition.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	104	[From ATT2:] How does one reconcile the average annual loss of about 300,000 acre feet per year of surface water (see Section 3) with the small average annual reductions in crop acreage of 23,421 acres (see Figure 4.10 [ATT2:ATT33] and Table 4.2 [ATT2:ATT35])? The answer is found in the SWRCB's assumption that increased groundwater pumping fully offsets the loss of surface water until pumping reaches maximum capacity. In effect, the loss of surface water is fully offset by increased groundwater pumping except in a few years such as when hydrologic conditions are critical. The SWRCB assumption is not consistent with the experience of Westlands Water District who has been facing volatile surface water supplies since the 1990s (see Attachment 1 [ATT2:ATT124]). Groundwater pumping in Westlands offsets 50% of the change in surface water supplies, not 100%. In its analysis of the impact of the proposed flow objective, Stratecon assumes that groundwater pumping increases to offset half the loss of surface water supplies until pumping reaches its maximum capacity. Thus, Stratecon predicts that implementation of the proposed flow objective will result in more land fallowing than reported in the SED.	See response to Comment 1176-18 regarding the approach to evaluating groundwater.
1176	105	[From ATT2:] The view that use of the SWAP model under predicts land fallowing is illustrated by comparing estimates of drought impacts on crop acreage in the Tulare Lake Basin using the SWAP model with land fallowing in Westlands (see Table 4.3 [ATT2:ATT36]). [Footnote 14: Richard Howitt, Josua Medellin Aruara, Duncan MacEvan, Jay Lund and Daniel Sumner, "Economic Analysis of the 2014 Drought for California Agriculture," U.C. Davis Center for Watershed Sciences and eraeconomics, July 23, 2014, Table 4, p. 6 for estimated acreage reductions in Tulare Lake Basin. For Westlands land fallowing, Westlands Water District, District Water Supply Charts, http://wwd.ca.gov/wpcontent/uploads/2016/06/Water-Supply-Charts.pdf. About 50,000 acres are fallowed independent of the availability of surface water (see Attachment 1 [ATT2:ATT124]).Therefore, land fallowing due to surface water availability equals acres fallowed less 50,000 acres.] Crop acreage in Westlands accounts for 19.6% of crop acreage in the Tulare Lake Basin. [Footnote 15: In 2010, crop acreage in the Tulare Lake Basin totaled 2,892,700 acres (California Water Plan Update, Tulare Lake Hydrologic Region, Table TL-13, p. TL-40). Westlands crop acreage in 2010 equaled 568,700 acres (see Westlands Water District, District Water Supply Charts).] In 2014, Westlands land fallowing from water availability (170,000 acres) equals 45.5% of the estimate for the drought impact for the entire Tulare Lake Basin, or 2.3 times Westlands share of crop acreage. [Footnote 16: 2.3 ≈ 45.5%/19.6%.] If the rate of land fallowing in Westlands was comparable to the rate of land fallowing in the Tulare Lake Basin, then actual land fallowing would be 2.3 times the estimated drought impact. For 2015 and 2016, Westlands actual land fallowing due to water availability exceeds the estimated drought impact for the Tulare Lake Basin. While groundwater pumping increases to offset losses of surface water supplies, the SWAP modeling efforts are assuming larger increases in groundwater pumping than occurs in practice.	See response to Comment 1176-18 and response to Comment 1176-55. The comment used land fallowing rates based on the Westlands Water District in the Tulare Lake Watershed to infer fallowing rates in the plan area. The commenter asserts groundwater pumping rates assumed in the SED are greater than in practice. However, as described in Appendix G, Agricultural Economic Effects of the Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results, Section G.2.1, Inputs from the WSE Model, the groundwater pumping rates used in the SED are based on reported rates used in the plan area. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for information on groundwater.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	106	[ATT2:ATT36: Table 4.3. Estimated drought impacts on crop acreage in Tulare Lake Basin and Westlands land fallowing (thousand acres).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	107	[From ATT2:] Local Economy The SWRCB staff estimates the impact of the proposed flow objective on the local economies of Stanislaus, San Joaquin and Merced counties [the Study Area] (see Figure 4.12 [ATT2:ATT37]). The proposed flow objective is estimated to reduce the average annual economic output of the Study Area by $64 million (2008$). [Footnote 17: Appendix G, Agricultural Economic Effects of Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results (hereinafter cited "Appendix G"), Table G.5-4, p. G-67.] Reflecting the fact that (i) the proposed flow objective reduces surface water supplies in critical, dry and below normal years, and (ii) the assumption that increased groundwater pumping will offset the loss of surface water supplies up to a maximum groundwater capacity, the loss of economic output in the Study Area is estimated to occur during below normal years, $50 million (2008$), about $100 million (2008$) in dry years and more than $200 million (2008$) in critical years. To extent that the ability to expand groundwater pumping to offset the loss of surface water supply is overstated, the economic impact of implementation of the proposed flow objective is understated. As with the loss of surface water supplies, focus on average impacts even by hydrologic conditions obscures the volatility of the estimated impact of the proposed flow objective on Study Area's local economy (see Figure 4.13 [ATT2:ATT38]). The spikes of estimated losses in economic output exceed $300 million (2008$), or five times the average annual impact reported in the SWRCB staff report. The SWRCB provides estimates of the job losses under their assumptions about the impact of the loss of surface water supplies on groundwater pumping (see Figure 4.14 [ATT2:ATT39]). The proposed flow objective is estimated to reduce jobs in the Study Area by 433. [Footnote 18: Appendix G, Table G.5-6, p. G-70.] Job losses average 929 in critical years. As with other impacts, focus on average annual impacts by even hydrologic conditions understates the volatility of the impact on the proposed flow objective on jobs in the Study Area (see Figure 4.15 [ATT2:ATT40]). The estimated annual job loss spikes at 1,500, or more than three times the average annual impact reported in the SWRCB staff report.	Please see response to comment 1176-55.
1176	108	[ATT2:ATT37: Figure 4.12. Graph showing economic output of area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	109	[ATT2:ATT38: Figure 4.13. Graph showing economic output of area including Merced, San Joaquin, and Stanislaus Counties by water year hydrology.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	110	[ATT2:ATT39: Figure 4.14. Graph showing employment Baseline versus Proposed Flow Objective in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	111	[ATT2:ATT40: Figure 4.15. Graph showing jobs by water year hydrology in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	112	[From ATT2:] SWRCB staff discussion of the impact of the proposed flow objective on municipal water service providers center on the consequences of increased groundwater pumping for water systems reliant on groundwater. They expect significant and unavoidable impacts from substantial depletion of groundwater resources and need for construction of new or expanded water supply and treatment facilities. [Footnote 19: Chapter 13, Service Providers, Table 13-1, p. 13-3.] They find less than significant that increased groundwater pumping will reduce groundwater quality sufficiently to violate water quality standards in public water systems. [Footnote 20: Ibid, Table 13-1, p. 13-5.] They expect significant and unavoidable impacts from increased groundwater pumping will reduce groundwater quality sufficiently to violate water quality standards in domestic wells. [Footnote 21: Ibid, Table 13-1, p. 13-7.] The findings generally reflect a qualitative discussion with two exceptions. First, the conclusion about groundwater quality is based on the absence of water quality violations for a sample of public systems in 2014 when groundwater pumping increased. [Footnote 22: Ibid, Table 13-7, p. 13-19.] Second, while well elevations are anticipated to fall with increased groundwater pumping, few public water systems have well depths less than 100 feet below the depth to groundwater. [Footnote 23: Ibid, p. 13-67.] Neither factor is dispositive. Implementation of the proposed flow objective increases the frequency and magnitude of spikes in groundwater pumping relative to baseline (see groundwater resource discussion above). Therefore, to use the recent experience of the drought, which groundwater pumping increases in critical years under the baseline, does not provide any insight into whether implementation of the proposed flow objective will not create groundwater quality problems. In addition, public water systems undertake actions to address violation of water quality standards. Thus, the issue involves whether public water systems must undertake additional actions to meet water quality standards to avoid violations. The difference between well depths and depth to groundwater does provide a cushion against increased groundwater pumping requiring deepening wells. However, there are many municipal water users not served by public water systems. One needs to assess specific circumstances of (a sample of) well users to assess the situation, something the SWRCB did not do.	As discussed in Chapter 13, Service Providers, Section 13.4.3, Impacts and Mitigation Measures, despite increases in 1) the amount of groundwater pumped for drinking purposes and 2) service provider reliance on groundwater in dry years, the number of water quality violations was not greater in dry years than in wet years (based on consumer confidence reports (CCRs) prepared by service providers). Table 13-5, Primary Detected Contaminants in Exceedance of Maximum Contamination Level in Drinking Water for Selected Water Suppliers during Representative Non-Drought and Drought Years, provides information from CCRs for selected municipalities in the groundwater basins during representative drought (2014) and non-drought (2011) years. 2014 was a critically dry year and represents a condition where surface water availability was reduced. This condition is similar to the reduced surface water availability that could occur as a result of implementing the proposed flow objective. It is not clear what is meant by "there are many municipal water users not served by public water systems". Municipal water users by definition are customers served by public water systems, the impacts of which are addressed in Chapter 13. If the comment is referring to private domestic wells, those impacts are also addressed in Chapter 13. Please see response to comment 1176-18.
1176	113	[From ATT2:] Groundwater Resources Reductions in surface water supplies due to the SED will impact groundwater resources in the Study Area [Merced, San Joaquin, and Stanislaus Counties] by way of: (A) reduced percolation (groundwater recharge) from applied surface water, and (B) increased groundwater pumping to offset the loss of surface water supplies. The SWRCB assessment concludes that implementation of the SED flow objective will result in a significant and unavoidable decline in regional groundwater elevations, depletion of groundwater supplies, substantial interference with groundwater recharge and potential migration of groundwater contamination. [Footnote 24: Chapter 9, Groundwater Resources, p. 9-4.] Despite these conclusions, however, the SWRCB quantifies none of the impacts. It is common knowledge that all sub-basins in the Study Area are experiencing steadily declining well elevations (increasing depths to groundwater) and are over drafted (see Table 5.1 [ATT2:ATT41]). [Footnote 25: Ibid, Table 9-4, p. 9-17.] Furthermore, other than the Eastern San Joaquin Sub basin, well elevations within the Study Area have declined faster the first	See response to Comment 1176-18.

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		approximately 15 years of this century than over the last three decades of the 20th century. Accordingly, any SED-related expansion of groundwater pumping will only exacerbate the existing overdraft conditions resulting in greater depths to groundwater; i.e., further material declines in regional well elevations. The irrigation districts in the Study Area do not have the historical experience with enough surface water supply variability and associated offsetting variability of their groundwater pumping and the associated effects on well elevations to effectively evaluate the potential regional response to the substantial reductions in surface water supplies associated with SED implementation. The one exception is the historical experience of the Stockton East Water District and Central San Joaquin Water Conservation District with respect to their surface water supplies from New Melones Reservoir, whose past experience with surface water supply variability is instructive on what might be expected with regards to the response of the Study Area's irrigation districts that rely on surface water to SED-related reductions in those districts' surface water supplies. This past experience and that of Westlands, which is located outside of the Study Area, but also is instructive on potential irrigation district response and resulting impacts, within the Study Area to substantial and sustained surface water supply reductions, are referred to herein as "natural experiments" as they are inferences not based on complex models built on a myriad of assumptions but straightforward assessments of what actually has been empirically observed.	
1176	114	[ATT2:ATT41: Table 5.1. Average annual decline in well elevation and overdraft in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	115	[From ATT2:] The New Melones Reservoir Natural Experiment The litigation between Stockton East Water District and Central San Joaquin Water Conservation District versus the United States over water deliveries from New Melones Reservoir represents a "natural experiment" for characterizing the relationship between volatility in surface water availability and associated variability in groundwater pumping and the resulting impacts on local well elevations. [Footnote 28: See the most recent federal appellate decision for discussion, Stockton East Water District and Central San Joaquin Water Conservation District v. United States, U.S. Court of Appeals for the Federal Circuit, 2013-5078.] As background, Stockton East and Central San Joaquin entered into a water delivery contract with the Bureau of Reclamation for the delivery of up to 155,000 acre feet per year of water from the New Melones Reservoir. The central issue of the litigation came with the passage of the Central Valley Project Improvement Act, and the Bureau of Reclamation's decision that except in wet years it would not be able to deliver the water specified in the contract due to other demands for the water. [Footnote 29: Ibid, p.] The Bureau's breach of its contract with the irrigation districts resulted in a volatile surface water supply for Central San Joaquin. Well elevations in Central San Joaquin have been steadily declining since the late 1950s to the point that the elevations of district wells with long histories have been below sea level for decades (see Figure 5.1 [ATT2:ATT42] for the historical trend in a sample of the district's wells). [Footnote 30: Figure 5.1 presents the	See response to comments 1176-18 and 1176-55.For a discussion on how the SED economic analyses was conducted, the factors considered, and differences between the SED assumptions and those made by Stratecon, please see Master Response 8.2, Regional Agricultural Economic Effects.

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		wells in Central San Joaquin presented in San Joaquin County Flood Control and Water Conservation District's Spring 2016 Groundwater Report. The location of the wells can be found in Figure 2-1 Well Hydrograph Locations at p. 2-15.] In fact, efforts to protect the area's groundwater resources from declining well elevations and from resulting salinity intrusion was a primary reason for the formation of Central San Joaquin Water Conservation District and the contract for water from the New Melones Reservoir. The declining trend in well elevations bottomed out in the mid-1990s with the commencement of New Melones surface water deliveries (see Figure 5.1 [ATT2:ATT42]). Since then, well elevations have varied up and down from year to year, as has the delivery of surface water (see Figure 5.2 [ATT2:ATT43]). Stratecon conducted a statistical analysis of the historical data for a number of wells within Central San Joaquin to estimate the impact of surface water deliveries on well elevations. Data on groundwater pumping by landowners is not available. The models relate annual well elevations to surface water deliveries (measured in 1,000 acre feet, "TAF"), the annual change in well elevation over time and Stockton rainfall. [Footnote 31: Stockton Rainfall at Fire Station No. 4. Spring 215 Groundwater Report, p. 1-2, data provided by San Joaquin County Flood and Water Conservation District.] The analysis indicates that: A) surface water deliveries increased well elevations significantly for Well L, Well M and Well O where there has been a significant declining trend in well elevations; B) surface water deliveries have no effect on the elevation of Well W, which has had no declining trend in elevation over time; C) Stockton rainfall has no impact on elevations for the first three wells in the table and D) the elevation of the relatively stable Well W declines with rainfall. T-statistic: ratio of coefficient to the standard deviation of estimated coefficient P-Value: probability of the estimated coefficient if its true value were zero Impact of Proposed Flow Objective on Well Elevations Stratecon applied the findings from the New Melones "natural experiment" to estimate the impact of the proposed flow objective on well elevations in the Study Area [Merced, San Joaquin, and Stanislaus Counties] as a result of the SED at the 40% unimpaired flow levels. As shown by the Central San Joaquin experience, the impact of surface water deliveries is not uniform (undoubtedly reflecting non-uniform aquifer characteristics and water usage patterns). The estimated range of impacts for areas with a declining trend in well elevations is defined by the findings for Wells L, M and O in Central San Joaquin. Before presenting the findings, the discussion addresses why findings from Central San Joaquin may be informative for circumstances elsewhere in the Study Area. Table 5.3 [ATT2:ATT45] shows the Spring 2016 elevations for key wells in San Joaquin County. [Footnote 32: Data compiled from Spring 2016 Groundwater Report, San Joaquin County Flood and Water Conservation District.] Like Central San Joaquin, well elevations are below sea level in Stockton East. The annual decline in elevations are a little slower in Central San Joaquin than Stockton East. [Footnote 33: The San Joaquin County Flood and Water Conservation District computes the annual change by relating well elevation to trend. As discussed above, the declining trend in well elevations in Central San Joaquin bottomed out with the introduction of surface water. As a result, the calculation of annual change in well	

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		elevations reported in Table 5.2 includes the impact of the introduction in surface water.] Therefore, application of the findings from the Central San Joaquin "natural experiment" to Stockton East may understate the impact of the proposed flow objectives on well elevations in Stockton East. The situation of South San Joaquin Irrigation District may be different. Well elevations are currently above sea level with a greater variability in the current annual rate of decline in elevations. The circumstances of Well T is most comparable to the circumstances of the most stressed wells in Central San Joaquin. The other wells are most comparable to the least stressed wells in Central San Joaquin. Well elevations in the other sub basins are declining considerably more rapidly and those declines accelerating as compared to the Eastern San Joaquin (see Table 5.1 [ATT2:ATT41]). The rate of decline is slowing in the Eastern San Joaquin. To the extent that declines in surface water availability have greater impacts on sub basins experiencing the most rapid declines in well elevations, application of the findings from the Central San Joaquin "natural experiment" to the other districts in the Study Area may underestimate, rather than overestimate, the impact on well elevations of reduced surface water availability due to the SED.	
1176	116	[ATT2:ATT42: Figure 5.1. Spring well hydrographs in Central San Joaquin 1958-2014.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	117	[ATT2:ATT43: Figure 5.2. Graph showing Bureau of Reclamation water deliveries to Central San Joaquin.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	118	[ATT2:ATT44: Table 5.2. Statistical analysis of spring well hydrograph in Central San Joaquin.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	119	[ATT2:ATT45: Table 5.3. Spring 2016 well elevations in San Joaquin County.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	120	[From ATT2:] Central San Joaquin Water Conservation District Figure 5.3 [ATT2:ATT46] shows the impact of the proposed SED flow objective on elevations of Well L, Well M and Well O. [Footnote 34: Reduced well elevation estimated by multiplying the reduction in available surface water (measured in TAF) by the coefficient for the surface water variable in Table 5.2 (rounded values 1.0 for Well L, 1.5 for Well M, and 0.6 for Well O).] The impact on well elevations is greatest in dry years ranging between 20 feet and almost 50 feet (when reduction in available surface water is the greatest) and between almost 10 feet and 20 feet in critical years (when the reduction in available surface water supplies is less than in dry years). The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective may increase the volatility in well elevations (see Figure 5.4 [ATT2:ATT47]). The reduction in well elevations spike between 60 feet to 90 feet. For the other water districts, the range of impacts on well elevations is defined on the low end by Well O impacts, middle by Well L impacts and the high end by Well M impacts. Reduction in well elevations are estimated by multiplying the reduction in available surface water (measured in TAF) by the coefficient for the surface water variable in Table 5.2	Please see response to Comment 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		(rounded values 1.0 for Well L, 1.5 for Well M, and 0.6 for Well O). The results are adjusted (multiplied) by the irrigated acreage in Central San Joaquin relative to the irrigated acreage in other water districts. [Footnote 35: Source for irrigated acreage, Appendix G: Agricultural Economic Effects of Lower San Joaquin River Flow Alternatives: Methods and Modeling Results. Table G.4-1, p. G-44.] In effect, the estimated impacts vary among the districts reflecting differences in the amount of surface water lost per irrigated acre.	
1176	121	[ATT2:ATT46: Figure 5.3. Chart showing impact of proposed flow objective on well elevations in Central San Joaquin Water Conservation District.]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	122	[ATT2:ATT47: Figure 5.4. Graph showing reduced well elevations in Central San Joaquin.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	123	[From ATT2:] Stockton East Water District Figure 5.5 [ATT2:ATT48] shows the range of impacts of the proposed flow objective on well elevations in Stockton East. Stockton East suffers smaller losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in dry years ranging from between 15 feet and almost 40 feet (when reduction in available surface water is the greatest) and up to 5 feet in critical years (when reduction in available surface water is lower than in critical years). The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.6 [ATT2:ATT49]). The reduction in well elevations spike between 40 feet to 80 feet.	Please see response to comments 1176-18 and 1176-55.
1176	124	[ATT2:ATT48: Figure 5.5. Chart showing impact of proposed flow objective on well elevations in Stockton East Water District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	125	[ATT2:ATT49: Figure 5.6. Graph showing reduced well elevations in Stockton East Water District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	126	[From ATT2:] Southern San Joaquin Irrigation District Figure 5.7 [ATT2:ATT50] shows the range of impacts of the proposed flow objective on well elevations. Southern San Joaquin suffers larger losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in critical years ranging between 30 feet and 80 feet (when the reduction in available surface water is the greatest) and between 10 feet to 30 feet in dry years (when the reduction in available surface water is lower than in dry years). The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.8 [ATT2:ATT51]). The reduction in well elevations spike between 60 feet to 120 feet.	Please see response to comments 1176-18 and 1176-55.
1176	127	[ATT2:ATT50: Figure 5.7. Chart showing impact of proposed flow objective on well elevations in Southern San Joaquin ID.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	128	[ATT2:ATT51: Figure 5.8. Graph showing reduced well elevations in South San Joaquin ID.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	129	[From ATT2:] Oakdale Irrigation District Figure 5.9 [ATT2:ATT52] shows the range of impacts of the proposed flow objective on well elevations. Oakdale suffers larger losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in critical years ranging between 40 feet and 120 feet (when reduction in available surface water is the greatest) and between 20 feet to 40 feet in dry years (when reduction in available surface water is lower than in dry years). The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.10 [ATT2:ATT53]). The reduction in well elevations spike between 75 feet to 200 feet.	Please see response to comments 1176-18 and 1176-55.
1176	130	[ATT2:ATT52: Figure 5.9. Chart showing impact of proposed flow objective on well elevations in Oakdale Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	131	[ATT2:ATT53: Figure 5.10. Graph showing reduced well elevations in Oakdale ID.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	132	[From ATT2:] Modesto Irrigation District Figure 5.11 [ATT2:ATT54] shows the range of impacts of the proposed flow objective on well elevations. Modesto suffers larger losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in critical and years ranging between 40 feet and 90 feet. Well elevations decline by 20 feet to 40 feet in below normal years. The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.12 [ATT2:ATT55]). The reduction in well elevations spike to more than 60 feet to 160 feet.	Please see response to comment 1176-18 and 1176-55.
1176	133	[ATT2:ATT54: Figure 5.11. Chart showing impact of proposed flow objective on well elevations Modesto Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	134	[ATT2:ATT55: Figure 5.12. Graph showing reduced well elevations Modesto Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	135	[From ATT2:] Turlock Irrigation District Figure 5.13 [ATT2:ATT56] shows the range of impacts of the proposed flow objective on well elevations. Turlock suffers larger losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in critical and dry years ranging between 30 feet and 80 feet. Well elevations decline by 16 feet to 40 feet in below normal years. The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.14 [ATT2:ATT57]). The reduction in well elevations spike to more than 60 feet to 140 feet.	Please see response to comments 1176-18 and 1176-55.
1176	136	[ATT2:ATT56: Figure 5.13. Chart showing impact of proposed flow objective on well elevations in Turlock Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	137	[ATT2:ATT57: Figure 5.14. Graph showing reduced well elevations in Turlock ID.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	138	[From ATT2:] Merced Irrigation District	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		Figure 5.15 [ATT2:ATT58] shows the range of impact of the proposed flow objective on well elevations. Merced suffers larger losses of surface water per acre than Central San Joaquin. The impact on well elevations is greatest in dry years ranging (when reduced surface water is greatest) between 60 feet and 100 feet. Well elevations decline by 35 feet to 80 feet in critical years. Well elevations decline by 20 feet to 60 feet in below normal years. The focus on average impacts even by water year hydrologic conditions fails to capture how much the proposed flow objective increases the volatility in well elevations (see Figure 5.14 [ATT2:ATT59]). The reduction in well elevations spike to more than 80 feet to 200 feet.	
1176	139	[ATT2:ATT58: Figure 5.15. Chart showing impact of proposed flow objective on well elevations in Merced Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	140	[ATT2:ATT59: Figure 5.16. Graph showing reduction in well elevations in Merced Irrigation District.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	141	The proposed flow objective will lower well elevations in the Study Area [Merced, San Joaquin, and Stanislaus Counties] significantly. Given the volatility in the annual loss of surface water supplies, the spikes in declining well elevations will be severe. Pumping costs will increase with greater lifts. Wells may have to be deepened to accommodate the severe volatility in elevations that will be outside the range of the operational experience in the Study Area.	Please see response to comments 1176-18, 1176-55 and 1176-67.
1176	142	[From ATT2:] Agriculture The potential economic impacts to the Study Area's [Merced, San Joaquin, and Stanislaus Counties] agricultural economy of fulfilling the SED-mandated unimpaired flow objectives are anticipated to result from: A) reductions in Merced, Stanislaus and Tuolumne River diversions for irrigation; and B) SED-related changes in each river system's water storage facility/reservoir management. The latter, SED-related water storage management changes, and the associated temporal and volume impacts on Merced, Stanislaus and Tuolumne River flows, are expected to primarily impact the Study Area economy through resulting changes in reservoir-based regional recreation activity and hydropower generation.	Please see response to comment 1176-18. Please see Master Response 8.4, Non-Agricultural Economic Considerations, for discussion of economic effects on hydropower and recreation.
1176	143	[From ATT2:] The direct impacts associated with SED-related increases in the unimpaired flows of the Merced, Stanislaus and Tuolumne Rivers will be driven primarily by the response to SED reductions in the Study Area's [Merced, San Joaquin, and Stanislaus Counties] surface water supplies available to those irrigation districts in the Study Area that receive surface water supplies (collectively referred to as the "Irrigation Districts"). The Irrigation Districts would be expected, all else being equal, to offset any reductions in their surface water supplies through a combination of increased groundwater pumping and reduced crop production (land fallowing [Footnote 36: While land fallowing refers to the idling of farm land due to reductions in water supplies it also is intended to account land that is not idled but instead deficit irrigated due to those same reductions in water supplies with the resultant same presumed overall economic impact.). Reductions in crop production would be anticipated as it is not expected that the Irrigation Districts (or their irrigators) would fully offset any SED water supply reductions with groundwater even before considering the pending need to reduce regional groundwater pumping from even current levels to help achieve State-mandated ground water sustainability objectives for the region under pending implementation of the State's	Please refer to response to comments 1176-18, 1176-55, and 1176-67. Please refer to Master Response 3.6 regarding availability of municipal water supply, and compliance with SGMA and the plan amendments.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		Sustainable Groundwater Management Act (or "SGMA"). Ultimately, implementation of measures to achieve the SGMA objectives may substantially eliminate the ability of the Irrigation District farmers to offset much, if any, of their SED surface water supply reductions with additional groundwater. The result of both SED reductions in surface supplies and pending restrictions in groundwater pumping due to the SGMA will squeeze from both sides the Irrigation Districts' water supplies and, necessarily, result in even greater reductions in Irrigation District crop production as compared to a situation of SED implementation but without any specific limitations on groundwater pumping. In its analysis of SED, the SWRCB assumes unfettered groundwater pumping by the Irrigation Districts up to the districts' estimated maximum capacity of groundwater pumping with no account for the SGMA. This, even though the SGMA was established by the State. The above noted, any increases in Irrigation District groundwater pumping to offset SED surface water supply reductions would be expected to cause regional depths to groundwater to increase (and, correspondingly, well elevations to decline). Increases in groundwater depths will not only lead to higher water costs within the Irrigation Districts, which all rely already on groundwater for a portion of their water supplies but also: A) irrigation districts and irrigators in the Study Area outside of the Irrigation Districts that rely solely on groundwater; and B) the region's communities which almost all rely entirely, and a few in part, on groundwater for their urban water supplies (including water for households, businesses and landscape use). Higher depths to groundwater increase groundwater costs per unit of water pumped due to a combination of factors including the following: - Increased electricity or other power consumption to lift pumped water further out of the ground; - Increased pump equipment maintenance due to longer durations for operating wells to yield the same amount of water; - Increased capital investment in well equipment, either new wells or to deepen existing wells, as some existing wells don't have the depth to reach water at the greater depths anticipated; and - Overall declines in water quality pumped from greater depth or with greater pressure and associated increases in the amount of water treatment required.	
1176	144	[From ATT2:] Direct Impacts on Irrigation Districts The Irrigation Districts that rely on surface water supplies from the Merced, Stanislaus and Tuolumne Rivers include: - South San Joaquin Irrigation District ("SSJID") - Stockton East Water District ("SEWD") - Central San Joaquin Water Conservation District ("CSJWCD")	Please see response to comments 1176-18 and 1176-55. Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, for discussion of why average results were presented. In addition, please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural Economic Effects, for presentation of the results of the revised SWAP model run averaged by water year type.

Ltr#	Cmt#	Comment	Response
		- Oakdale Irrigation District ("OID") - Modesto Irrigation District ("Modesto ID") - Turlock Irrigation District ("TID") - Merced Irrigation District ("Merced ID") To evaluate the potential agricultural production impacts of the SED within each of the above districts and for a range of water supply conditions, the SWRCB overlaid the Irrigation Districts' respective 2010 cropping patterns, 2009 groundwater pumping capacities and SED unimpaired flow objectives onto each district's surface water supply conditions for every year of the period 1922 through 2003 ("Study Period"). Stratecon adopted this same framework and built directly off the SWRCB's underlying estimates of the relationship between water supplies and cropping patterns within the Irrigation District to estimate the impacts of the SED at the 40% unimpaired flow level ("SED 40") on cropping patterns and associated gross revenues from crop sales ("crop gross revenues") under alternative assumptions regarding the SED's Irrigation District water supply impacts. Stratecon performed this analysis assuming two scenarios on how the districts and their farmers would have responded to the SED surface water supply cutbacks with respect to groundwater pumping in lieu of the SWRCB estimates on the groundwater pumping response. The first scenario assumes no specific constraints on groundwater pumping other than the capacity of existing well infrastructure as of 2009 (consistent with the SWRCB's analysis) and assumes groundwater pumping levels that are consistent with Stratecon's assessment of Westlands Irrigation District's historical groundwater pumping and land fallowing rates in response to surface water supply reductions (see Attachment 1-1 [ATT1:ATT124]). [Footnote 37: To estimate the crop production impacts of the SED 40 for Stratecon's estimates of SED 40 water supply impacts, Stratecon extrapolated directly from the SWRCB's estimates for each Irrigation District of the relative impacts on crop production by crop type as a result of SWRCB's estimates of water supply changes by matching the proportionality of impacts between crop groups modeled by the SWRCB each year of the Study Period.] Stratecon's estimates of groundwater pumping response are lower than the SWRCB's and, correspondingly, Stratecon's estimates of the farmer land fallowing response within the Irrigation Districts to SED-related reductions in surface water supplies higher than SWRCBs. Table 6.1 [ATT2:ATT60] summarizes the results of this analysis for the Irrigation Districts. Consistent with the SWRCB's assessment of the SED impacts, Stratecon evaluates the impacts on the SEWD and CSJWCD collectively, referred to herein as SEWD/CSJWCD. Table 6.1 [ATT2:ATT60] shows, for example, that during the Study Period in any one year the SED 40 would have resulted in a reduction in crop gross revenues generated by the Modesto Irrigation District by about 25% from approximately $136 million to about $102 million. Over the entire Study Period the estimated average impact of the SED 40 would have been a reduction in gross crop revenues in the Modesto Irrigation District by about 5%. The table further shows that in the Study Period year that the surface water supply reduction would have been at its highest (peak) for the Study Period due to the SED 40, the Irrigation Districts' combined crop revenues would have been an estimated approximately 16% lower than baseline in the absence of the SED 40. This compares to an average reduction in crop	

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		gross revenues for the Study Period due to the SED of about 4%. The large difference reveals that the consideration of only averages substantially mutes the indicated inter-year impacts of the SED 40. While the average impacts to crop revenues may not appear particularly severe, there are numerous years where the estimated impacts are substantially larger and could have significant detrimental impacts on the economics of the Irrigation Districts' farmers. Figure 6.1 [ATT2:ATT61] shows Stratecon's estimates of lost crop gross revenues due to the SED 40 each year during the Study Period for the Irrigation Districts combined. The graphic reveals many years that those lost crop gross revenues would have been substantial, including many years over $100 million. Figure 6.2 [ATT2:ATT62] presents the same information shown in Figure 6.1 but consolidates it as averages across each water year type during the Study Period (e.g., critically dry, dry, above normal, etc.). The figure clearly shows that the SED 40 impacts on crop production and associated crop gross revenues within the Irrigation Districts would be most severe during critically dry and dry years. This is to be expected as those are years in which overall Irrigation District surface water supplies are most reduced. The second scenario assumes that the implementation of measures to meet the SGMA objectives would keep the Irrigation Districts from responding to surface water supply reductions with any groundwater pumping. Accordingly, the second scenario concludes much greater reductions in crop production due to the SED as compared to the first scenario due to the former's more severe assumptions on total water supply reductions. Table 6.2 [ATT2:ATT63] summarizes the results of this analysis for the Irrigation Districts. The Table shows for the Modesto Irrigation District, for example, that in the peak year of surface water supply reductions during the Study Period due to the SED 40 and with SGMA groundwater pumping limits, that the district would have generated an estimated third less (33%) in crop gross revenues. This compares to a 25% loss of crop gross revenues without accounting for the SGMA as discussed above and shown in Table 6.1. Furthermore, the average for the Study Period for Modesto with the SED 40 is a 6% annual reduction in crop gross revenues when accounting for the SGMA as compared to 5% without the SGMA, as discussed above and shown in Table 6.1. Additionally, the table shows that in the peak surface water reduction year for all the Irrigation Districts collectively, crop revenues would have been an estimated approximately 27% lower had the SED 40 been in place along with SGMA restrictions on increased groundwater pumping to offset surface water supplies. This compares to an average for the Study Period of 6%. The large difference reveals again that the consideration of only averages masks the indicated potential impacts of the SED 40. While the average impacts to crop revenues may not appear particularly severe even with SGMA-related groundwater pumping restrictions, there are numerous years where the impacts are substantially larger and could have significant detrimental impacts on the economics of the Irrigation Districts' farmers not only in those specific years but also in the longer run as a result of the response by farm investors, lenders, service providers and other stakeholders in the regional agricultural economy to an overall sizable permanent increase in the risk and uncertainty of farming within the region due to reduced surface water supply reliability and availability.	

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	145	[ATT2:ATT60: Table 6.1. Summary of lost gross crop revenues for various irrigation districts (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	146	[ATT2:ATT61: Figure 6.1. Lost crop gross revenues (2008$), all irrigation districts combined.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	147	[ATT2:ATT62: Figure 6.2. Lost crop revenues - average by water year type (2008$), all irrigation districts combined.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	148	[ATT2:ATT63: Table 6.2. Summary of lost gross crop revenues (2008$) for various irrigation districts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	149	[From ATT2:] It should be noted that while Stratecon's estimates of the amount of fallowing and, thus, reductions in crop production by the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] as a result of the SED are in all cases higher than the SWRCB's, Stratecon's fallowing estimates specifically for the SEWD and CSJWCD stand out in particular, as the SWRCB concluded no impacts of the SED 40 on those two districts. This is because the SWRCB analysis assumed that the anticipated reductions in the two districts' surface water supplies would be 100% offset with groundwater pumping by the districts (reflecting the assumption that both districts have the groundwater pumping infrastructure in place and it makes economic and logistical sense for them to pump at that level). No other of the Irrigation District's is assumed by the SWRCB to fully offset their surface water losses with groundwater. On the other hand, Stratecon assumes that the SEWD and CSJWCD, like the other Irrigation Districts, will offset 50% of their SED-related reductions in surface water with groundwater resulting in a greater level of fallowing. Accordingly, the Stratecon crop production impact analysis with regard to the two districts is in particularly sharp contrast to the SWRCB's analysis. Figure 6.3 [ATT2:ATT64] shows Stratecon's estimates of lost crop gross revenues during the Study Period for the Irrigation Districts combined due to the SED 40 and assuming SGMA groundwater pumping limits. The graphic reveals that those lost crop gross revenues would have been substantial, exceeding $200 million in many years. Figure 6.4 [ATT2:ATT65] presents the same information shown in Figure 6.3 but consolidates it as averages across each water year type during the Study Period [1922-2003] (e.g., critically dry, dry, above normal, etc.). The figure clearly shows that the SED 40 impacts with the SGMA on crop production and associated crop gross revenues within the Irrigation Districts would be most severe during critically dry and dry years. It should additionally be noted for both scenarios that the substantial reduced reliability of surface water supplies under the SED and associated substantial risk of significant water shortages and, thus, crop revenue declines in any given year, is likely to have a chilling impact on regional farm investment and long term average crop production within the Irrigation Districts. This is not captured in the impact analyses by SWRCB or in the above, which examines the short-run, single year potential impacts in each year of the Study Period not the impacts of the potential multi-year experience of farmers faced with a permanent reduction in surface water supplies due to the SED, a situation that is expected to be significantly exacerbated by SGMA constraints on groundwater pumping.	Please see response to comments 1176-18 and 1176-55.
1176	150	[ATT2:ATT64: Figure 6.3. Lost crop gross revenues (2008$), all irrigation districts combined,	The commenter is providing this attachment for reference purposes in support of their comments. Those

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		with SGMA.]	comments are addressed in these responses to comments; therefore, no additional response is required.
1176	151	[ATT2:ATT65: Figure 6.4. Lost crop revenues - average by water year type (2008$), all irrigation districts combined, with SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	152	[From ATT2:] Forward Linkage Effects of SED Impacts on Regional Crop Production Not only will SED 40 implementation directly cause a reduction in crop production by the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] but have additional, what are termed "downstream," impacts on regional businesses reliant on that crop production including dairies, livestock enterprises, food processors and agricultural commodity transportation enterprises, among others. The challenge in evaluating these impacts is to determine the extent to which dairies, for example, that purchase feed inputs from local farmers may substitute reduced supplies of certain types of feed from local sources with sources outside of the area. While the SWRCB does comment on these potential impacts it does not provide any quantification based on the argument that it is difficult to perform such a calculation. Though it is in fact challenging to quantify impacts on these downstream sectors, an examination of the upper bound of certain of these potential impacts is instructive regarding their potential severity. Such an upper bound would be a situation where the identified downstream sectors are unable to offset declines in local crop production on which they rely with outside-of-the-area sources for those crops due to limitations on outside supply and transportation costs as well as general transportation challenges. The result of reductions in crop input supplies would be corresponding potential declines in production by those downstream sectors and associated employment loss. Stratecon focused specifically on the dairy and livestock production and manufacturing sectors, though other economic sectors, including other food processing such as tomato processing and transportation services would also be impacted. Both the Study Area [Merced, San Joaquin, and Stanislaus Counties] dairy and livestock sectors rely heavily on locally produced hay and grain feed crops. Some of those crops, most notably corn silage, which is an important part of the region's dairy and livestock rations due to its high nutrient load and cattle digestibility characteristics, is very heavy and difficult to store and transport. Accordingly, the region's dairies and livestock producers dependent on local corn silage and hay would have a difficult time replacing offsetting reductions in locally produced corn and other silage and hay products. To provide an order-of-magnitude estimate of the potential output and employment impacts of the SED 40 on the Study Area's dairy and livestock sectors, Stratecon evaluated the implications of a presumed one-to-one reduction in those sectors' production and, thus, revenues corresponding to the estimated SED 40-related percentage reduction in regional grain and hay production contained within the figures presented in Tables 6.2 [ATT2:ATT63] and 6.3 [ATT2:ATT66]. For example, if in any year the anticipated reduction in Study Area grain and other crop (hay and pasture) production due to the SED 40 was estimated to be 15% it was assumed, at the upper bound, that the region's dairy and livestock sectors would contract by that same 15%. Accordingly, the approach implicitly assumes that the dairy sector would have no other feed options to offset the reduction of locally produced grain and hay. The analysis then accounts for the additional potential impacts of reduced local dairy production (milk) on local dairy	Please see response to comment 1176-82 regarding dairies, IMPLAN, and livestock. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies and food processors.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		product manufacturing, including notably fluid milk and butter, cheese and frozen dairy dessert manufacturing as it is the singular most important commodity input to dairy product manufacturing. This additional downstream impact on dairy manufacturing is modeled assuming that the impact of the upper bound reduction in Study Area milk production will at its upper bound result in that same percentage reduction in regional dairy product manufacturing. With respect to livestock the downstream effects start with the estimated lost Study Area grain and hay production and the resultant assumed proportional impacts on regional livestock production as an upper bound, which in turn, is presumed to reduce proportionally the supply of livestock available to local livestock slaughter, rendering and processing enterprises and, thus, at the upper bound, also proportionally reduce the output of those enterprises. Table 6.3 [ATT2:ATT66] shows Stratecon's estimates of upper bound lost Study Area combined dairy sectors revenues during the Study Period due to the SED 40 before and with SGMA groundwater pumping limits. The table shows, for example that the Study Area's dairy sectors, upper bound, could experience as much as a nearly 23.6% decline in production and, thus, revenues in any one year under SED 40 implementation with SGMA restrictions on groundwater pumping. Figure 6.5 [ATT2:ATT67] shows Stratecon's estimates of upper bound lost dairy sectors revenues during the Study Period [1922-2003] due to the SED 40 and assuming SGMA groundwater pumping limits. The graphic reveals many years that those lost dairy sectors revenues would have been substantial, exceeding $50 million in many years. Table 6.4 [ATT2:ATT68] shows Stratecon's estimates of the upper bound lost Study Area livestock sectors revenues during the Study Period due to the SED 40 before and with SGMA groundwater pumping limits. The table shows, for example that the Study Area's livestock sectors, at the upper bound, could experience as much as a nearly 23.6% decline in production and, thus, revenues in any one year under SED 40 implementation with SGMA restrictions on groundwater pumping. Figure 6.6 [ATT2:ATT69] shows Stratecon's estimates of the upper bound lost livestock sectors revenues during the Study Period due to the SED 40 and assuming SGMA groundwater pumping limits. The graphic reveals many years that those livestock sectors revenues would have been substantial, exceeding $50 million in many years.	
1176	153	[ATT2:ATT66: Table 6.3. Summary of upper bound lost dairy sector revenues (2008$) before and after SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	154	[ATT2:ATT67: Figure 6.5. Graph showing upper bound lost dairy sector revenues (2008$) in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	155	[ATT2:ATT68: Table 6.4. Summary of upper bound lost livestock sector revenues (2008$) before and after SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	156	[ATT2:ATT69: Figure 6.6. Graph showing upper bound lost livestock sector revenues (2008$) in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	157	[From ATT2:] Indirect Impacts of SED Due to Impacts on Groundwater Elevations The increases in groundwater pumping that would be expected to result from SED-related reductions in surface water supplies available to the Study Area [Merced, San Joaquin, and Stanislaus Counties] irrigation districts ("Irrigation Districts") [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] that rely on surface water from the Merced, Stanislaus and Tuolumne Rivers will result in increased groundwater pumping and, correspondingly, average depths to groundwater, the implementation of ground water pumping restrictions to meet SGMA objectives notwithstanding. The increased average depths to groundwater will in turn result in higher pumping costs for the Irrigation Districts as well as all other irrigation districts and irrigators in the region almost all of whom rely entirely on groundwater for their water supplies. Study Area Irrigation Districts Reliant on Surface Water Supplies Table 6.5 [ATT2:ATT70] summarizes the estimated lower and upper bound Study-Period [1922-2003]: A) peak single year; and B) average additional cost of groundwater pumping that would have been incurred by each of the Irrigation Districts reliant on surface water supplies assuming the high estimate of potential increases in groundwater depths were to occur with SED 40 implementation. The pumping cost estimates are based on an assumed range of $0.39 (lower bound) to $1.12 (upper bound) of combined cost for electricity and well maintenance for each acre foot pumped one foot of elevation. The electricity cost estimates are based on the recent electricity expenses for groundwater pumping experienced by the Cities of Turlock ($0.39) and Modesto ($1.12). The well maintenance costs estimates are based on the assumptions adopted by the SWRCB in its assessment of SED economic impacts. The cost estimates do not account for the additional potential costs that the Irrigation District's might incur to add new wells or extend existing wells to reach groundwater at average depths that have increased due to SED-related increases in groundwater pumping. The costs do not account for the potentially significant additional costs that the Irrigation Districts are likely to incur due to SED-related increases in groundwater depths for pumping and water treatment infrastructure. Though the districts all have a number of deep wells many individual irrigators in the districts that supplement their irrigation with their own pumping do not and may face increased well infrastructure investment to meet their water needs when offsetting SED reductions in their surface water supplies. The table [Table 6.5, ATT2:ATT70] suggests that of the irrigation districts reliant on surface water Merced will likely be the most impacted by the SED due to the extent to which the district, as a result, will need to depend on additional groundwater pumping to meet its water supply needs, limitations on pumping due to the SGMA notwithstanding. The table indicates, for example, that the estimated additional cost of pumping incurred by the Merced ID in any one year covering the hydrologic record of the Study Period, due to SED-related increases in groundwater depths and increased pumping, ranges from a lower bound of about $23 million to an upper bound of over $67 million district-wide, which translates to about $240 to $680 per baseline irrigated acre in the district in 2015$. This added cost per acre would represent a significant escalation of costs for the district's	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
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		farmers and eliminate or put tremendous pressure on existing farmer profitability and even viability in any given year, particularly producers of relatively lower value grain and hay crops. The table further shows that the high estimate average annual impact on cost per acre across the entire Study Period ranges from $17 to $49 in 2015$. As with crop gross revenues, a focus on averages masks the severity of potential impacts in any given year. Figure 6.7 [ATT2:ATT71] shows Stratecon's estimates of the upper bound of increased pumping costs during the Study Period for the Irrigation Districts combined due to the range of estimated SED 40-related increases in regional groundwater depths, low, middle and high estimates. The graphic reveals significant inter-year variability in those cost impacts and many years that those added costs would have been substantial. Figure 6.8 [ATT2:ATT72] presents the same information shown in Figure 6.7 but consolidates it as averages across each water year type during the Study Period (e.g., critically dry, dry, above normal, etc.). The figure clearly shows that the SED 40 impacts groundwater pumping costs within the Irrigation Districts would be most severe during critically dry and dry years. This is to be expected as pumping in low surface water supply years is estimated to be higher than in other years.	
1176	158	[ATT2:ATT70: Table 6.5. Summary of cost impacts of SED 40% groundwater depth and increased pumping for various irrigation districts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	159	[ATT2:ATT71: Figure 6.7. Graph showing upper bound increased groundwater pumping costs with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	160	[ATT2:ATT72: Figure 6.8. Chart showing increased groundwater pumping costs due to SED 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	161	[From ATT2:] Irrigation Outside of the Irrigation Districts Irrigation districts and irrigators outside of the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] but within the same water basins as the Irrigation Districts rely entirely on groundwater for their water supplies. Table 6.6 [ATT2:ATT73] summarizes SWRCB's estimates of the total baseline groundwater pumping by these irrigation districts and irrigators. The table shows total annual baseline pumping of about 1.47 million acre feet on about 531,000 irrigated acres. Table 6.7 [ATT2:ATT74] calculates the estimated groundwater pumping cost impacts of the SED 40 on these irrigators assuming three different associated increases in well depths during the Study Period [1922-2003] because of increased Irrigation District pumping: A) the weighted average increase in lift of 33.50 feet; B) the lower bound single year high estimate in increased in lift among the Irrigation Districts (see Table 6.5 [ATT2:ATT70] peak change in groundwater depth for SEWD); and C) the upper bound single year high estimate increase in lift among the Irrigation Districts (see Table 6.5 peak change in groundwater depth for Merced ID). The table indicates an average added cost per acre for these irrigators ranging from $36.04 to $103.50 per acre over the Study Period. This is a significant potential increase in the average cost of irrigation, which could have important impacts on the viability of regional farming. In addition, this estimate does not account for inter-year variability in groundwater depth increases due to the SED that could in certain years result in incremental impacts on	Please see response to comment 1176-18 and 1176-55.

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		per-acre groundwater pumping costs that are substantially higher. For example, and as shown in the table, were the average well depth in the region due to the SED increase by 84.7 feet in any one year (see Table 6.5) consistent with the lower bound high estimate of potential well depth increases in any one year of the Study Period among the Irrigation Districts, the average per acre increase in water costs for irrigators in the Study Area [Merced, San Joaquin, and Stanislaus Counties] outside of the Irrigation Districts would be estimated in a range of about $91 to almost $262. This goes up to $226 to almost $650 per acre were the well depth increases in any year equal to the upper bound high estimate for the Irrigation Districts during the Study Period of about 210.1 feet (see Table 6.5). This level of cost increase would more than wipe out the profits for a large portion of the region's farmers and have a severely adverse impact on the regional economy. Furthermore, even the risk of this outcome would result in a fundamental structural change to the region's economy in the long run as the financial risks of farming for most would become untenable. Figure 6.9 [ATT2:ATT75] shows Stratecon's estimates of increased groundwater costs during the Study Period for the irrigators outside of the Irrigation Districts based on the cost per foot of lift ranging from $0.39 to $1.12. The graphic reflects the high estimates of the potential impacts on groundwater depths for each basin of the Study Area based on the high estimates of groundwater depth impacts for the Irrigation Districts within those basins. For example, the Modesto Basin groundwater depth assumptions are based on the estimated SED 40 impacts on groundwater depths in the Modesto Irrigation District. For the Turlock Basin, Stratecon assumed depth changes consistent with the estimates for the Turlock Irrigation District. For the Merced Basin, Stratecon assumed depth changes consistent with the estimates for the Merced Irrigation District. For the Eastern San Joaquin Basin, Stratecon assumed depth changes consistent with the weighted average groundwater pumping of the Oakdale ID, Stockton East WD and the Central San Joaquin WCD. The graphic reveals significant inter-year variability in the potential pumping cost impacts and many years that those added costs would have been substantial.	
1176	162	[ATT2:ATT73: Table 6.6. Summary of SWRCB's estimated baseline groundwater pumping by irrigation districts outside of SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	163	[ATT2:ATT74: Table 6.7. SED 40 impact on outside irrigation district (other than SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID) groundwater pumping costs.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	164	[ATT2:ATT75: Figure 6.9. Graph showing increased pumping costs due to SED 40% for project area irrigators outside of Irrigation Districts (SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID), high estimate.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	165	[From ATT2:] Except for several communities within the Study Area [Merced, San Joaquin, and Stanislaus Counties] that rely on surface water for a portion of their Domestic, Commercial, Municipal and Industrial water supplies ("DCMI" water supplies), the majority of communities within the Study Area rely entirely on groundwater for their DCMI water supplies. Accordingly, the potential impacts of the SED as it relates to community DCMI water supplies will be both direct as it relates to those communities in the region that rely on	See response to Comment 1176-18.

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		surface water for some portion of their DCMI water supplies as well as indirect as it relates to anticipated increases in regional groundwater depths and associated pumping costs due to expected increases in groundwater pumping by irrigators and communities to offset some portion of their SED-related reductions in surface water supplies, potential SGMA-associated pumping limitations aside.	
1176	166	[From ATT2:] Surface DCMI Supplies A number of the Study Area's [Merced, San Joaquin, and Stanislaus Counties] communities rely heavily on surface water conjunctively with groundwater to meet their overall water supply needs. These communities, which include Stockton and Manteca in San Joaquin County and Modesto in Stanislaus County, among others, receive surface water under contract from the region's Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID]. In its assessment of potential SED impacts, SWRCB assumed that the region's communities reliant on surface water would not experience any reductions in those supplies as a result of SED under the presumption that the communities' surface water needs would take priority over Irrigation District demands. Accordingly, the SWRCB provided no estimates of the regional economic impacts of reduced Study Area community surface water supplies. However, it is Stratecon's understanding that the region's communities that rely on surface water do not have such priority and, therefore, along with their Irrigation District suppliers, will share in the burden of significant SED-related reductions in their surface water supplies. At the time of this report's preparation, Stratecon did not have the SED water supply impact information needed to accurately assess the potential economic implications of these potential changes in community surface water supplies, which certainly warrant quantification and emphasis. However, it should be understood that Stratecon's (and the SWRCB's) assessment of SED-related reductions incrop production and associated economic impacts implicitly accounts for the economic impacts of the surface water that might be lost by the region's communities due to the SED though only in terms of farm production losses and associated impacts of that reduced water supply, not the increased costs that would be incurred by the affected communities to mitigate for the loss of water and associated impacts. Thus, while the potential economic impacts of reduced community surface water supplies due to the SED are not explicitly quantified by Stratecon, an assessment of the impacts of the loss of this water, regardless of its amount, is embedded elsewhere in Stratecon's overall economic impact analysis and, therefore, reflected in Stratecon's overall impact conclusions.	Please see Chapter 13, Service Providers, Section 13.4.2, Methods and Approach, LSJR Alternatives, for a description of the qualitative methodology used to evaluate potentially significant impacts to service providers under each of the LSJR alternatives. This evaluation does not assume the region's communities reliant on surface water would not experience any reductions, as claimed by the comment. For additional information regarding service providers, please see Master Response 3.6, Service Providers, regarding the approach to evaluating impacts, potential effects related to service providers and the potential availability of water in the plan area for municipal uses. Please see Master Response 8.4, Non-Agricultural Economic Considerations, regarding municipal economic effects. Please also see Chapter 20, Economic Analysis, Section 20.3.3, Effects on Municipal and Industrial Water Supplies and Affected Regional Economies for a discussion of potential changes to water supply costs and rates. Please see Master Response 1.2, Water Quality Control Planning Process, for information regarding Bay-Delta Plan implementation and water right priority.
1176	167	[From ATT2:] Groundwater DCMI Supplies Already the Study Area [Merced, San Joaquin, and Stanislaus Counties] is facing significant DCMI water supply challenges due to long term chronic overdraft of its aquifers that over time has reduced community water supply reliability and increased the cost of water. These cost impacts have affected community water systems as well as businesses, school districts and individual homeowners operating their own wells for water supply. According to the California Department of Water Resources ("CDWR") the San Joaquin River Basin is one of a number of basins in California that have experienced recent large increases in groundwater depths during the current drought as the combined result of increased pumping and reduced aquifer recharge (natural and artificial). For example, CDWR reports	See response to comments 1176-18, 1176-55, and 1176-195.

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		that the Merced Groundwater Basin is already being depleted at a rate of 54,000 acre-feet per year for urban uses and 492,000 acre-feet per year for agricultural uses and that the Turlock Groundwater Basin is being depleted at a rate of 65,000 acre-feet per year for urban uses and 387,000 acre-feet per year for agricultural uses. The result has already been many wells going dry and substantial water quality issues in certain areas. The Planada Community Services District in Merced County, as an example, has recently dealt with major challenges in meeting its community water service needs as several of its wells have gone dry due to the drought and it has had to find emergency funding to put in new wells in response. Planada, a farming town whose population is around 4,500, is designated as a Severely Disadvantaged Community by the State of California due to its very low household incomes. Further, potentially large reductions in groundwater elevations in the area of Planada due to the SED could place untenable additional financial hardship on that community. With the above as context, SED reductions in surface water supplies will only exacerbate the region's already existing serious problem with urban water supply reliability and rising water costs. The latter will be the result of: A) the need in some cases for the deepening of existing wells or development of new wells to access groundwater such as Planada's, Modesto's and other communities' water systems and individual businesses and households have already experienced with the recent drought; B) additional incremental energy and other costs associated with pumping water from greater depths; C) additional incremental expenses for increased chemical treatment and other actions necessary to resolve anticipated deterioration in water quality resulting from increased well depths and D) water conservation mandates to reduce water demand. Along with Planada and Modesto, a very large portion of the region's communities are designated as DACs, including the cities of Merced and Stockton, the two largest cities in Merced and San Joaquin Counties, respectively. Thus, the economic challenges in many Study Area communities posed by potential necessary increases in water rates or other financing initiatives to offset well-depth-related increases in water costs may prove particularly material and these communities simply may not have the financial and human resources to adequately mitigate for the impacts. Unfortunately, there is limited information available from many of the region's communities regarding their existing well depths and the incremental costs associated with pumping groundwater. This noted, Table 7.1 [ATT2:ATT76] provides certain fiscal year 2015 summary water use and average pricing statistics for a number of the region's communities most likely to be highly impacted by SED-related increases in groundwater depths. This information provides a baseline for evaluating the potential implications of added DCMI costs. The table shows, for example, that the average monthly charge for water per connection (including residential, commercial, landscape, etc.) in Planada, a DAC, was about $2.00 per thousand gallons in 2015. Upward pressure on the communities' water costs this year and in the near future term even without the SED is significant due to drought-related response. More detailed information than is presented in Table 7.1 was obtained for the cities of Modesto (a DAC) and Turlock, both in Stanislaus County. Given the recent drought, this data provides some insight to the potential response of Study Area communities to SED-related reductions in regional surface water supplies and associated anticipated increases in well depths. Table 7.2 [ATT2:ATT77] summarizes the recent water supply situation in Modesto, which relies on both surface and groundwater to meet its water supply needs. The table	

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		shows that Modesto most recently has experienced drought-related decreases in its surface water supplies and not actually offset those reductions through increases in its groundwater pumping. To address the drop off in water supply the City has aggressively sought to implement conservation measures. Such measures can only go so far as to mitigating for water supply reductions. With even greater reductions in its surface supplies as a result of the SED the City expects to have no other option than to increase its groundwater pumping. In fact, as the City has grappled with its recent drought-related water supply challenges, it has just funded the addition of a new deep well to its groundwater system at a cost of $1.5 million. Table 7.3 [ATT2:ATT78] summarizes the City of Modesto's recent residential water demand. The table shows a decline in household connections and household water use into fiscal year 2016 that corresponds to drought-related residential water use cutbacks/conservation. Table 7.4 [ATT2:ATT79], which summarizes the City of Modesto's recent commercial, industrial, etc. water demand ("non-residential" water use), reveals a similar decline as residential water use into 2016. Table 7.5 [ATT2:ATT80] summarizes the recent water supply situation in the City of Turlock, which relies entirely groundwater to meet its water supply needs. The table shows that Turlock most recently has experienced drought-related decreases in its groundwater pumping and use in conjunction with increased depth to groundwater. Table 7.6 [ATT2:ATT81] summarizes the City of Turlock's recent historical residential water use. The table shows a drop-off in household water consumption from calendar year 2013 into the current drought through 2015. As with the region's other communities, measures to reduce water use and encourage conservation can only go so far in helping to offset rising pumping costs. This is especially true as the Study Area's population is projected to continue its strong growth, well outpacing the rate of growth for the State of California. Based on data provided by the Cities of Modesto and Turlock, the added cost per acre-foot of water pumped per foot of elevation in the region is estimated to range from $0.39 to $1.12. This cost includes expenses for both power (electricity, diesel, etc.) and maintenance. It does not include added costs of capital investment to reach greater depths or costs of added treatment due to the lower quality of water at greater depths. According to the SWRCB, the annual baseline DCMI pumping from the Study Area's four groundwater sub-basins is 247,000 acre feet. Table 7.7 [ATT2:ATT82] summarizes the implications for the cost of this groundwater for a range of potential regional well elevation declines based on Stratecon's assessment of the impacts on depth to groundwater of the SED 40. The table shows that for the projected average well depth impact for the Irrigation Districts during the Study Period [1922-2003] of about 33.5 feet, the estimated additional cost burden on DCMI water users in the region ranges from about $3.2 to $9.3 million. This translates to about $6.39 to $18.36 per household (about $0.50 to $1.50 a month) within the region to provide some order of magnitude perspective (though of course some of the estimated cost would be incurred by non-residential users of water including commercial users, schools, etc.). Concurrently, within the range of projected well depth increases as a result of SED-related increases in pumping for any one year during the Study Period, the estimated lower and upper bound, high estimate pumping cost impacts range from about $8.2 million to $58.1 million or about $16 to $115 per region household. This again highlights the fact that in	

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		many hydrologic years during the study period the impacts on well depths and resulting associated increases on community water costs could be substantial. Figure 7.1 [ATT2:ATT83] shows Stratecon's estimates of increased groundwater costs during the Study Period for the Study Area's communities based on the cost per foot of lift ranging from $0.39 to $1.12. The graphic reflects estimates of the lower and upper bound, high estimate potential impacts of the SED 40 on groundwater depths for each basin based on the estimates for the Irrigation Districts within those basins. For example, the Modesto Basin groundwater depth assumptions are based on the estimated SED 40 impacts on groundwater depths in the Modesto Irrigation District. For the Turlock Basin, Stratecon assumed depth changes consistent with the estimates for the Turlock Irrigation District. For the Merced Basin, Stratecon assumed depth changes consistent with the estimates for the Merced Irrigation District. For the Eastern San Joaquin Basin, Stratecon assumed depth changes consistent with the weighted average groundwater pumping of the Oakdale ID, Stockton East WD and the Central San Joaquin WCD. The graphic reveals significant inter-year variability in the pumping cost impacts and many years that those added costs would have been substantial for the region's communities.	
1176	168	[ATT2:ATT76: Table 7.1. 2015 water use and pricing statistics for the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	169	[ATT2:ATT77: Table 7.2. Modesto water supply statistics.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	170	[ATT2:ATT78: Table 7.3. Modesto residential water demand.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	171	[ATT2:ATT79: Table 7.4. Modesto non-residential water demand.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	172	[ATT2:ATT80: Table 7.5. Turlock water supply statistics.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	173	[ATT2:ATT81: Table 7.6. Turlock residential water demand.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	174	[ATT2:ATT82: Table 7.7. SED 40 water cost impacts for area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	175	[ATT2:ATT83: Figure 7.1. Graph showing increased DCMI water pumping costs due to SED 40%, high estimate, in area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	176	[From ATT2:] Recreation The SED 40 would be expected to result in material declines in Study Area [Merced, San Joaquin, and Stanislaus Counties] reservoir elevations as less spring snow pack run-off will be allowed to be captured by the region's dams and held for later release for irrigation and other purposes. A number of the Study Area reservoirs (Woodward Reservoir and Modesto Reservoir, as primary examples) and reservoirs adjacent to the Study Area operated by the	Chapter 10, Recreational Resources and Aesthetics, evaluates potential physical environmental impacts on recreation at reservoirs in the plan area (New Melones, New Don Pedro, and Lake McClure) and in the extended plan area in response to implementation of the LSJR plan amendments. The methodology for the analysis, which includes evaluating changes in reservoir elevations, is explained in Section 10.4, Methods and Approach, LSJR Alternative Reservoir Modeling Methodology and Results. Please see Master Response 3.2, Surface Water Analyses and Modeling, for a discussion of carryover storage at these reservoirs.

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		Irrigation Districts (Lake Don Pedro and Lake McClure, as primary examples) are important regional water-based recreation destinations. Accordingly, SED-associated declines in reservoir elevations during the spring and, particularly, summer months, which are peak periods for water-based recreation regionally is expected to have an adverse effect on recreation at the region's reservoirs and, thus, adverse economic impacts due to associated declines in local recreation-associated spending and job creation. This is potentially particularly true of Woodward, which has a strict surface elevation threshold for terminating body contact activities within the reservoir. Historically, this threshold has been reached in October but recently, with the drought, has been triggered in September. Any SED-related reductions in the reservoir's elevations could result in the threshold being reached earlier, particularly in drier years, having a definitive adverse impact on recreation at the reservoir and associated regional recreation-related spending and economic output and employment effects. Stratecon was unable to obtain the data it sought to perform statistical analyses relating the region's lake recreation visitation to lake levels as a basis to estimate the recreation effects of the SED 40. This noted, the SWRCB dismissed those impacts as minor with no empirical foundation for that conclusion. Stratecon believes that while the recreation-related impacts may be substantially less than the impacts associated with crop production and water costs the SED 40's potential recreation-associated economic impacts are likely to be material, particularly during drier hydrologic years when the unimpaired flow requirements will have particularly substantial impacts on summertime reservoir elevations. As such, the SWRCB should explicitly seek to quantify those impacts as part of its programmatic assessment of the SED.	Many of the smaller reservoirs in the plan area, such as Woodward Reservoir and Modesto Reservoir are located along water conveyance facilities for the irrigation districts. Storage in these reservoirs typically is retained at relatively high levels provided water is moving through the conveyance system for irrigation or other purposes (WQTS and Johnson 2016). Storage data for Modesto Reservoir available from the California Data Exchange Center (CDEC) indicates that storage in Modesto Reservoir fluctuates, but since 1995, storage has typically remained between about 15 TAF and 20 TAF, even during the 2012 – 2015 drought. Some water would remain available for irrigation, as demonstrated by this data, and as such these reservoirs would likely remain at levels high enough for recreational purposes. Please see Master Response 8.4, Non-Agricultural Economic Considerations, for a discussion of how the information contained in Chapter 10 is used to evaluate potential recreational economic effects in the plan area and extended plan area. As noted by the commenter, very little data exists to analyze recreation visitation to lake levels at the reservoirs located in the extended plan area. The State Water Board qualitatively addresses potential reservoir-elevation, recreational-related, economic considerations in the extended plan area in Master Response 8.4.
1176	177	[From ATT2:] Hydropower The SED's impacts on hydropower generation are estimated by the SWRCB to be less than $1 million attributed to a combination of lost power production and reduced power value. While the SWRCB does not address the implications for regional power consumers (households, businesses, etc.) of the cost of replacement power and associated economic impacts, Stratecon believes those impacts to likely be relatively small. Accordingly, Stratecon defers to the SWRCB evaluation of power production effects and, accordingly, does not evaluate the associated economic impacts.	The reduced power production volume is small (see Section 20.3.4, Effects on Hydropower Generation, Revenues and the Regional Economy, and response to comment 1176-81), as the commenter acknowledged, and the difference may be replaced by other energy sources, or by conservation (reduced demand) or both. Regardless, the effects on consumers will be minimal.
1176	178	[From ATT2:] Reduced Agricultural Production by Irrigation Districts Stratecon examined the implications of the SED 40 on Study Area [Merced, San Joaquin, and Stanislaus Counties] agricultural production under two scenarios related to Irrigation District [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] response to the anticipated SED 40 surface water supply reductions. The first assumed that the Irrigation Districts would increase their groundwater pumping to offset the water supply reductions. It is assumed that the rate of replacement of surface water lost with groundwater would be consistent with the observed historical response of the Westlands Irrigation District to surface water supply delivery variability. This resulted in estimates of groundwater pumping by the Irrigation Districts during the Study Period [1922-2003] were the SED 40 in place that were less than estimated by the SWRCB. Accordingly, Stratecon's analysis concluded greater reductions in overall Irrigation District water supplies during the Study Period due to the unimpaired flow requirements	See response to comments 1176-18 and 1176-55.

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		than did the SWRCB and, correspondingly, greater crop land fallowing/idling and associated declines in crop production and gross revenues.	
1176	179	[From ATT2:] SED 40 without SGMA Limitations on Groundwater Pumping Table 10.1 [ATT2:ATT84] shows Stratecon's estimates of lost gross crop revenues for each of the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] in the peak Study Period [1922-2003] year of total supply reductions and on average. These lost gross crop revenues represent the estimated direct economic output losses of the SED 40 without account for potential groundwater pumping restrictions associated with the SGMA. The table shows an average estimated annual loss of direct economic output in 2008$ of $52 million or about 4% of the Irrigation Districts' estimated average economic output. This compares to the SWRCB's estimate of $36 million. Perhaps more importantly, however, the table shows a peak single year expected decline in economic output by the Irrigation Districts in 2008$ of about $235 million or 16% of the Irrigation Districts' direct economic output. The severity of the impacts on output of this single year and other years during the Study Period also with very significant estimated losses of economic output is masked by a focus on the average impacts over the entire Study Period with a number of years with small or no expected impacts due to more favorable hydrological conditions (wet or above normal years). Figure 10.1 [ATT2:ATT85] shows the substantial inter-year volatility in crop gross revenue losses due to the SED 40. These losses are expected to often exceed $100 million annually. Table 10.2 [ATT2:ATT86] summarizes the estimated direct farm sector employment impacts in the Irrigation Districts of the direct output impacts shown in Table 10.1 [ATT2:ATT84]. The estimates of employment impacts were derived applying the IMPLAN employment multipliers for the Study Area [Merced, San Joaquin, and Stanislaus Counties] specific to each of the primary agricultural commodity sectors identified in the IMPLAN model. The table shows an average direct employment loss of about 276 jobs and a peak year employment loss nearing 1,450 jobs, which represents about 18% of the estimated crop production employment within the Irrigation Districts. Figure 10.2 [ATT2:ATT87] shows the substantial inter-year volatility in estimated crop production reduction-related job losses due to the SED 40. These losses are expected in many years to exceed 400. Table 10.3 [ATT2:ATT88] summarizes the estimated total output impacts associated with the estimated reduction in Irrigation District crop production and, correspondingly, crop gross revenues during the Study Period because of the SED 40. These impacts include both the direct farm sector output impacts as shown in Table 10.1 and the additional secondary impacts because of the direct farm output impacts as farmers spend money in different sectors of the regional economy in support of their crop production activities and farm workers spend their income within the regional economy. The table shows, for example, that the estimated contribution of the Irrigation Districts to Study Area total economic output averages almost $2.6 billion per year and the average reduction due to the SED 40 over the Study Period is estimated at about $91 million or approximately 4% of that total output contribution. Concurrently, in the peak reduction year during the Study Period for the Irrigation Districts combined the total impact on	Please see response to comments 1176-18 and 1176-55.

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		economic output is estimated at about $413 million or approximately 17% to the total output contribution of the Irrigation Districts. Figure 10.3 [ATT2:ATT89] shows the substantial inter-year volatility in total Study Area output losses due to the SED 40's impacts on the Irrigation Districts' farm production. These losses are expected in many years to exceed $200 million. Table 10.4 [ATT2:ATT90] summarizes the estimated total employment impacts within the Study Area of the SED 40 because of Irrigation District reductions in crop production. The jobs include the direct farm jobs shown in Table 10.2 [ATT2:ATT86] as well as additional jobs within the economy (secondary employment impacts) associated with Irrigation District spending on non-labor inputs for farming and farm worker spending of their wages. The table shows, for example, that the estimated contribution of the Irrigation Districts to Study Area total employment averages about 19,000 jobs and the average reduction due to the SED 40 over the Study Period is estimated at about 700 or approximately 4% of those total jobs. Concurrently, in the peak water supply reduction year during the Study Period for the Irrigation Districts combined, the total impact on employment is estimated at about 3,000 jobs lost or approximately 17% of the total employment contribution to the Study Area by the Irrigation Districts. Figure 10.4 [ATT2:ATT91] shows the substantial inter-year volatility in total Irrigation District output losses due to the SED 40. These losses are expected in many years to exceed 1,000 jobs.	
1176	180	[ATT2:ATT84: Table 10.1. Summary of lost direct output (2008$) for various irrigation districts under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	181	[ATT2:ATT85: Figure 10.1. Graph showing lost farm output before SGMA (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	182	[ATT2:ATT86: Table 10.2. Irrigation district direct farm sector employment impacts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	183	[ATT2:ATT87: Figure 10.2. Graph showing lost farm employment before SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	184	[ATT2:ATT88: Table 10.3. Total industrial output impacts for various irrigation districts (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	185	[ATT2:ATT89: Figure 10.3. Graph showing lost farm production output before SGMA (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	186	[ATT2:ATT90: Table 10.4. Total irrigation district losses due to SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	187	[ATT2:ATT91: Figure 10.4. Graph showing total lost irrigation district employment before SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	188	[From ATT2:] SED 40 with SGMA Limitations on Groundwater Pumping	Please see response to comments 1176-18 and 1176-55.

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		Table 10.5 [ATT2:ATT92] shows Stratecon's estimates of lost gross crop revenues for each of the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] in the peak Study Period [1922-2003] year of total supply reductions and on average. These lost gross crop revenues represent the estimated direct economic output losses of the SED 40 accounting for potential groundwater pumping restrictions associated with the SGMA. The table shows an average estimated annual loss of direct economic output in 2008$ of about $90 million or about 6% of the Irrigation Districts' average economic output. This compares to the SWRCB's estimate of $36 million. Perhaps more importantly, however, the table shows a peak single year expected decline in economic output by the Irrigation Districts of about $406 million or 27% of the Irrigation Districts' direct economic output from crop production. The severity of the impacts on output of this single year and other years during the Study Period also with very significant estimated losses of economic output is masked by a focus on the average impacts over the entire Study Period, which includes a number of years with small or no expected impacts due to more favorable hydrological conditions (wet or above normal years). Figure 10.5 [ATT2:ATT93] shows the substantial inter-year volatility in crop gross revenue losses due to the SED 40 assuming SGMA groundwater pumping restrictions. These losses are expected to often exceed $200 million annually. Table 10.6 [ATT2:ATT94] summarizes the estimated direct farm sector employment impacts in the Irrigation Districts of the direct output impacts shown in Table 10.5 [ATT2:ATT92]. The estimates of employment impacts were derived applying the IMPLAN employment multipliers for the Study Area [Merced, San Joaquin, and Stanislaus Counties] specific to each of the primary agricultural commodity sectors identified in the IMPLAN model. The table shows an average direct employment loss of about 467 jobs and a peak year employment loss of about 2,200 jobs, which represents about 28% of the estimated crop production employment within the Irrigation Districts. Figure 10.6 [ATT2:ATT95] shows the substantial inter-year volatility in estimated crop production reduction-related job losses due to the SED 40 with SGMA groundwater pumping restrictions. These losses are expected in many years to exceed 1,000. Table 10.7 [ATT2:ATT96] summarizes the estimated total output impacts associated with the estimated reduction in Irrigation District crop production and, correspondingly, crop gross revenues during the Study Period because of the SED 40. These impacts include both the direct farm sector output impacts as shown in Table 10.5 and the additional secondary impacts because of the direct farm output impacts as farmers spend money in different sectors of the regional economy in support of their crop production activities and farm workers spend their income within the regional economy. The table shows, for example, that the estimated contribution of the Irrigation Districts to Study Area total economic output averages almost $2.6 billion per year and the average reduction due to the SED 40 over the Study Period accounting for the SGMA is estimated at about $160 million or approximately 6% of that total output contribution. Concurrently, in the peak reduction year during the Study Period for the Irrigation Districts combined, the total impact on economic output is estimated at about $712 million or approximately 27% to the total output contribution of the Irrigation Districts. Figure 10.7 [ATT2:ATT97] shows the substantial inter-year volatility in total Irrigation District	

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		output losses due to the SED 40 with the SGMA. These losses are expected in many years to exceed $400 million. Table 10.8 [ATT2:ATT98] summarizes the estimated total employment impacts of the SED 40 with the SGMA because of Irrigation District reductions in crop production. The jobs include the direct farm jobs shown in Table 10.6 [ATT2:ATT94] as well as additional jobs within the Study Area economy (secondary employment impacts) associated with Irrigation District spending on non-labor inputs for farming and farm worker spending of their wages. The table shows, for example, that the estimated contribution of the Irrigation Districts to Study Area total employment averages about 19,000 jobs and the average estimated reduction due to the SED 40 over the Study Period is estimated at 1,082 or approximately 6% of those total jobs. Concurrently, in the peak water supply reduction year during the Study Period for the Irrigation Districts combined, the total impact on employment is estimated at about 4,900 jobs lost or approximately 26% of the total crop production employment contribution to the Study Area by the Irrigation Districts. Figure 10.8 [ATT2:ATT99] shows the substantial inter-year volatility in total Irrigation District output losses due to the SED 40 accounting for SGMA restrictions on additional groundwater pumping. These losses are expected in many years to exceed 2,000 jobs.	
1176	189	[ATT2:ATT92: Table 10.5. Summary of lost direct output (2008$) for various irrigation districts under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	190	[ATT2:ATT93: Figure 10.5. Graph showing lost farm output with SGMA (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	191	[ATT2:ATT94: Table 10.6. Direct farm sector employment impacts for various irrigation districts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	192	[ATT2:ATT95: Figure 10.6. Graph showing lost farm employment with SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	193	[ATT2:ATT96: Table 10.7. Total industrial output impacts (2008$) for various irrigation districts.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	194	[ATT2:ATT97: Figure 10.7. Graph showing lost irrigation district output with SGMA (2008$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	195	[ATT2:ATT98: Table 10.8. Total employment impacts for various irrigation districts under SED with SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	196	[ATT2:ATT99: Figure 10.8. Graph showing lost total irrigation district employment under SED with SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	197	[From ATT2:] Direct Output Impacts Table 10.9 [ATT2:ATT100] shows Stratecon's estimates of the upper bound average and peak year lost dairy and livestock sectors revenues expected to result from SED 40 reductions in regional feed crop availability both before and with SGMA implementation. These lost revenues represent the estimated upper bound potential direct economic output	Please see response to comments 1176-18 and 1176-55.

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		losses of the SED 40 within both sectors. For example, the table shows an average estimated annual loss of direct economic output in 2008$ for the region's dairy sectors before the SGMA of $156 million or about 3.6% of the region's estimated average dairy sectors economic output and a peak single year expected decline in dairy sectors economic output of about $763 million, about 17.7% of the region's estimated average dairy sectors output. The table also shows an average estimated annual loss of direct economic output in 2008$ for the region's livestock sectors before the SGMA of about $37 million or about 3.6% of the region's estimated average livestock sectors economic output and a peak single year expected decline in livestock sectors economic output of about $180 million, about 17.7% of the region's estimated livestock sectors output. Figures 10.9 [ATT2:ATT101] and 10.10 [ATT2:ATT102] show the substantial inter-year volatility in anticipated dairy and livestock sectors revenue losses due to the SED 40. Figure 10.9 [ATT2:ATT101] indicates that dairy sectors direct output losses frequently exceed $100 million. Figure 10.10 [ATT2:ATT102] indicates that livestock sectors direct output losses frequently exceed $40 million.	
1176	198	[ATT2:ATT100: Table 10.9. Summary of anticipated dairy and livestock sectors output losses (2008$) under SED, before and after SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	199	[ATT2:ATT101: Figure 10.9. Graph showing upper bound dairy sector direct output losses (2008$) for area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	200	[ATT2:ATT102: Figure 10.10. Graph showing upper bound livestock sectors direct output losses (2008$) for area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	201	[From ATT2:] Direct Employment Impacts Table 10.10 [ATT2:ATT103] summarizes the estimated direct dairy and livestock sectors employment impacts of the direct output impacts shown in Table 10.9. These lost jobs represent the estimated upper bound potential direct economic employment losses of the SED 40 within both sectors. For example, the table shows an average estimated annual upper bound potential loss of direct employment for the region's dairy sectors before the SGMA of 415 jobs or about 3.6% of the region's estimated average dairy sectors economic employment and a upper bound peak single year expected decline in dairy sectors employment of about 2,021, about 17.7% of the region's estimated average dairy sectors employment. The table also shows an average estimated annual upper bound loss of direct employment for the region's livestock sectors before the SGMA of about 112 jobs or about 3.6% of the region's estimated average livestock sectors employment and a peak single year expected decline in livestock sectors employment of about 544 jobs, about 17.7% of the region's estimated livestock sectors employment. Figures 10.11 [ATT2:ATT104] and 10.12 [ATT2:ATT105] show the substantial inter-year volatility in estimated dairy and livestock sectors job losses due to the SED 40. Figure 10.11 [ATT2:ATT104] indicates that dairy sectors direct employment losses frequently exceed 500 jobs. Figure 10.12 [ATT2:ATT105] indicates that livestock sectors direct employment losses	Please see Master Response 8.2, Regional Agricultural Economic Effects, for a discussion regarding the evaluation of dairies and the use of IMPLAN.

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		frequently exceed 150 jobs.	
1176	202	[ATT2:ATT103: Table 10.10. Summary of upper bound dairy and livestock sectors direct employment losses under SED, before and after SGMA.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	203	[ATT2:ATT104: Figure 10.11. Graph showing upper bound lost dairy sector direct employment in the project area.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	204	[ATT2:ATT105: Figure 10.12. Graph showing upper bound lost livestock sector direct employment in the project area.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	205	[From ATT2:] Total Output Impacts Table 10.11 [ATT2:ATT106] summarizes the total estimated Study Area [Merced, San Joaquin, and Stanislaus Counties] economic output impacts of SED 40-related upper bound potential declines in regional dairy and livestock sectors production. These impacts include both the direct dairy and livestock sectors output impacts as shown in Table 10.10 [ATT2:ATT103] and the additional secondary impacts because of the direct dairy and livestock sectors impacts as dairy and livestock enterprise operators spend money in different sectors of the regional economy in support of their dairy and livestock production activities, respectively, and workers within those sectors spend their income within the regional economy. To derive these secondary impacts, Stratecon made several adjustments to the IMPLAN model for 2010 for the three-county Study Area. These adjustments included: - Replacing the IMPLAN model's baseline data for output by the region's grain and other crop sectors (the latter includes hay crops) as the IMPLAN grain sector baseline output was substantially lower (~$80 million) than reported within the agricultural statistics for the three counties (~$350 million) and the other crop sector production about 15% lower than reported within the agricultural statistics for the three counties in 2010. - Adjusting the Study Area's dairy sector (raw milk production) production function to remove the sector's flow through demand for grain and other crops (hay) so that the analysis of the impacts of the SED 40 on the dairy sector would not account for any portion of the impacts on the grain and other crops sectors separately addressed in the analysis of crop production impacts (to avoid double counting). - Adjusting the Study Area's livestock sector (cattle and other livestock production) production function to remove the sector's flow through demand for grain and other crops (hay) so that the analysis of the impacts of the SED 40 on the livestock sector would not account for any portion of the impacts on the grain and other crops sectors separately addressed in the analysis of crop production impacts (to avoid double counting). - Combining the four sectors within the IMPLAN model associated with dairy product manufacturing including the fluid milk and butter, cheese, ice cream and frozen dessert sector and ice cream and frozen dessert production sectors--collectively referred to as dairy manufacturing sectors. - Adjusting the Study Area's dairy manufacturing sectors production function to remove the sectors' flow through demand for raw milk from the dairy sector so that the analysis of the	Please see responses to comments 1176-55, 1176-74, and 1176-82 regarding agricultural economic considerations, dairies and livestock, and IMPLAN.

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		impacts of the SED 40 on the dairy manufacturing sectors would not account for any portion of the impacts on the dairy sector separately addressed in the analysis of dairy sector impacts (to avoid double counting). - Adjusting the Study Area's livestock slaughtering, rendering and processing sector ("livestock processing sector") production function to remove the sector's flow through demand for livestock (live cattle and other livestock) from the livestock sector so that the analysis of the impacts of the SED 40 on the livestock processing sector would not account for any portion of the impacts on the livestock sector separately addressed in the analysis of livestock sector impacts (to avoid double counting). The table shows, for example, that the estimated upper bound average reduction during the Study Period [1922-2003] in regional economic output due to the estimated upper bound potential SED 40-related reduction in regional dairy sectors (includes dairy sector (raw milk production) and dairy manufacturing sector combined) production before SGMA implementation is about $274 million or 3.6% of the dairy sectors' estimated total output contribution to the regional economy. Concurrently, in the peak reduction year during the Study Period the upper bound total loss of regional economic output due to declines in dairy sectors production is estimated at about $1.33 billion or 17.7% of the dairy sectors' total estimated contribution to regional output. The table further shows, for example, that the estimated average reduction during the Study Period in regional economic output due to the upper bound potential SED 40-related reduction in regional livestock sectors production before SGMA implementation is about $65 million or 3.6% of the livestock sectors' total output contribution to the regional economy. Concurrently, in the peak reduction year during the Study Period the upper bound total loss of regional economic output due to declines in in livestock sectors production is estimated at about $317 million or about 17.5% of the livestock sectors' total estimated contribution to regional output. Figures 10.13 [ATT2:ATT107] and [ATT2:ATT108] 10.14 show the substantial inter-year volatility in estimated upper bound dairy and livestock sectors-driven output losses due to the SED 40. Figure 10.13 [ATT2:ATT107] indicates that the estimated dairy sectors-related output losses frequently exceed $200 million. Figure 10.14 [ATT2:ATT108] indicates that the estimated livestock sectors-related output losses frequently exceed $100 million.	
1176	206	[ATT2:ATT106: Table 10.11. Summary of anticipated lost output due to upper bound dairy and livestock sectors production reductions (2008$) under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	207	[ATT2:ATT107: Figure 10.13. Graph showing upper bound lost output (2008$) due to dairy sectors in the area including Merced, San Joaquin, and Stanislaus Counties under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	208	[ATT2:ATT108: Figure 10.14. Graph showing upper bound lost output (2008$) due to livestock sectors in the area including Merced, San Joaquin, and Stanislaus Counties under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	209	[From ATT2:] Total Employment Impacts Table 10.12 [ATT2:ATT109] summarizes the total estimated regional employment impacts of the direct output impacts shown in Table 10.9 [ATT2:ATT100]. These lost jobs represent the estimated upper bound potential economic employment losses within the Study Area	Please see Master Response 8.2, Regional Agricultural Economic Effects for a discussion on how the SED economic analyses was conducted, the factors considered, and the differences between the SED assumptions and those made by commenters who conducted their own economic effects analyses (i.e., Stratecon). Please also see Master Response 8.2, Regional Agricultural Economic Effects, for discussion on consideration of potential economic impacts on industries supported by the agricultural industry, specifically

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		[Merced, San Joaquin, and Stanislaus Counties] economy due to the SED 40's impact on the region's dairy and livestock sectors. For example, the table shows an average estimated annual loss of employment associated with the region's dairy sectors before the SGMA of 1,015 jobs or about 3.2% of the region's estimated average dairy sectors economic employment and a peak single year potential upper bound decline in dairy sectors employment of about 4,944 jobs, about 15.4% of the region's estimated average dairy sectors employment. The table also shows an average estimated upper bound potential annual loss of direct employment for the region's livestock sectors before the SGMA of about 255 jobs or about 3.3% of the region's estimated average livestock sectors employment and a peak single year upper bound expected decline in livestock sectors employment of about 1,244 jobs, about 15.8% of the region's estimated livestock sectors employment. Figures 10.15 [ATT2:ATT110] and 10.16 [ATT2:ATT11] show the substantial inter-year volatility in estimated regional job losses due to the SED 40's estimated potential upper bound impacts on the dairy and livestock sectors. Figure 10.15 [ATT2:ATT110] indicates that the employment losses associated with the dairy sectors frequently exceed 500 jobs. Figure 10.16 [ATT2:ATT11] indicates that livestock sectors direct employment losses frequently exceed 300 jobs.	regarding the topics of effects to dairy and livestock industries and effects on the regional economy. There is a correlation between industry output and employment as noted in the discussion in Master Response 8.2 on dairies and livestock, and in the economic profile.
1176	210	[ATT2:ATT109: Table 10.12. Summary of upper bound lost employment due to dairy and livestock sectors production reductions.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	211	[ATT2:ATT110: Figure 10.15. Graph showing upper bound lost employment due to dairy sectors in the area including Merced, San Joaquin, and Stanislaus Counties under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	212	[ATT2:ATT111: Figure 10.16. Graph showing upper bound lost employment due to livestock sectors in the area including Merced, San Joaquin, and Stanislaus Counties under SED.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	213	[From ATT2:] Increases in Irrigator Groundwater Costs Implementation of the SED 40 before the SGMA could have substantial impacts on Study Area [Merced, San Joaquin, and Stanislaus Counties] groundwater depths and, accordingly, groundwater pumping costs. These added costs extend not only to the Irrigation Districts' [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID] existing pumping and additional pumping to offset lost surface water supplies but also irrigators outside the Irrigation Districts that rely entirely on groundwater for their water supplies. The increases in costs will result in corresponding decreases in farmer profit and farmer disposable incomes. The result will be reduced consumer spending regionally and associated lost regional economic output and employment. To evaluate these impacts Stratecon used the IMPLAN model household sector spending profiles to determine the weighted average regional output and employment impacts (multipliers) of each dollar spent by households. Stratecon then applied these multipliers to the estimated upper bound potential cost impacts on irrigators (lost income) in the Study Area of SED 40-related increases in groundwater depths. This translates the estimated lost income into regional spending and associated economic effects. Table 10.13 [ATT2:ATT112] summarizes the results of this analysis. The table indicates that the total output and employment impacts of the anticipated SED 40-related increases in irrigator groundwater pumping costs are estimated to be as much as about $106 million and 865 jobs on average	Please see response to comments 1176-55, and 1176-67. Please also see Master Response 8.0, Economic Analyses Framework and Assessment Tools, regarding the regulatory context of the economic analysis, reasonable assumptions, and spatial and temporal considerations. Master Response 8.2 provides a discussion of regional economic effects and provides an estimate of the output and employment effects associated with the LSJR alternatives. These estimates account for increases in water supply costs due to replacement groundwater pumping. The Stratecon analysis relies upon an extreme worst case conditions combined with a speculative set of assumptions of impacts to localized groundwater, effects of groundwater depth on other growers' cost structure, and spending patterns by growers, that result in impacts that strain credulity.

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		per year, respectively, with peak single year impacts of as much as about $397 million and 3,230 jobs. Figures 10.17 [ATT2:ATT113] and 10.18 [ATT2:ATT114] show the substantial inter-year volatility in estimated regional estimated output and job losses due to the SED 40's estimated potential upper bound impacts on irrigator groundwater costs. Figure 10.17 [ATT2:ATT113] indicates that the output losses frequently exceed $100 million but in one year during the Study Period [1922-2003] would have seen an increase due to reduced irrigator pumping costs due to lower groundwater elevations. Figure 10.18 [ATT2:ATT114] indicates that the job losses frequently exceed 500 but in one year during the Study Period would have seen an increase due to reduced irrigator pumping costs due to lower groundwater elevations.	
1176	214	[ATT2:ATT112: Table 10.13. Summary of irrigator cost, output, and employment impacts due to increased groundwater depths.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	215	[ATT2:ATT113: Figure 10.17. Graph showing upper bound lost output due to irrigator pumping cost impacts (2015$) in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	216	[ATT2:ATT114: Figure 10.18. Graph showing upper bound lost employment due to irrigator pumping cost impacts in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	217	[From ATT2:] Increases in Community Groundwater Costs SED 40-related impacts on groundwater depths and associated pumping costs will extend not only to the Study Area's [Merced, San Joaquin, and Stanislaus Counties] irrigators but also its communities that rely mostly all, some in part, on groundwater for their water supplies. These added costs would be expected necessarily to ultimately be incurred by households and business and result in corresponding decreases in household disposable incomes and business incomes, respectively. The result will be reduced consumer spending regionally and associated lost regional economic output and employment. To evaluate these impacts Stratecon applied its estimates of the upper bound potential cost impacts on households in the Study Area of the SED 40 to its IMPLAN-based multipliers for regional economic effects of household spending. Table 10.14 [ATT2:ATT115] summarizes the results of this analysis. The table indicates that the upper bound output and employment impacts of the anticipated SED 40-related increases in community groundwater pumping costs are estimated to be as much as about $25 million and 203 jobs on average per year, respectively, with peak single year upper bound impacts of as much as almost $97 million and 787 jobs. Figures 10.19 [ATT2:ATT116] and 10.20 [ATT2:ATT117] show the substantial inter-year volatility in estimated regional estimated output and job losses due to the SED 40's estimated potential upper bound impacts on community groundwater costs. Figure 10.19 [ATT2:ATT116] indicates that the output losses frequently exceed $20 million but in one year during the Study Period would have seen an increase due to reduced community pumping costs due to lower groundwater elevations. Figure 10.20 [ATT2:ATT117] indicates that the job losses frequently exceed 100 but in one year during the Study Period [1922-2003] would have seen an increase due to reduced community pumping costs due to lower	Please see response to comment 1176-195 and 1176-242. The analysis provided by the commenter relies upon an inherent assumption that groundwater pumping costs will increase for communities. As noted in Master Response 8.4, Non-Agricultural Economic Considerations, communities typically rely upon a portfolio of water supply sources and adjust and operate their systems strategically to take advantage of changing conditions. Even communities that rely extensively, or even exclusively, upon groundwater have options for adapting to changes in groundwater depth, if they occur. This is noted within Chapter 20 and in Master Response 8.2. However, the Stratecon analysis focus on the most extreme outcome, combined with overly conservative assumptions, and then applies IMPLAN multipliers, to suggest similarly extreme impacts on jobs and output. In summary, the suggestion of reduced household disposable income and business income is highly speculative, and the effects derived from them are not reasonable.

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		groundwater elevations.	
1176	218	[ATT2:ATT115: Table 10.14. Summary of community cost, output, and employment impacts due to increased groundwater depths.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	219	[ATT2:ATT116: Figure 10.19. Graph showing upper bound lost output due to community pumping cost impacts (2015$) in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	220	[ATT2:ATT117: Figure 10.20. Graph showing upper bound lost employment due to community pumping cost impacts in the area including Merced, San Joaquin, and Stanislaus Counties.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	221	[From ATT2:] Tables 10.15 [ATT2:ATT118] and 10.16 [ATT2:ATT119] summarize the total upper bound output and employment impacts as estimated by Stratecon due to the SED 40 both before and with SGMA implementation. Table 10.15 [ATT2:ATT118] shows, for example, that the estimated upper bound average annual total lost economic output and job losses within the Study Area [Merced, San Joaquin, and Stanislaus Counties] that will result from the SED 40 before SGMA is as much as about $607 million (2015$) and 2,976 jobs, respectively. Table 10.16 [ATT2:ATT119] shows, for example, that the estimated upper bound peak total lost economic output and job losses within the Study Area that will result from the SED 40 with SGMA is as much as almost $3.2 billion (2015$) and 13,206 jobs, respectively. These impacts don't account for a number of potential SED 40 impact sources including production reductions in sectors other than dairy and livestock downstream of, and that rely on, the farm sectors that will be directly impacted and regional community loss of surface water supplies (though potential impacts from the loss of the subject surface water are embedded in the impact estimates associated with reduced crop production within the Irrigation Districts [SSJID, SEWD, CSJWCD, OID, ModID, TID, and MeID]).	Please see response to comments 1176-18, 1176-55, 1176-195, 1176-238. In addition, please see Master Response 8.2, Regional Agricultural Economic Effects, for a discussion of potential economic effects to the food processing industry (which rely on farm sectors) and Master Response 8.4, Non-Agricultural Economic Considerations regarding a discussion of municipal economic effects.
1176	222	[ATT2:ATT118: Table 10.15. Summary of average cost, output, and employment impacts during Stratecon's 1922-2003 study.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	223	[ATT2:ATT119: Table 10.16. Summary of peak cost, output, and employment impacts during Stratecon's 1922-2003 study.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	224	[From ATT2:] The proposed SED will fundamentally alter the water resource portfolios of Merced, San Joaquin and Stanislaus counties [the Study Area]. In its assessment of the impacts of the SED unimpaired flow proposals, SWRCB staff failed to address the resulting water supply reliability, sustainability and volatility issues that will confront the counties. Instead, the SWRCB economic analysis assumes that groundwater pumping will expand to fully offset the loss of surface water supplies until groundwater pumping capacity is exhausted. This full offset assumption is inconsistent with the evidence from Westlands Water District's actual response to increased variability in, and lower levels of, available surface water supplies. Large increases in groundwater pumping is also inconsistent with the fact that groundwater basins in the Study Area are severely over-drafted, well elevations are on a declining trend and all Study Area sub-basins have been designated as "high priority" for	See response to Comment 1176-18.

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		action under SGMA.	
1176	225	[From ATT2:] The SWRCB staff severely underestimated the economic impacts of the proposed flow objective on the local economies. Land fallowing will initially be 60% higher than predicted by SWRCB staff. Once SGMA is implemented, the impact will be almost three times higher. This will result in substantial declines in regional agricultural production and associated economic output. The proposed flow objective introduces a new factor into the local economy--increased volatility in surface water supplies. With reliable surface water supplies falling by 60%, the foundation of the regional agricultural and associated sector investment is completely undermined. Water users can manage their losses by engaging in increased conjunctive use of the highly variable surface water supplies with groundwater. Perhaps the 366 TAF increase in the expected annual yield of unreliable surface water supply under the proposed flow objective can be managed conjunctively to yield 180 TAF of firm water supplies. Surface water users and the local economy more generally still stand to lose more than 400 TAF of reliable surface water supplies. This will result in a structural change to the regional economy that will result in lost jobs, income and tax revenues. The impact of the proposed flow objective on the local economies is obscured by averages. Peak estimated impacts are more than four-fold the averages. Economic risks are severe. The proposed flow objective will change the course of investment and growth far beyond the impacts on which SWRCB focuses, that of relatively small average reductions in lower valued crops such as grains, alfalfa and pasture. The proposed flow objective will put the local economies in the three counties on the pathway to retrenchment. The large reduction in reliable surface water supplies and long-term cutback in groundwater pumping under SGMA is at odds with the rapid population growth for the region predicted by the Department of Finance and any meaningful associated and necessary economic growth.	Please see response to comment 1176-55. Please also see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding the scope of the agricultural economic analysis and how the SWAP model approaches fallowing, and addressing concerns regarding a potential contraction in the agricultural industry. Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, for discussion of how average results were appropriated presented in the SED. In addition, please see Master Response 8.1 and Master Response 8.2, Regional Agricultural Economic Effects, for presentation of the results of the revised SWAP model run averaged by water year type. For information regarding the SED groundwater impact analysis and SED approach to incorporating the Sustainable Groundwater Management Act (SGMA), please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act.
1176	226	[From ATT2:] Disadvantaged and severely disadvantaged communities where most households in the region reside will face water supply challenges comparable to other communities in the Central Valley struggling with the loss of surface water supplies from the Central Valley Project. Residents in these communities will experience job losses from the reduced farm economy and escalating water rates caused by lost water supplies.	Please refer to Master Response 8.2, Regional Agricultural Economic Effects, regarding the potential effects of the plan amendments on employment. Please see Master Response 2.7, Disadvantaged Communities, for discussion on the plan amendments as they relate to disadvantaged communities. Also refer to Chapter 20, Economic Analyses, regarding consideration of the potential economic effects of the plan amendments, which includes an assessment of regional and local economic and fiscal conditions and of in Section 20.3.
1176	227	[From ATT2:] Future Economic Impacts The future economic impact of the SED on the local economies in the Study Area [Merced, San Joaquin, and Stanislaus Counties] depends on the timing of SED implementation and SGMA implementation. With the SWRCB currently anticipated to decide by Summer 2017, SED implementation is assumed to start in 2018. Since the Department of Water Resources has designated all sub-basins in the Study Area as high priority and over drafted, SGMA implementation would start in 2020 and must be fully implemented within 20 years (2039). [Footnote 38: See Sustainable Groundwater Management Act of 2015, Frequently Asked Questions, Association of California Water Agencies, http://www.acwa.com/sites/default/files/post/groundwater/2014/04/2014-	See response to Comment 1176-18.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		groundwaterfaq-2.pdf.] Therefore, the economic impact of the SED would be captured by the pre-SGMA scenario for 2018 and 2019. Thereafter, the economic impact of the SED would be a mix of the pre-SGMA and post-SGMA scenario during the SGMA implementation period (2020- 2039) and only the post-SGMA scenario after full implementation. [Footnote 39: The analysis assumes that SGMA implementation steadily builds up over the 20-year period with a 5% weight given to the post-SGMA scenario in 2020, 10% weight for 2021, with the weight on the post-SGMA scenario growing by 5% each year until a 100% weight is given to the post-SGMA scenario by 2039.]	
1176	228	[From ATT2:] The economic impact of SED depends on hydrologic conditions. Stratecon conducted a Monte Carlo study of future hydrologic conditions for a 40-year time horizon starting in 2017 based on the Sequential Index Method. [Footnote 40: A Monte Carlo study uses repeated random sampling from statistical distributions to obtain numerical results, see https://en.wikipedia.org/wiki/Monte_Carlo_method. In this instance, the numerical result is the present value of the annual loss of economic output from the SED. The sequential index method uses the hydrologic record as the statistical distribution for future water year conditions. It assumes that the hydrologic conditions for 2017 are equally likely to be any of the water years in the historic record 1922-2003. Hydrologic conditions in subsequent years follow the sequence of hydrologic conditions in the historic record. When the sequence reaches the last year of the historic record (2003), hydrologic conditions "wrap around" to the water year condition for 1922 and subsequent years for the remainder of the 40-year time horizon.] The impact of SED over the 40- year time horizon is measured by the present value of lost economic output. [Footnote 41: The calculation uses an interest rate of 5.5%, 100 basis points above the long-term yield on 10-year Treasury Notes. The projections assume that the annual impact of SED is constant in real terms. Therefore, the estimated annual output loss is increased by 2.5% per year, the long-term expected rate of inflation. The discount rate used in the calculation of present value is the real interest rate (2.9%) implied by an interest rate of 5.5% and expected inflation of 2.5%. For discussion of interest rates and expected inflation, see http://hydrowonk.com/blog/2013/01/11/project-evaluation-ii-thoughts-about-interest-rates/.] Figure 11-1 [ATT2:ATT120] presents how the present value of lost economic output from the SED varies with actual 2017 hydrologic conditions. The expected present value of lost economic output over the 50-year horizon totals $14.49 billion. Depending on actual 2017 hydrologic conditions, the present value of lost economic output revenues range from a low of $10.45 billion (if 2017 hydrologic conditions are the same as water year 1934 and hydrologic conditions in subsequent years follow the sequence in the historical record) to a high of $18.43 billion (if 2017 hydrologic conditions are the same as water year 1986 and hydrologic conditions in subsequent years follow the sequence in the historical record). The economic loss related to reduced crop output accounts for less than one-fourth the total loss (see Table 11-1 [ATT2:ATT121]). The downstream impact on dairy sectors is the largest source of loss in economic output, accounting 56.0 percent of the total loss. The downstream impact on the livestock sectors accounts for 13.3 percent of the total loss. The lost output from the increased cost of groundwater pumping, while material, represents only 8.1 percent of total losses. This small share reflects the fact that increased groundwater	The Monte Carlo approach that the commenter used was not appropriate to assessing the impact of the plan amendments. By simulating random samples of the hydrological conditions using the described method, the commenter actually assessed the effect of different future hydrological conditions to estimate economic output. Future hydrological conditions depend on many factors that vary randomly and would occur with or without the plan amendments. Implementation of the plan amendments does not result in any change to future hydrological conditions. Therefore, no further response is warranted.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		pumping will only occur during the short run until SGMA is fully implemented. Delay in the start of SGMA implementation or a faster period for SGMA to reach full implementation has a secondary effect on the expected present value of lost economic output (see Table 11-2 [ATT2:ATT122]). Delay in the start of SGMA implementation from year 2020 to year 2025 reduces the expected present value of lost economic output by about $300 million (2015$). Faster SGMA implementation increases the expected present value of lost economic output by about $300 million (2015$). SED implementation will fundamentally transform the investment environment for agriculture and related industries. Lost water supplies reduce locally produced inputs for livestock and dairy operations. The volatility in locally produced inputs will more than triple the risk of shortfalls in available local inputs (see Table 11-3 [ATT2:ATT123]). [Footnote 42: Local capacity estimated by the maximum amount of locally produced inputs (measured by acreage in alfalfa and irrigated pasture for livestock and silage for dairy). Capacity utilization measured by ratio of crop acreage for each water year hydrologic condition to local capacity. Shortfall risk equals percentage of years crop acreage is less than local maximum. Unused capacity measured by 100% less capacity utilization.] For hay and pasture, expected unused capacity increases from 4% under baseline conditions to 23% under SED implementation before SGMA and 29% after SGMA implementation. For grain, expected unused capacity increases from 1% under baseline conditions to 7% under SED implementation before SGMA and 11% after SGMA implementation. The average unused capacity for hay and pasture inputs when shortfalls happen increase from 4% under baseline conditions to 23% under SED implementation before SGMA and 29% under SED implementation after SGMA. The average unused capacity for grain inputs when shortfalls happen increase from 3% under baseline conditions to 11% under SED implementation before SGMA and 17% under SED implementation after SGMA. Peak unused capacity almost doubles for hay and pasture inputs and increases four-fold for grain inputs. This increased risk in unused capacity reduces the economic incentive for investment. The impact on the local economy from the reduced investment is not considered in this study. Therefore, this study understates the economic consequences of SED implementation for the local economies.	
1176	229	[ATT2:ATT120: Figure 11-1. Graph showing present value of lost economic output from SED by 2017 water year condition.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	230	[ATT2:ATT121: Table 11-1. Composition of lost economic output from SED implementation.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	231	[ATT2:ATT122: Table 11-2. Expected present value of lost economic output from SED and SGMA timing (billion 2015$).]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	232	[ATT2:ATT123: Table 11-3. Risk of shortfalls in locally produced inputs for livestock and dairy.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	233	[ATT2:ATT124: Attachment 1. "Westlands Water District: A Case Study of the Impact of Reduced Surface Water Supplies on Agriculture and Groundwater."]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	234	[ATT2:ATT125: Attachment 2. "Background Data on Baseline Conditions of Study Area."]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	235	[ATT2:ATT126: Attachment 3. "Estimated SED 40 Impacts on Groundwater Pumping and Crop Gross Revenues."]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	236	[From ATT2:ATT126:] SSJID Figure A3.1 [ATT2:ATT126:ATT1] summarizes the estimated water supply impacts within the SSJID during the Study Period [1922-2003] were the SED in place at the SED 40. The figure shows that in many years during the Study Period, there would have been no anticipated impact on the availability of water for the district and, accordingly, the district's overall water supplies because of the SED 40; i.e., the combined total surface and groundwater supplies under the SED 40 would have been equal to those combined totals in the absence of the SED 40. Generally, this is the case in years that are designated by SWRCB to be wet years, above normal precipitation years and even below normal precipitation years depending on prior year precipitation conditions. Concurrently, the figure shows several years during the study Period where SSJID's water supplies with the SED 40 in place would have been lower than the district's baseline water supplies in the absence of the SED. These are years generally designated by SWRCB as dry or critically dry. In these years, it is estimated that SED reductions in the district's surface water supplies would not have been fully offset by additional groundwater pumping. In 1977, for example, designated a critically dry year by the SWRCB that followed another critically dry year, it is estimated that the applied water in the district would have been about 97,000 acre-feet with the SED in place, down almost 40% from the baseline 159,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in crop production that year by the district.	Please see the response to comments 1176-18 and 1176-55.
1176	237	[ATT2:ATT126:ATT1: Figure A3.1. Graph showing SSJID total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	238	[From ATT2:ATT126:] In each of the years shown in Figure A3.1 [ATT2:ATT126:ATT1] that the SSJID's water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop sales revenues (gross revenues). Figure A3.2 [ATT2:ATT126:ATT2] illustrates the years when the crop gross revenues generated by the district during the Study Period [1922-2003] would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. The figure shows that the magnitude of lost revenues in years that would have experienced below baseline water supplies due to the SED are less than for water supply shown in Figure A3.2. This is because the analysis of the fallowing of crops due to SED water supply reductions reflects the fact that in the face of water supply reductions farmers tend to fallow relatively lower-valued, higher water consuming annual crops such as pasture in much greater proportion than higher valued crops such as almonds.	Please see response to comment 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
1176	239	[ATT2:ATT126:ATT2: Figure A3.2. Graph showing SSJID estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	240	[From ATT2:ATT126:] Figure A3.3 [ATT2:ATT126:ATT3] revisits the crop gross revenue analysis presented in Figure A3.2 [ATT2:ATT126:ATT2] with the imposition of the SGMA and associated assumption that in years that [SSJID's] surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply reductions with groundwater. The result is much more significant impacts on crop gross revenues due to the SED surface water supply reductions as can be observed by a comparison of the larger differences between the two lines in Figure A3.3 where the lines diverge as compared to in Figure A3.2.	Please see response to comments 1176-18 and 1176-55.
1176	241	[ATT2:ATT126:ATT3: Figure A3.3. Graph showing SSJID estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	242	[From ATT2:ATT126:] OID Figure A3.4 [ATT2:ATT126:ATT4] summarizes the estimated water supply impacts within the OID during the Study Period [1922-2003] were the SED in place at the SED 40. The figure shows that in many years during the Study Period, there would have been no anticipated impact on the availability of water for the district and, accordingly, the district's overall water supplies because of the SED 40; i.e., the combined total surface and groundwater supplies under the SED 40 would have been equal to those combined totals in the absence of the SED 40. Concurrently, the figure shows several years during the study Period where OID's water supplies with the SED 40 in place would have been lower than the district's baseline water supplies in the absence of the SED. In these years, it is estimated that SED reductions in the district's surface water supplies would not have been fully offset by additional groundwater pumping. In 1977, for example, designated a critically dry year by the SWRCB that followed another critically dry year, it is estimated that the applied water in the district would have been about 88,000 acre-feet with the SED in place, down about 47% from the baseline 167,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in crop production that year by the district. In each of the years shown in Figure A3.4 that OID's water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop sales revenues (gross revenues). Figure A3.5 [ATT2:ATT126:ATT5] illustrates the years when the crop gross revenues generated by the district during the Study Period would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. Figure A3.6 [ATT2:ATT126:ATT6] revisits the crop gross revenue analysis presented in Figure A3.5 with the imposition of the SGMA and associated assumption that in years that the district's surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply reductions with groundwater. The result shows some additional impacts on crop gross revenues due to the SED surface water supply reductions as can be observed by a comparison of the differences	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		between the two lines in Figure A3.6 where the lines diverge as compared to in Figure A3.5. The magnitude of the additional impacts appears less significant compared to the SSJID case because of OID's lower reliance on groundwater in general as compared to SSJID.	
1176	243	[ATT2:ATT126:ATT4: Figure A3.4. Graph showing OID total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	244	[ATT2:ATT126:ATT5: Figure A3.5. Graph showing OID estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	245	[ATT2:ATT126:ATT6: Figure A3.6. Graph showing OID estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	246	[From ATT2:ATT126:] SEWD/CSJWCD Figure A3.7 [ATT2:ATT126:ATT7] summarizes the estimated water supply impacts within SEWD and CSJWCD combined during the Study Period [1922-2003] were the SED in place at the SED 40. The figure shows that in many years during the Study Period there would have been no impacts on the availability of surface water for the districts and, accordingly, the districts' overall water supplies because of the SED 40. Concurrently, the figure shows a near equal number of years during the study Period where OID's water supplies with the SED 40 in place would have been lower or, in fact, higher than the district's baseline water supplies in the absence of the SED. In the years with lower supplies, it is estimated that SED reductions in the district's surface water supplies would not have been fully offset by additional groundwater pumping. In 1987, for example, designated a critically dry year by the SWRCB that actually followed a wet year, it is estimated that the applied water in the district would have been about 61,000 acre-feet with the SED in place, down about 50% from the baseline 121,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in crop production that year by the district. In each of the years shown in Figure A3.7 that SEWD/CSJWCD water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop sales revenues (gross revenues). Figure A3.8 [ATT2:ATT126:ATT8] illustrates the years when the crop gross revenues generated by the districts during the Study Period would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. The figure shows some instances of fairly substantial decreases in the districts' crop gross revenues in four years during the Study Period in excess of 30%. Figure A3.9 [ATT2:ATT126:ATT9] revisits the crop gross revenue analysis presented in Figure A3.8 with the imposition of the SGMA and associated assumption that in years that the district's surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply reductions with groundwater. The result show significant additional impacts on crop gross revenues due to the SED	Please see response to comment 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		surface water supply reductions as can be observed by a comparison of the differences between the two lines in Figure A3.9 where the lines diverge as compared to in Figure A3.8. In fact, Figure A3.9 shows for three years during the Study Period that in theory the districts' crop gross revenues will be driven to zero due to a complete lack of local water supply.	
1176	247	[ATT2:ATT126:ATT7: Figure A3.7. Graph showing SEWD and CSJWCD total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	248	[ATT2:ATT126:ATT8: Figure A3.8. Graph showing SEWD/CSJWCD estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	249	[ATT2:ATT126:ATT9: Figure A3.9. Graph showing SEWD/CJSWCD estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	250	[From ATT2:ATT126:] Modesto ID Figure A3.10 [ATT2:ATT126:ATT10] summarizes the estimated water supply impacts within the Modesto ID during the Study Period [1922-2003] were the SED in place at the SED 40. The figure shows that the baseline water supply during the Study Period is highly variable due to the lack of district groundwater pumping infrastructure and, thus, limited ability to respond to normal inter-year surface water supply changes with offsetting groundwater pumping. The figure further shows many years during the Study Period that the SED would have caused substantial reductions in the district's water supplies below the baseline. In 1977, for example, designated a critically dry year by the SWRCB that followed another critically dry year, it is estimated that the applied water in the district would have been about 88,000 acre-feet with the SED in place, down almost 40% from the baseline 141,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in crop production that year by the district. In each of the years shown in Figure A3.10 that the Modesto ID's water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop sales revenues (gross revenues). Figure A3.11 [ATT2:ATT126:ATT11] illustrates the years when the crop gross revenues generated by the district during the Study Period would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. The figure shows that the magnitude of lost revenues in years that would have experienced below baseline water supplies due to the SED are less than for water supply shown in Figure A3.10. This is because the analysis of the fallowing of crops due to SED water supply reductions reflects the fact that in the face of water supply reductions farmers tend to fallow relatively lower-valued, higher water consuming annual crops such as pasture in much greater proportion than higher valued crops such as almonds. Figure A3.12 [ATT2:ATT126:ATT12] revisits the crop gross revenue analysis presented in Figure A3.11 with the imposition of the SGMA and associated assumption that in years that the district's surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply	Please see response to Comment 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		reductions with groundwater. The result is much more significant impacts on crop gross revenues due to the SED surface water supply reductions as can be observed by a comparison of the larger differences between the two lines in Figure A3.12 where the lines diverge as compared to in Figure A3.11.	
1176	251	[ATT2:ATT126:ATT10: Figure A3.10. Graph showing Modesto ID total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	252	[ATT2:ATT126:ATT11: Figure A3.11. Graph showing Modesto ID estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	253	[ATT2:ATT126:ATT12: Figure A3.12. Graph showing Modesto ID estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	254	[From ATT2:ATT126:] TID Figure A3.13 [ATT2:ATT126:ATT13] summarizes the estimated water supply impacts within TID during the Study Period [1922-2003] were the SED 40 in place. The figure shows that the district's baseline water supply during the Study Period is highly variable due to the lack of district groundwater pumping infrastructure and, thus, limited ability to respond to normal inter-year surface water supply changes with offsetting groundwater pumping. The figure further shows many years during the Study Period that the SED would have caused substantial reductions in the district's water supplies below the baseline. In 1977, for example, designated a critically dry year by the SWRCB that followed another critically dry year, it is estimated that the applied water in the district would have been about 259,000 acre-feet with the SED in place, down almost 1/3rd, 33%, from the baseline 385,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in the district's crop production and associated crop gross revenues. In each of the years shown in Figure A3.13 that the Modesto ID's water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop gross revenues. Figure A3.14 [ATT2:ATT126:ATT14] illustrates the years when the crop gross revenues generated by the district during the Study Period would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. The figure shows that the magnitude of lost revenues in years that would have experienced below baseline water supplies due to the SED are less than for water supply shown in Figure A3.10. This is because the analysis of the fallowing of crops due to SED water supply reductions reflects the fact that in the face of water supply reductions farmers tend to fallow relatively lower-valued, higher water consuming annual crops such as pasture in much greater proportion than higher valued crops such as almonds. Figure A3.15 [ATT2:ATT126:ATT15] revisits the crop gross revenue analysis presented in Figure A3.14 with the imposition of the SGMA and associated assumption that in years that the district's surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		reductions with groundwater. The result is greater impacts on crop gross revenues due to the SED surface water supply reductions as can be observed by a comparison of the larger differences between the two lines in Figure A3.15 where the lines diverge as compared to in Figure A3.14. However, the impact of SGMA on the crop revenue results is not as significant as for some of the other districts as TID is relatively less reliant on groundwater to manage is surface water supply variability.	
1176	255	[ATT2:ATT126:ATT13: Figure A3.13. Graph showing TID total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	256	[ATT2:ATT126:ATT14: Figure A3.14. Graph showing TID estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	257	[ATT2:ATT126:ATT15: Figure A3.15. Graph showing TID estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	258	[From ATT2:ATT126:] Merced ID Figure A3.16 [ATT2:ATT126:ATT16] summarizes the estimated water supply impacts within Merced ID during the Study Period [1922-2003] were the SED 40 in place. The figure shows that the district's baseline water supply during the Study Period is highly variable. The figure further shows many years during the Study Period that the SED would have caused substantial reductions in the district's water supplies below the baseline. In 1947, for example, designated a critically dry year by the SWRCB that followed another critically dry year, it is estimated that the applied water in the district would have been about 282,000 acre-feet with the SED in place, down almost 28% from the baseline 389,000 acre-feet that would have been available to the district in the absence of the SED that year. The difference would have resulted in a reduction in the district's crop production and associated crop gross revenues. In each of the years shown in Figure A3.16 that the Merced ID's water supplies would have been reduced below baseline due to the SED there would have been expected reductions in cropping and associated crop gross revenues. Figure A3.17 [ATT2:ATT126:ATT17] illustrates the years when the crop gross revenues generated by the district during the Study Period would have been lower than baseline were the SED in place. The revenue figures are in common 2008 dollar terms consistent with the SWRCB's SED assessment. The difference between the two lines, where they diverge, represents the estimated lost revenues associated with the SED in that year. The figure shows that the magnitude of lost revenues in years that would have experienced below baseline water supplies due to the SED are less than for water supply shown in Figure A3.16. This is because the analysis of the fallowing of crops due to SED water supply reductions reflects the fact that in the face of water supply reductions farmers tend to fallow relatively lower-valued, higher water consuming annual crops such as pasture in much greater proportion than higher valued crops such as almonds. Figure A3.18 [ATT2:ATT126:ATT18] revisits the crop gross revenue analysis presented in Figure A3.17 with the imposition of the SGMA and associated assumption that in years that the district's surface water supplies would have been reduced below baseline due to the SED 40 the district would not have been able to offset any of those surface supply	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		reductions with groundwater. The result is substantially greater impacts on crop gross revenues due to the SED surface water supply reductions as can be observed by a comparison of the larger differences between the two lines in Figure A3.18 where the lines diverge as compared to in Figure A3.17. The much greater impact reveals the substantial reliance of the Merced ID on groundwater to offset surface water supply variability.	
1176	259	[ATT2:ATT126:ATT16: Figure A3.16. Graph showing Merced ID total applied water, baseline versus 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	260	[ATT2:ATT126:ATT17: Figure A3.17. Graph showing Merced ID estimated total crop revenues with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	261	[ATT2:ATT126:ATT18: Figure A3.18. Graph showing Merced ID estimated total crop revenues under SGMA implementation with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	262	[From ATT2:ATT126:] SSJID Figure A3.19 [ATT2:ATT126:ATT19] characterizes the estimated low, medium and high potential impacts on groundwater depths within the SSJID during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater and accordingly, groundwater lifts as a result of SED 40 implementation for a number of the years during the Study Period. This includes in several of the Study Period years a near doubling of the average depths to groundwater based on the high estimate for increased lifts. Figure A3.20 [ATT2:ATT126:ATT20] shows the estimated pumping cost incurred by the district and its farmers during the Study Period as a result of the anticipated increases in well depths shown in Figure A3.19. The figure shows increased costs of pumping in SSJID as much as $9.0 million in some years based on the high estimate for those years of increased pumping lifts due to increased pumping resulting from the SED 40.	Please see response to comments 1176-18 and 1176-55.
1176	263	[ATT2:ATT126:ATT19: Figure A3.19. Graph showing SSJID average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	264	[ATT2:ATT126:ATT20: Figure A3.20. Graph showing SSJID cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	265	[From ATT2:ATT126:] OID Figure A3.21 [ATT2:ATT126:ATT21] characterizes the estimated low, medium and high potential impacts on groundwater depths within the OID during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater and accordingly, groundwater lifts as a result of SED 40 implementation for a number of the years during the Study Period. This includes in several of the Study Period years a more than doubling of the average depths to groundwater based on the high estimate for increased	Please see response to comments 1176-18 and 1176-55.

Table 4-1. Responses to Comments			
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		lifts. Figure A3.22 [ATT2:ATT126:ATT22] shows the estimated pumping cost incurred by the district and its farmers during the Study Period as a result of the anticipated increases in well depths shown in Figure A3.21. The figure shows increased costs of pumping in OID as much as $9.0 million in some years based on the high estimate for those years of increased pumping lifts due to increased pumping resulting from the SED 40.	
1176	266	[ATT2:ATT126:ATT21: Figure A3.21. Graph showing OID average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	267	[ATT2:ATT126:ATT22: Figure A3.22. Graph showing OID cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	268	[From ATT2:ATT126:] SEWD Figure A3.23 [ATT2:ATT126:ATT23] characterizes the estimated low, medium and high potential impacts on groundwater depths within the SEWD during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater and accordingly, groundwater lifts as a result of SED 40 implementation for a number of the years during the Study Period. This includes a number of the Study Period years a more than doubling of the average depths to groundwater based on the high estimate for increased lifts. Concurrently, as SEWD's surface water supplies would be expected to increase over baseline in some years under the SED 40, the expected impact will actually be a reduction of district average groundwater depths certain of those years. Figure A3.24 [ATT2:ATT126:ATT24] shows the estimated additional and reduced pumping costs incurred by the district and its farmers during the Study Period as a result of the anticipated increases and decreases, respectively in well depths shown in Figure A3.23. The figure shows increased costs of pumping in SEWD by as much as almost 3.0 million in some years based on the high estimate for those years of increased pumping lifts due to increased pumping resulting from the SED 40. The figure also shows, conversely, estimated decreases in pumping costs by nearly $3.0 million with anticipated SED-related well depth declines in some years.	Please see response to comments 1176-18 and 1176-55.
1176	269	[ATT2:ATT126:ATT23: Figure A3.23. Graph showing SEWD average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	270	[ATT2:ATT126:ATT24: Figure A3.24. Graph showing SEWD cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	271	[From ATT2:ATT126:] CSJWCD Figure A3.25 [ATT2:ATT126:ATT25] characterizes the estimated low, medium and high potential impacts on groundwater depths within the CSJWCD during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented.	Please see response to comments 1176-18 and 1176-55.

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		The figure shows potentially significant increases in the district's average depth to groundwater and accordingly, groundwater lifts as a result of SED 40 implementation for a number of the years during the Study Period. This includes in several of the Study Period years a more than doubling of the average depths to groundwater based on the high estimate for increased lifts. Concurrently, as CSJWCD's surface water supplies would be expected to increase over baseline in some years under the SED 40 as with the SEWD, the expected impact will actually be a reduction of district average groundwater depths in those years. The frequency and magnitude of years with reduced groundwater depths is lower for CSJWCD than for SEWD (see Figure A3.23 [ATT2:ATT126:ATT23]). Figure A3.25 #2 [ATT2:ATT126:ATT25.2] shows the estimated additional pumping cost incurred by the district and its farmers during the Study Period because of the anticipated increases in well depths shown in Figure A3.25. The figure shows increased costs of pumping in CSJWCD by over $3.0 million in some years based on the high estimate for those years of increased pumping lifts due to increased pumping resulting from the SED 40. The figure also shows, conversely, estimated decreases in pumping costs by $2.0 million in two of the Study Period years when there would have been anticipated SED-related well depth declines.	
1176	272	[ATT2:ATT126:ATT25: Figure A3.25. Graph showing CSJWCD average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	273	[ATT2:ATT126:ATT25: Figure A3.25 #2. CSJWD cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	274	[From ATT2:ATT126:] Modesto ID Figure A3.26 [ATT2:ATT126:ATT26] characterizes the estimated low, medium and high potential impacts on groundwater depths within the Modesto ID during the Study Period [1922-2003] as a result of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater the majority of the Study Period years and, accordingly, groundwater lifts, as a result of SED 40 implementation. This includes in several of the Study Period years well more than a doubling of the average depths to groundwater based on the high estimate for increased lifts. Figure A3.27 [ATT2:ATT126:ATT27] shows the estimated additional pumping cost that would have been incurred by the district and its farmers during the Study Period as a result of the estimated increases in well depths shown in Figure A3.26. The figure shows increased costs of pumping in Modesto ID by as much as $5.0 million based on the high estimate for those years of increased pumping lifts due to increased pumping resulting from the SED 40.	Please see response to comments 1176-18 and 1176-55.
1176	275	[ATT2:ATT126:ATT26: Figure A3.26. Graph showing Modesto ID average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	276	[ATT2:ATT126:ATT27: Figure A3.27. Graph showing Modesto ID cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	277	[From ATT2:ATT126:] TID	Please see response to comments 1176-18 and 1176-55.

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		Figure A3.28 [ATT2:ATT126:ATT28] characterizes the estimated low, medium and high potential impacts on groundwater depths within the TID during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater the majority of the Study Period years and, accordingly, groundwater lifts, as a result of SED 40 implementation. This includes a number of the Study Period years well more than a doubling of the average depths to groundwater based on the high estimate for increased lifts. Figure A3.29 [ATT2:ATT126:ATT29] shows the estimated additional pumping cost that would have been incurred by the district and its farmers during the Study Period because of the estimated increases in well depths shown in Figure A3.28. The figure shows increased costs of pumping in TID by as much as $20.0 million in one year and above $15.0 million in several years during the Study Period based on the high estimate for the increased pumping lifts due to increased pumping resulting from the SED 40.	
1176	278	[ATT2:ATT126:ATT28: Figure A3.28. Graph showing TID average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	279	[ATT2:ATT126:ATT29: Figure A3.29. Graph showing TID cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	280	[From ATT2:ATT126:] Merced ID Figure A3.30 [ATT2:ATT126:ATT30] characterizes the estimated low, medium and high potential impacts on groundwater depths within the Merced ID during the Study Period [1922-2003] because of the district's SED-related increases in groundwater pumping to offset reduced surface water supplies assuming the SED 40 was implemented. The figure shows potentially significant increases in the district's average depth to groundwater the majority of the Study Period years and, accordingly, groundwater lifts, as a result of SED 40 implementation. This includes one of the Study Period years with a threefold estimated increase in well depths based on the high estimate for increased average groundwater depths and many of the Study Period years with at least a doubling of the average depths to groundwater based on the high and middle estimates for increased lifts. Figure A3.31 [ATT2:ATT126:ATT31] shows the estimated additional pumping cost that would have been incurred by the district and its farmers during the Study Period as a result of the estimated increases in well depths shown in Figure A3.30. The figure shows increased costs of pumping in Merced ID by as much as $40.0 million in one year and in the $30 to $0 million in a number of additional years during the Study Period based on the high estimate for the increased pumping lifts due to increased pumping resulting from the SED 40.	Please see response to comments 1176-18 and 1176-55.
1176	281	[ATT2:ATT126:ATT30: Figure A3.30. Graph showing MercedID average well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	282	[ATT2:ATT126:ATT31: Figure A3.31. Graph showing Merced ID cost due to increased well depths with 40% unimpaired flows.]	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	283	[ATT3: Map of San Joaquin County 2015 crop types.]	The commenter is providing this attachment for reference purposes in support of their comments. Those

Table 4-1. Responses to Comments			
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			comments are addressed in these responses to comments; therefore, no additional response is required.
1176	284	[ATT4: Comments on Phase 1 Economic Impacts Estimated in the SED by Dr. Jeffrey Michael. February 13, 2017.]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	285	[From ATT4:] Economic Impact of 40% Unimpaired Flow on the Merced, Tuolumne, and Stanislaus Rivers The SED estimates the impact of the increasing the amount of unimpaired flow on agriculture in Merced, Stanislaus and San Joaquin Counties in Appendix G. The techniques used in Appendix G are only appropriate for a short-run water shortage, and this ignores and underestimates many important impacts that would be incorporated into a long-run analysis. While the SED reports impacts as annual averages from a one-year model, a closer look at the modeling results show that implementing the SED would cause the loss of most local production of critical forage crops in 1 out of 3 years, in addition to some elimination of water from permanent crops that would cause a loss of investment that far exceeds the loss of crop revenue included in the SED. A closer analysis of the impacts of reduced reliability suggests that the SED would result in a permanently reduced amount of high-revenue permanent crops and/or a reduction in cattle and dairy herd sizes because of frequent shortages of local pasture and forage. Over time, agricultural impacts in the three counties are likely to many times higher than the SED estimates.	The SED economic impact analysis appropriately considered economic effects related to agricultural production. Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding the scope of the agricultural economic analysis, the SWAP model, permanent crops and fallowing of permanent crops in SWAP, and long term economic effects of changes in water supply availability. Please see Master Response 2.3, Presentation of Data and Results in SED and Responses to Comments, regarding the use of average values in the SED.
1176	286	[From ATT4:] SED Is Only A Short-Run, One Year Analysis. It Ignores The Impacts of Reduced Reliability and Many Large Long-Run Impacts. The economic analysis in the SED uses a short-run model. As such, it treats the flows proposal as if it is a regulation that will only be imposed for one year, and then removed. It does not account for costs that will grow over time, especially as groundwater substitution becomes more costly or is prohibited by law. The estimates are based on the SWAP model, which has been most notably used to characterize drought effects in a single year. It appears that the SED approach to modeling is the same as has been done in these single-year drought impact studies. This approach does not account for the way that impacts grow over time, and it also ignores the eventual implementation of the Sustainable Groundwater Management Act ("SGMA") which will eliminate the ability to substitute groundwater as assumed in the analysis. Thus, the SED agricultural analysis grossly underestimates the impacts of the proposed regulation.	Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for discussion of SGMA implementation. Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding the scope of the agricultural economic analysis and for discussion of the SWAP model.
1176	287	[From ATT4:] The SED analysis does not value the decreased reliability of water supplies and how the increased variability could affect the long-run viability of agricultural sectors where production in subsequent years requires keeping maintaining crops and animal herds during years of severe water shortage. In addition to permanent crops such as nuts, the SED will create severe hardships for cattle and dairy products that depend on "low value" pasture and annual forage crops that would be virtually eliminated in many years according to the SED's modeling.	Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding the scope of the agricultural economic analysis and water supply reliability. Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of regional economic effects, including impacts to the dairy and livestock industries.
1176	288	[From ATT4:] The SED modeling estimates that critical forage crops such as irrigated pasture and silage would be almost completely eliminated in about 1 out of every 3 years.	Please see Chapter 11, Agricultural Resources, Section 11.4.2, Methods and Approach, for information about impacts on alfalfa and grain. Effects on silage are also described in this section and dairy and cattle are evaluated in Impact AG-2. Please see Master Response 3.5, Agricultural Resources, and Master Response

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		Unlike alfalfa and grain, it is very difficult to substitute imported crops for these. Cattle herds are not an annual crop like corn or vegetables, and it is hard to see how the current cattle and dairy industries could remain viable without local sources of pasture and silage in 1 out of 3 years. Consider one example from the file Agricultural Economic Analysis 09142016.xls (land tab) that included the detailed results from the SED's modeling. For the Modesto Irrigation District, the acreage of irrigated pasture decreased by more than 95% (to nearly zero) in 27 out of 82 years for the 40% unimpaired flow with groundwater replacement. The SED does not include modeling for post-SGMA years without groundwater replacement, but the 50% unimpaired flow scenario in the results file creates similar water shortages as shutting off groundwater substitution. In the 50% unimpaired flow scenario, irrigated pasture is virtually eliminated in 35 out of 82 years. Other field crops (primarily silage) have an over 95% decline in acreage in 22 out of 82 years in the 40% unimpaired flow scenario.	8.2, Regional Agricultural Economic Effects, for information about dairy and cattle industry, cattle and dairy feed, and local and regional agricultural economics. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for information about the appropriate incorporation of SGMA into the SED.
1176	289	[From ATT4:] The SED contains no analysis of impacts on the cattle and dairy sectors of virtually eliminating pasture in 1 out of 3 years. The SED only includes a qualitative discussion of downstream impacts on livestock and dairy, even though the vast majority of lost crops are critical to livestock industries such as pasture and alfalfa. The three counties impacted by the SED have over 500 dairy farms, nearly 1.2 million cattle, over 20% of the cattle in the state of California. In 2015, the 3 counties produced over $850 million in cattle, and over $1.9 billion in milk. Even a 10% decrease in dairy and cattle production due to the SED modeling prediction of frequent years of near elimination of irrigated pasture and silage would be an over $279 million loss. This will be the most significant impact for Stanislaus and Merced Counties where the dairy industry is large.	Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Also, please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the economic effects on dairies.
1176	290	[From ATT4:] It is likely that far less pasture would be fallowed than the SED assumes, substantially increasing losses if fallowing shifts to higher value crops. Even if most of the water shortage induced fallowing that shifted away from pasture went to corn instead of higher value permanent crops, the increase in costs would be substantial. According to the SED modeling, corn has water demand of about 3 feet per acre, compared to 5 feet per acre for irrigated pasture. That means each acre of pasture not fallowed, would equate to 5/3 acre of corn fallowed. In the SED, the value of corn per acre is double the value of irrigated pasture--thus shifting water from pasture fallowing to corn fallowing would increase agricultural losses associated with a unit of water by a factor of 3.33. Examining crop fallowing patterns in the San Joaquin Valley during recent drought years shows there was almost no reduction in irrigated pasture, but large reductions in corn and other silage crops.	Please see Chapter 11, Agricultural Resources, Section 11.5, Impacts and Mitigation Measures, for information about SWAP modeling output and its use in the impact analysis in Chapter 11. Please see Master Response 3.5, Agricultural Resources, and Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, for information regarding SWAP and changes in cropping patterns. Please see Master Response 8.2, Regional Agricultural Economic Effects, regarding silage, dairy feed and the potential economic effects on dairies.
1176	291	[From ATT4:] Reduced reliability will result in a smaller share of the area's farmland being used for high-revenue permanent crops, substantially increasing long-run economic loss over the SED's estimates. This issue is the greatest for South San Joaquin Irrigation District ("SSJID"). SSJID has 70% of its land planted in permanent crops, the highest of any of the districts. As SGMA is implemented, SSJID will see their capacity to support permanent crops significantly reduced and will probably have to shift up to 25% of their irrigated land from high-revenue	Please see response to comment 1176-326.

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		permanent crops to lower revenue annual crops which can be fallowed.	
1176	292	[From ATT4:] Groundwater Pumping Costs The SED does calculate increased groundwater pumping costs for a single year, but it does not consider how those costs will increase each year due to increased groundwater depletion to continue offsetting the flow reductions as the SED predicts. In addition, it fails to calculate how the increased pumping will decrease groundwater levels and raise pumping costs in areas outside the irrigation districts that share a groundwater basin. As discussed in the Stratecon report [ATT2], these costs can be very substantial.	Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, regarding the scope of the economic analysis and groundwater pumping costs.
1176	293	[From ATT4:] Permanent Crop Impacts While the vast majority of crop loss is to annual crops, the SED does estimate some acreage loss in permanent crops such as almonds on average and noticeable losses in dry years. The SED does not consider how the loss of a permanent crop in one year will have continuing impacts in subsequent years.	Please see Master Response 3.5, Agricultural Resources, for information about permanent crops and Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding SWAP model capabilities and successive dry years.
1176	294	[From ATT4:] Ignores Implementation of the Sustainable Groundwater Management Act (SGMA) In the short term, it is reasonable to expect groundwater substitution to reduce direct crop loss as is done in the SED. This will no longer be a viable strategy once SGMA is implemented over the next two decades. The SED should have modeled the impact without groundwater substitution as they did in the original 2012 draft. In 2012, they estimated over 60,000 fallowed acres without groundwater substitution and we can expect a similar result with SGMA. With fallowed acres more than doubled, more of the crop loss will cut into higher value crops over time. The SED should have modeled a post-SGMA scenario, and calculated cumulative loss over a transition period as was done in the Stratecon report [ATT2]. In the absence of post-SGMA modeling scenario, the SED appendix does include modeling results for a 50% unimpaired flow regime with groundwater substitution. The 50% unimpaired modeling results is probably a good approximation for losses after full SGMA implementation.	Please see response to Comment 1176-15 regarding the groundwater impact. Please see response to Comment 1176-18 regarding SED consideration of SGMA and related information.
1176	295	[From ATT4:] Using 2008 Dollars Obscures the Scale of the Impacts 2008 was nearly a decade ago and crop prices were much lower then. The SED should utilize data from a more recent year and present impacts in current dollars to give a more accurate and current picture of the scale of impacts.	Please see Master Response, 8.0, Economic Analyses Framework and Assessment Tools, for a discussion of the dollar values used in the SED and information regarding the consumer price index values.
1176	296	[From ATT4:] San Joaquin County Impacts Are Severely Underestimated By The SED 40% Unimpaired Flow Proposal. Impacted areas of San Joaquin County have over 60% of their irrigated acreage planted in permanent crops according to the SED, a much higher share than other affected areas. Thus, the single-year analysis using the SWAP model is particularly problematic in San Joaquin County. SSJID, Stockton East Water District ("SEWD"), and Central San Joaquin Water Conservation District ("CSJWCD") are entirely within San Joaquin County. A portion of Oakdale Irrigation District is also in San Joaquin County.	Please see Master Response 3.5, Agricultural Resources, and Chapter 11, Agricultural Resources, Tables 11-6 and 11-9 for information on the crop mix in the plan area. Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, for information regarding the use of SWAP as an appropriate economic model in the SED.

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1176	297	[From ATT4:] Due to the high share of permanent crops, over time, the reduced water supply reliability from the 40% unimpaired flow order will reduce SSJID crop revenue by an estimated $82 million per year in 2015 dollars. According to the SEDs estimates of 2010 water demand, 70% of applied water demand in SSJID is in permanent crops including extensive almond orchards on about half of the districts irrigated acreage, but also including substantial plantings of cherries, and wine grapes. SSJID is also home to numerous dairies. Thus, it also is reasonable to include the roughly 5% of its acreage in irrigated pasture as virtually permanent since it is vital to replacement heifers and the continuing existence of local dairy herds. While much of the field crops that provide feed to the local dairy and cattle industry could be fallowed in dry years and replaced with imported feed, this 5% acreage can reasonably represent the minimum level of local forage required every year without cutting back the cattle herd. Thus, about 75% of SSJID's current crop production could be considered permanent and unable to be fallowed for a single year without a significant loss in capital investment. In other words, only 25% of SSJID's 2010 agricultural water demand could be interrupted for a year without damaging permanent crops or animal production. According to the SED's modeling, SSJID will experience a significant loss in reliability which can be illustrated by the frequency of years that SSJID would lose 25% or more of its irrigation water supplies, the level that can be fallowed on an annual basis under SSJID's 2010 crop distribution. Under baseline conditions, the SED estimates a loss of 25% or more of its irrigation water supplies would occur in only 2 out of 84 years. That means that under baseline conditions, SSJID would experience water supply impacts on permanent crops every 42 years, longer than the typical 25-30 year productive life of an almond orchard. However, even with groundwater replacement, the SED finds that under 40% unimpaired flow; SSJID would lose 25% or more of its irrigation water supply in 13 out of 82 years, or once every 6.3 years on average. This is far too little reliability for SSJID to sustain its current crop composition. The SED analysis provides no estimates without groundwater replacement, but stepping up to 50% unimpaired flow with groundwater replacement provides some insight to what water shortages could be like under SGMA. In this case, water supply to SSJID is reduced by over 25% in 26 out of 82 years, nearly one in 3 years. Clearly, SSJID will not be able to sustain 75% of its acreage in permanent crops under 40% unimpaired flow. If one uses a standard of 1 interruption in 25 years as a minimum standard of reliability for permanent crops, the modeling in the SED shows that SSJID would have to shift from 75% permanent crops to 50% permanent crops under the 40% unimpaired flow proposal. That means that roughly 47,000 acre feet of annual applied water demand would have to be redistributed from permanent crops to annual field crops. At the water demand used for SED for almonds, that equates to 13,342 acres moving from almonds (the most common permanent crop) which earned $6,638 per acre in 2015 to corn (the most common annual crop) which earned $731 per acre in 2015. That represents a loss of $78.8 million in annual revenue to SSJID farms in 2015 dollars. In addition, there would be an annual average of $3.2 million in annual crop losses, for a total annual loss of $82 million in crop revenue in SSJID in 2015 dollars. This is over ten times the $6 million annual loss (2008 dollars) estimated in the SED because it does not properly account for the impacts on permanent crops or allow any minimal allowance for	Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, regarding the long term economic effects of changes in water supply availability and reoptimization of cropping patterns. In addition, the conclusion that there will not be enough water to maintain permanent crops does not take into account standard agricultural water management practices such as deficit irrigation, which can be used to keep permanent crops in production with less applied water, albeit with lower yields. For the analysis of agricultural impacts in the SED using the Statewide Agricultural Production (SWAP) model, deficit irrigation is applied and the results show very little fallowing of permanent crops, even at water shortages greater than 25% of the overall applied water demand. The fallowing of permanent crops that does occur represents the observed practice of tree growers who in dry conditions may remove older trees a year or two before they were scheduled to be removed in order to plant new trees that need less water. Please see Master Response 8.1, Local Agricultural Economics Effects and the SWAP Model, for discussion of the SWAP model and assumptions about stress irrigation and permanent crops. Furthermore, please see Master Response 3.5, Agricultural Resources, for discussion of agricultural water management. Please see Master Response 3.5, Agricultural Resources, for discussion of the potential effects on dairies and livestock operations. Please see Master Response 8.2, Regional Agricultural Economic Effects, for discussion of the potential economic effects on dairies and food processors.

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		irrigated pasture or other forage crops to maintain animal production.	
1176	298	[From ATT4:] The SED Incorrectly Assumes No Loss to Stockton East and CSJWCD Because It Incorrectly Assumes Full Replacement With Groundwater. Obviously, the SED's assumption of full replacement by groundwater is invalid after the implementation of SGMA in the overdrafted groundwater basin. But even in the pre-SGMA years, this analysis understates the value of the loss to farmers. Farmers in these districts are currently paying over $50 per acre foot for these water supplies, so clearly the water has value to them in excess of this payment. The SED estimates an annual average loss of surface water supplies of 10,000 acre feet for these two irrigation districts. At the margin, agricultural water in California is valued by economists at $150 per acre foot, so that would represent a minimum annual loss of $1.5 million even if there is the option for groundwater replacement. Stockton East and CSJWCD also have a large share of acreage in permanent crops, but less than SSJID. It appears about 38% of water supply could be interrupted while limiting damage to annual crops, which is more than the 25% calculated for SSJID. In addition, Stockton East and CSJWCD are less reliant on the impacted tributaries for their irrigation water supplies. Thus, it seems possible that these districts may be able to avoid a reduction in the share of permanent crops due to the 40% unimpaired flow order. However, the SED does not provide any modeling data on water supply reliability to investigate this claim because it assumes full groundwater replacement and does not model post-SGMA conditions. Thus, it is not possible to provide an estimate of agricultural losses for Stockton East and CSJWCD with the available information, although it can be definitively stated that the losses are not zero as the SED implies, and likely total several million dollars in an average year--especially if the loss to groundwater levels is properly modeled and valued.	It is assumed in the analysis that SEWD and CSJWCD will fully replace surface water shortages from the Stanislaus with groundwater to maintain their agricultural production. This assumption is valid because prior to New Melones deliveries both districts were relying on groundwater to meet these demands. This assumption is also corroborated by SEWD's 2015 Agricultural Water Management Plan (AWMP), which states on page 24, "The balance of the agricultural water demands not met by available surface water each year is satisfied with customer pumped groundwater." Furthermore, as shown in Table 7 of SEWD's 2015 AWMP, SEWD received very little water from New Melones from 2013 to 2015. However, over the same period, Table 11 shows that irrigated area increased by 3,258 acres. Table 8 reveals how this was possible, showing that between the district and its customers they were able to pump 146,340 acre-feet of groundwater in 2015 to meet their crop demands. The SED does not model post-SGMA conditions because the impacts of proposed LSJR alternatives are evaluated by comparison to baseline. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for more information regarding SGMA implementation in relationship to LSJR flow objectives and program of implementation. Please see Appendix F.1 Attachment 1 for annual estimates of surface water diversion for the CVP contractors and how they change in response to implementation of the LSJR alternatives. For more detailed information on the surface water diversion and groundwater use of SEWD and CSJWCD please see the SED modeling spreadsheets posted on the SWRCB website.
1176	299	[From ATT4:] South Delta Salinity Standards The SED claims that it is recommending changes based on science, but it fails to provide a minimal scientific basis for its claim that increasing the allowed growing season salinity level by 41% (0.7 to 1.0 dS/cm) will not reduce agricultural productivity in the Delta. The steps to the scientific method are well-known. Simply put, the scientific method starts with the development of a hypothesis about a subject that is derived from theory, knowledge about similar situations, or other appropriate sources. In the next step of the scientific method, researchers collect data to test the hypothesis, applying statistical techniques as appropriate to determine if the hypothesis is false. The findings of the Hoffman report are only a hypothesis based on modeling a set of assumptions. The Hoffman report does not endeavor to test its predictions or any of its critical assumptions with data from the study area, and thus does not yield any scientific conclusions. In addition to Hoffman and the SED's failure to collect relevant data to test their hypothesis, and the SED ignores evidence and other studies that cast substantial doubt on Hoffman's hypothesis. Thus, the SED's proposed South Delta Salinity Standard is arbitrary rather than based on science as is claimed.	Please see Master Response 3.3, Southern Delta Water Quality, for a discussion of why the SDWQ objectives are being updated, as well as discussion of assumptions in the Hoffman Report (Appendix E, Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta). The report used the current state of knowledge on crop salt tolerance along with available input information such as leaching fraction, crops, and water quality from the Delta. Please see Master Response 1.2, Water Quality Control Planning Process, for information on the State Water Board's external peer review of the Scientific Basis report (Appendix C, Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives) that informs the development of the LSJR flow and SDWQ objectives, the requirements for establishing water quality objectives, and the water quality control planning process. Please see Chapter 11, Agricultural Resources, Section 11.4.2, Methods and Approach, for information on the impacts of salinity to crops in the southern Delta.
1176	300	[From ATT4:] The Hoffman Report is not a Valid Scientific Basis for Changing South Delta	Please see Master Response 3.3 Southern Delta Water Quality for information about the water quality in the Delta and Appendix E (Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta). Please see

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		Salinity Standards. The SED's claim that its recommendation to increase the South Delta Salinity standard is based on recent, updated scientific information is a false statement. The claim is false for two reasons. First, the only support provided for this statement is the Hoffman Report (Appendix) E. The SED mischaracterizes the Hoffman report as a scientific study, but the Hoffman report is a modeling/predictive exercise not a scientific study. Second, the SED completely ignores recent studies and observational data that directly contradict the findings of the Hoffman report and the SED's claim that there is no harm to Southern Delta agriculture under current water quality conditions.	Chapter 11 Agricultural Resources section 11.4.2 Methods and Approach for information about the methods to analyze the impacts of the SDWA objectives and Appendix E. Appendix E used the current state of knowledge on crop salt tolerances along with available input information such as leaching fraction, crops, and water quality from the Delta. The information presented by the commenter on the recent leaching study by Dr. Leinfelder-Miles does not consider all of the author's findings and rather selects findings that support the comment. Specifically, additional information in Dr. Leinfelder-Miles report indicates the yield in areas with low leaching fraction were higher than some areas with higher leaching fractions. Also Dr. Miles found that irrigating with high quality water (ie seasonal average low EC of 0.47 dS/m) in a soil with a low leaching fraction resulted in an alfalfa yield (8.1 tons/acre). This is in contrast to the study field with the lowest water quality (1.78 dS/m seasonal average) that had the highest leaching fraction (25%) and yield of 9.8 tons/acre. Field 2 of the study in 2013 had the highest soil salinity (ECe), a 3 percent leaching fraction and the highest yield. The one factor that this field excelled in was a 150 cm rooting which was deeper than the rooting depth in all other fields. This extra depth (10-50 cm) allows for better drainage. In addition, the author stated that field 1, which had the shallowest rooting depth, appeared to have a high water table that appeared to impede leaching. Reducing the level of the water table is a common practice with infrastructure such as tile drains. These data points and information indicate that leaching is crucial to obtaining superior yields. Finally, as shown in the study, water quality is not the reason for the reduced yields or lower leaching fraction rather it is the soil profile's ability to drain.
1176	301	[From ATT4:] The Hoffman Report is a modeling exercise that makes predictions based on questionable assumptions. Its conclusion is a hypothesis derived from specific assumptions. Hoffman did not collect data to test the conclusion or the validity of the assumptions. Hoffman does not claim to have made a scientific finding, and in fact, recommends further research to verify the prediction. In the conclusion, he merely states the following (page 101), "All of the models presented in this report predict that the water quality standard could be increased to as high as 0.9 to 1.1 dS/m and all of the crops normally grown in the South Delta would be protected." The SED misrepresents Hoffman's modeling prediction as a scientific conclusion. Since Hoffman is predicting that higher salinity levels would still protect crops in the Delta, it is obvious that his models would also predict that crops in the South Delta should not experience any salt damage or stress under current conditions. The scientific method requires testing the prediction with observational data from the South Delta, but Hoffman fails to gather such data even in the face of widespread anecdotal reports of salt damage under current conditions. Not only does Hoffman fail to collect data to test the predictions of his model, he fails to collect data to test the critical assumptions of the model--most notably that leaching fractions in the Delta are as high as he assumes. Instead, he tries to infer leaching fractions from groundwater tile drains in an area on the perimeter of the Delta. The South Delta Water Agency has explained why this approach is inaccurate, and presents recent data that directly measures leaching fractions in the South Delta and finds values that are much lower than Hoffman's assumption.	Please see Master Response 3.3, Southern Delta Water Quality, for discussion of the Hoffman Report and southern Delta leaching fractions.
1176	302	[From ATT4:] The SED ignores recent studies and observational data that contradict Hoffman's hypothesis and assumptions underlying his prediction. Thus, it greatly	Please see Master Response 3.3, Southern Delta Water Quality, for discussion of the Hoffman Report. Please see Master Response 3.3, Southern Delta Water Quality, for discussion of the Hoffman Report. Please see Chapter 11, Agricultural Resources, Section 11.4.2, SDWQ Alternatives, for information on the

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		mischaracterizes the state of scientific knowledge. If Hoffman's prediction is correct, then there should be no observable salt damage to crops in the South Delta in recent decades. However, this is contradicted by observational data and the peer-reviewed study of Delta crop production done for the Delta Protection Commission's Economic Sustainability Plan ("ESP"). First, there are many documented cases of current salt damage to crops and management actions currently taken to combat salt damage to crops. The South Delta Water Agency has compiled documented examples. These cases are real observational data, and are valid scientific evidence against Hoffman's hypothesis. Second, the Economic Sustainability Plan conducted a regression analysis to determine if salinity was affecting crop choice in the Delta. The statistical analysis covered 8 years and thousands of observations over a time period where Hoffman concluded there would be no harm to agriculture from water quality. In contrast, the ESP's statistical analysis found, after controlling for other factors determining crop choice such as market conditions, plot elevation and soil type; that higher salinity areas in the Delta were far more likely to grow lower-value but more salt tolerant crops and less likely to grow high-value salt-sensitive crops such as the wine grapes and almonds that are the most common crops in the non- Delta areas of San Joaquin County. The ESP study of agriculture was praised by the peer-review panel as "state of the art." The failure of the 2016 SED to even cite this highly-relevant 2012 report is grossly deficient. Finally, a recent study by Dr. Leinfelder-Miles calculated leaching fractions at a several relevant locations throughout the heart of the south Delta, and found that most areas have much lower leaching fractions than assumed by Hoffman. If Hoffman had used leaching fractions similar to Dr. Leinfelder-Miles' field observations, he would predict significant salt damage.	impacts of salinity to crops in the southern Delta. The information presented in this comment regarding the Delta Protection Commission's Economic Sustainability Plan refers to a statistical modeling effort to characterize the impacts from salinity. The Delta Protection Commission's analysis used a statistical approach relating variables to best describe the data; however this approach may or may not be related in a mechanistic sense to water quality, leaching, and crop salt tolerance on crop production. The Hoffman approach (described in Chapter 11 and Appendix E, Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta) used cited literature that relates physical relationships among salinity in the water, soil, and crops. The information presented on the recent leaching study by Dr. Leinfelder-Miles (further discussed in Master Response 3.3, Southern Delta Water Quality) does not consider all of the author's findings and rather selects findings that support the comment. Specifically, Dr. Leinfelder-Miles' reports indicate the yield in areas with low leaching fractions were higher than some areas with higher leaching fractions.
1176	303	[From ATT4:] The shift from compliance points to averages along sections of rivers is not justified. Farmers divert in specific locations and do not mix water across locations to average water quality. Assuring adequate water quality should be most concerned with compliance points that have water quality problems, and averaging would obscure these areas of non-compliance. Given that the SED proposes to increase salinity standards to levels that will increase crop damage (or to the threshold of significant crop damage if accepting Hoffman's estimates), compliance points should intentionally be in diversion locations that have water quality problems--not averaged across zones of worse and better water quality.	Please see response to Comment Letter 1176-21.
1176	304	[ATT5: Bay-Delta Substitute Environmental Document Technical Review Comments prepared by Luhdorff & Scalmanini Consulting Engineers for Neumiller & Beardslee, legal representatives for San Joaquin County. February 2017.]	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
1176	305	[From ATT5:] The subbasins affected by the proposed alternatives have been identified as having conditions of critical overdraft and are on an accelerated schedule to develop and implement GSPs meeting the technical standards for evaluating historical and current conditions and viability of management actions required to achieve sustainability of groundwater resources. If, by the State Water Board's determination, a GSP does not satisfy	Please see Master Response 1.1, General Comments, for discussion on the scope and programmatic nature of the SED, adequacy of the approach, use of best available data, and substantial evidence in the SED. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act for discussion on the approach to the groundwater impact analysis, the threshold and criteria used to evaluate

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		the technical standards, agencies which form Groundwater Sustainability Agencies (GSAs) may lose local management authority granted under SGMA.	impacts to groundwater resources, consideration of groundwater pumping outside of irrigation districts, and SED consideration of SGMA. SGMA was passed by the legislature in 2014 to address overdraft issues and associated negative impacts to groundwater basins from over extraction. SGMA requires local public agencies in the plan area form groundwater sustainability agencies (GSAs) by June 30, 2017 and draft groundwater sustainability plans (GSPs) by 2020 for critically overdrafted basins and 2022 for all other basins. GSAs have 20 years to implement GSPs and achieve sustainability. GSAs are now formed in the plan area, but GSPs have yet to be drafted or implemented. The State Water Board acknowledges reaching sustainability in these overdrafted basins will be challenging, but the plan amendments do not conflict with SGMA. Instead, knowledge of the plan amendments during the GSP drafting phase allows for integrated planning of scarce water resources that does not trade impacts between surface and groundwater. The SED and plan amendments do not require or encourage increased groundwater pumping. The SED analyses reflect that the historical local response to reduced surface water availability has been to choose to increase groundwater pumping; therefore, the SED was required to analyze this reasonably foreseeable and potentially significant and unavoidable impact on the groundwater basin from this local response. The SED does not assume that all reductions in surface water supplies can be met with increased groundwater pumping. Rather, if local water users choose to replace reduced surface water with groundwater, maximum groundwater pumping could reach the levels associated with 2009 and 2014 infrastructure. The level of detail in the SED is reasonable and appropriate for a program-level analysis and is not meant to be, nor required to be, a site-specific analysis of, for example, each cone of depression or potential cone of depression in each basin. Moreover, it is speculative to assume how pumpers in each area will respond to implementation of the flow objectives, because it will depend on many individual and collective decisions including, but not limited to, the discrete actions of local water users in response to reductions in surface water, crop choices in response to markets and other factors, and implementation of SGMA and conservation measures. For the purpose of analyzing impacts to resources, the plan area is divided into sub-areas depending on natural or physical boundaries appropriate to the resource being assessed. For groundwater resources, impacts are assessed for the four groundwater subbasin underlying the plan area (Eastern San Joaquin, Modesto, Turlock and Extended Merced—i.e. the study area referenced in the comment). The study area represents the primary area that could potentially experience groundwater effects associated with the LSJR alternatives, because the study area underlies the surface water delivery area for the three eastside tributaries. Groundwater is pumped from these four subbasins for agricultural and municipal uses within the plan area. If water users choose to pump more groundwater in response to reductions in surface water supply, these four subbasins would be the primary areas that could be potentially impacted. Furthermore, geographically, the plan area is largely within the boundaries of the four subbasins and impacts at one location of the basin can eventually spread to an entire subbasin. As explained in Appendix G, Agricultural Economic Effects of the Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results, the LSJR alternatives would only affect the availability of surface water in the LSJR Watershed—groundwater pumping and recharge for areas outside of the districts would not change in any of the LSJR alternatives. Therefore, irrigation districts are the only parties analyzed for the groundwater balance. The estimated groundwater effect is then standardized by dividing the estimated net change in groundwater balance by the subbasin surface area, not the irrigation-district service area, because the analysis is at the subbasin scale. Please refer to Appendix F.1, Hydrologic and Water Quality Modeling and Appendix G, Agricultural Economic Effects of Lower San Joaquin River Flow Alternatives: Methodology and Modeling Results, for a detailed

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			description of the models and related assumptions used to evaluate impacts. The water quality control planning process and SGMA are two separate and distinct regulatory processes. As discussed above, knowledge of the plan amendments during the early stages of SGMA allows for integrated planning of both surface and groundwater resources. However, the purpose of, and requirements for, the SED are not the same as a GSP. The site-specific variables required to develop a complete groundwater budget (e.g., recharge and discharge components, subsurface inflows and outflows, delineation of aquifers, hydrogeologic characteristics of the subbasins, beneficial uses within each subbasin, estimates of sustainable yield, quantification of saline intrusion, groundwater elevation decline and subsidence due to different management options, and feasibility of aquifer storage and recovery plans such as water banking and in-lieu recharge projects) are speculative and beyond the scope of the SED. Moreover, these variables are required components of a GSP (Cal. Code Regs., tit 23, § 354.18; Water Code §§ 10727.2, 10727.4 and 10727.6). As discussed in Chapter 9, much of the available groundwater data is incomplete or only represents a certain geography (e.g., county) of a total subbasin. The legislature intended to address these data gaps through SGMA (Water Code § 10720.1 subdv. (f)). The State Water Board used the best available data for the SED and plan amendments.
1176	306	[From ATT5:] While we focused on San Joaquin County and the Eastern San Joaquin Groundwater Subbasin, our findings apply to the analyses of all four subbasins. Conceptualization and Thresholds of Significance There are several aspects of the SED groundwater conceptualization that do not adhere to generally accepted practices for evaluating groundwater conditions. These include the following: - Selection of the plan area for analysis of impacts to groundwater resources limited to individual subbasin boundaries; - Incomplete water budget for groundwater recharge and discharge components; - Methodology inconsistent with DWR guidelines and best management practices for evaluating groundwater conditions; - Significance thresholds do not address all indicator parameters of overdraft that currently exist or could be exacerbated by Project Alternatives; and - Selection of tools to analyze impacts to groundwater resources in critically overdrafted basins limits the ability to assess and report on impacts to groundwater within the plan area subbasins and in adjacent subbasins where impacts from the Project Alternatives would likely propagate.	Please see response to Comment 1176-334.
1176	307	[From ATT5:] The SED conceptualizes the impacted groundwater subbasins in the context of inconsistencies in available data, problems with periods of record, uncertainty about water user responses, varying assumptions, and uncertainties in water budget components. The aquifer system is not delineated laterally or vertically to account for the different aquifers that are present (and where pumping and recharge occur on an aquifer specific basis). With respect to impacts to the groundwater budget, the aquifer system is treated as a pool with no-flow boundaries between subbasins both inside and outside the plan area. The analysis assumes that impacts to groundwater resources will be confined within each	Please see response to Comment 1176-334, regarding the approach to the groundwater impact analysis. Chapter 9, Groundwater Resources, Section 9.4.2, Methods and Approach, provides the rationale for the aquifer assumptions; the system was treated as four separate pools, because there is some connectivity between the different depths, and increased groundwater pumping would occur in both shallow and deep wells. Substrate with low permeability might slow the interaction between deeper confined and shallower unconfined sections of the aquifer, but water pumped from a deeper confined section of the aquifer would eventually be replaced by water from above or from the edges. Furthermore, within the four subbasins, the number of deep and shallow wells is too large to feasibly assign pumping increases to separate sections of

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		affected subbasin. The SED does not provide a basis for this assumption and contradicts general geologic and hydrogeologic principles, including the fact that subbasins in the San Joaquin Valley permit groundwater movement across boundaries and are not hydrogeologically isolated. The plan area should be based on a technical analysis of the propagation of impacts across all affected subbasins. The conceptual water budget in the SED is incomplete as it relates to all the recharge and discharge components to the groundwater system. Most important, the lack of accounting for subsurface inflows and outflows of groundwater from the plan area subbasins are not identified as important budget components. Experience indicates that lateral flow between subbasins are major budget components for San Joaquin Valley groundwater systems. Thus, ignoring groundwater inflow and outflow from the subbasins and how these water budget components could change under the Project Alternatives and potentially impact neighboring subbasins is an important factor in judging the impacts of the proposed flow requirements; particularly for those agencies engaged in meeting the requirements of SGMA including preparing and implementing a GSP. The conceptualization doesn't follow state guidelines for hydrogeologic conceptual models (HCM) that are required in all GSPs under SGMA. The foundation of a conceptual model is a detailed description of the physical system including lateral and vertical boundaries, recharge and discharge processes, water budget components, and various beneficial uses and limitations of groundwater resources within a subbasin. [Footnote 1: Department of Water Resources DRAFT Hydrogeologic Conceptual Model Best Management Practice, December 2016.] GSPs are required to include scaled geologic cross sections to support the system description. A sound HCM is a requirement for GSPs because potential actions by GSAs to achieve sustainability must be feasible. In turn, possible mitigation actions referred to in the SED, such as ASR, cannot be, and are not, evaluated because feasibility in a portion of the groundwater subbasin in an affected water district was not determined. In short, the conceptualization used in the SED does not meet technical standards under SGMA, which now governs groundwater management in the state.	the aquifer. The simplifying assumptions of separating the aquifers by subbasin and not depth are acceptable, because the purpose of the analysis is to estimate the average effect of the LSJR alternatives on the subbasins as a whole, not effects at specific well locations.
1176	308	[From ATT5:] Significance thresholds in the SED for groundwater impacts are limited to changes in storage primarily in the upper, unconfined aquifer, plus subsidence. Other impacts to groundwater resources not addressed include chronic declines in groundwater levels, groundwater pumping impacts on beneficial uses of surface water, and impacts on groundwater quality. The only significance threshold that was quantified is a change in aquifer storage, which is defined as a reduction in the groundwater water balance equal to one-inch of water distributed across the entire subbasin. According to the SED, an impact of one inch assuming 10-percent specific yield translates to a 10-inch decline in groundwater levels (Chapter 9, page 46), or approximately equal to the average historic rate of decline. That threshold, though arbitrary, may not, by itself, be problematic; however, the range of variability in that historic rate between subbasins spans an order of magnitude: from 2.8 inches per year in the Turlock Subbasin to 20 inches per year in the Eastern San Joaquin Subbasin (Table 9-4). Thus, the threshold is an overestimate for the Turlock Subbasin (by a factor of about 3.5), while an underestimate in the Eastern San Joaquin Subbasin (by a factor of 2). With respect to the Eastern San Joaquin Subbasin, the stated minimum threshold for	It is unclear why the commenter stated the threshold of significance is overestimated/understated by a factor of 3.5/2.0 for the Turlock/Eastern San Joaquin Subbasins. The groundwater impact analysis is at the subbasin scale; therefore, the groundwater effect is standardized by dividing the estimated net change in groundwater balance by the subbasin surface area, not the irrigation-district service area, which the commenter seems to suggest. The Water Supply Effects (WSE) model incorporates data from CalSim II, not C2VSim. However, the groundwater impact analysis is not conducted in the WSE Model. The groundwater impact analysis is a spreadsheet analysis that uses outputs from the WSE Model, information extracted from various agricultural water management plans, and information provided by irrigation districts. This spreadsheet model can be downloaded at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/2016_sed/index.shtml. Please see Master Response 3.2, Surface Water Analyses and Modeling, regarding the relationship between CalSim II and the WSE model. Please see response to comment 1176-334 regarding the scope of the SED and SGMA in the context of the

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		significance amounts to nearly 60,000 acre-feet, a quantity that may require years of planning and development to offset; and yet, this understates the actual impact on groundwater levels for lands within irrigation districts by a factor of about 3.5 (the subbasin has an area of 707,000 acres, but the irrigation district acreage of is only about 25 percent of the subbasin area). The reduced surface water delivery will induce a local effect before accruing, if ever, to the entire subbasin. Using 10 percent for specific yield, a 36- inch drop in water levels each year could quickly result in widespread sustainability issues even if it is partially mitigated by inflows from surrounding areas. The Water Supply Effects spreadsheet model incorporated data from a detailed groundwater flow model (C2VSim); however, C2VSIM was not used as the primary tool for analyzing impacts to the groundwater system. As it relates to SGMA, DWR would not accept such a spreadsheet tool that emphasizes surface water and surface water budget components as a valid model of groundwater hydrology. In addition, it appears as if the WSE was used mainly to assess how historical river flow conditions would change under the Project Alternatives and did not present an analysis of how groundwater conditions would change under future conditions, which is normally a required element for either programmatic or project-specific environmental documents. There is also no numeric or other quantifiable measure for subsidence. Since subsidence is a sustainability indicator parameter and is prevalent in the San Joaquin Valley, the lack of numeric or other measurable criteria for determining significance is a technical deficiency, one that, by contrast, will be required in GSPs prepared by local agencies. It appears that the identification of impacts and significance criteria is related to the tool used in impacts analysis, which primarily emphasizes a surface water budget and does not have the capability to assess impacts to groundwater resources other than in simplified terms. This simplification is consistent with the nature of the spreadsheet model used to evaluate impacts.	plan amendments. The numbers presented in Table 9-4 show a range of values that vary by subbasin and depend on the time period evaluated. For example, as shown in Table 9-4, estimated rates of decline for the Turlock subbasin range from 2.8 inches/year (from DWR Bulletin 118) to 20 inches/year (from DWR groundwater update 2013). The one-inch per year significance threshold was chosen as an indicator of substantial effect, not to precisely mimic historic levels. The referenced paragraph has been modified for clarification. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, regarding detailed groundwaters model such as C2VSim.
1176	309	[From ATT5:] Model Selection The state's Water Supply Effects (WSE) spreadsheet model simplifies groundwater processes and interactions between groundwater and surface water and treats groundwater storage as a single ledger item in a water budget within each subbasin. The model does not evaluate interactions between groundwater subbasins within the plan area, nor does it distinguish between upper and lower aquifers. The inability of the WSE to assess impacts across subbasin boundaries prevents any assessment of Project Alternative impacts in one subbasin on adjacent subbasins. This inability prevents an assessment of whether some subbasins would experience greater impacts than the WSE predicts and others would see reduced impacts. This omission also limits GSAs under SGMA to utilize the SED to assess how the reduction in surface water supplies in one subbasin impacts the future groundwater conditions in an adjacent subbasin. This should not lead one to assume that, on average, no net negative impact would occur as the negative implications of more rapidly declining aquifer storage in one area might easily outweigh the positive implications of reduced rates of decline in another. Additionally, by treating the groundwater within a subbasin as a single storage unit, the model essentially misses a fundamental tenet of multi-aquifer hydrogeology in the estimation of yearly groundwater level changes; that is, recharge from the ground surface primarily influences upper aquifer conditions, while irrigation pumping generally occurs	Please see response to Comment 1176-337

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		in deeper aquifer units (or likely will trend in that direction over time with continued water level declines), and the two may not be directly connected. As the WSE treats groundwater in a subbasin as a single quantity (i.e., volume), recharge due to irrigated agriculture seems to offset increased pumping due to reduced surface water supplies; however, this is a poor assumption for two reasons. First, recharge from irrigation has already been part of this system and therefore there is no new input to consider as mitigation for the new (increased) pumping demand. Second, the recharge from irrigation does not directly impact the confined aquifer(s). Without a more robust conceptualization and analysis of the groundwater system, there is no way to determine if recharge of the unconfined aquifer from irrigation water would mitigate the decline in confined aquifer storage. Therefore, the model used in the SED may significantly underestimate the impact of surface water replacement pumping from deeper aquifers. For decades, hydrogeologists in academia, state government, and the private sector have urged an integrated groundwater/surface-water approach to hydrology. Yet, in this case, the Water Board has opted to use a more limited modeling approach even though the state has developed a detailed integrated groundwater flow model (C2VSim) that allows for a robust representation of the groundwater system and influences from surface water as compared to the capabilities of the WSE.	
1176	310	[From ATT5:] Impacts on Sustainability The SED indicates that the proposed actions in the Bay-Delta plan affecting surface water deliveries could be offset by increased groundwater pumping. Such an action is infeasible for critically overdrafted subbasins under SGMA. Eastern San Joaquin and the other subbasins must implement plans by 2020 to address overdraft conditions of declining water levels and land subsidence. The magnitude of dry-year deficits with the project will require significant actions such as water banking and in-lieu recharge projects that will increase regional demand for supplemental water supplies for these projects. In a setting of finite opportunities for acquiring, storing or banking water, one conclusion that should be discussed is that the flow requirements would translate directly to reduced agricultural output exactly equal to the loss in supply. In short, any increased pumping to offset impacts of surface water delivery reductions would lead to a greater imbalance in the subbasins and place a greater burden on GSAs to prepare feasible GSPs and management actions relying on supplemental water supplies.	Please see response to Comment 1176-334.
1176	311	[From ATT5:] Viability of Possible Actions The SED states that there may be a variety of actions undertaken by local irrigation districts and others in response to decreased availability of surface water. We believe that one suggested action, increased groundwater pumping, is likely infeasible since pumping in the subbasins already exceed sustainable yields and this action would likely not be feasible under SGMA. Other actions, such as water banking and ASR, are mentioned as possible actions; however, there is no basis to assess the feasibility of these actions in the SED since the WSE does not identify specific sources of water available for banking or ASR besides stating that surface water transfers are speculative and unknown (page 16-9).	Please see response to Comment 1176-334, regarding the scope of the groundwater impact analysis, potential increases in groundwater pumping, and SED consideration of SGMA. Chapter 16, Evaluation of Other Indirect and Additional Actions, Section 16.2, Lower San Joaquin River Alternatives—Other Indirect Actions, describes the actions affected entities could take to replace surface water that may no longer be available due to implementation of an LSJR alternative; substitution of surface water with groundwater is one of the actions described, but not the only action. Potential costs of those actions are also discussed in Section 16.2. The feasibility of locally chosen actions, such as aquifer storage and recovery, will need to be assessed at the project-level by the project's lead agency. As noted in the comment, GSAs will have to consider how locally chosen projects affect sustainability in adjacent subbasins. As discussed in response to Comment 1176-334, it would be speculative to assume the types of projects GSAs will choose and the location of those projects.

Table 4-1. Responses to Comments			
Ltr#	**Cmt#**	**Comment**	**Response**
		The WSE also does not characterize aquifer storage or yield, and makes no distinction between aquifers. At minimum, a conceptual model of groundwater storage processes; a schedule and accounting of surplus water in wet years; and a description of points of diversion and recovery for the affected water districts should be presented to provide parameters for evaluation of the feasibility of groundwater storage as a strategy for mitigation of impacts of new flow regimes on the SJR. The SED does not include any technical vetting such as required of GSAs in groundwater sustainability plans to avoid state intervention. Just as important, consideration of how these projects affect sustainability in adjacent subbasins must be addressed in the GSPs submitted by the local agencies participating in GSAs. In addition, the recognition of additional infrastructure costs associated with the ASR and water banking projects along with the existing financial investment for utilizing surface water supplies that will be curtailed have not been adequately addressed.	Please see Master Response 8.0, Economic Analyses Framework and Assessment Tools, regarding the economic analysis used in the SED to help inform the State Water Board's consideration of potential economic effects related to the plan amendments.
1176	312	[From ATT5:] Water Agency Contracts Stockton East Water District and Central San Joaquin Water District service areas comprise approximately half of district irrigated lands in the Eastern San Joaquin Subbasin. Under existing water contracts, both districts rely on groundwater to a significant degree to meet demand. As the SED recognizes, both districts experience variable delivery amounts, particularly in dry years. Under the SED, these districts will be disproportionately impacted by reduced surface water deliveries in any year they occur. Because the subbasin is currently under critical conditions of overdraft, this disproportionate impact would directly affect the agricultural economy due to the inability to rely further on groundwater to make up shortfalls in supply.	Please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural Economic Effects, for discussions regarding potential economic impacts of the plan amendments.
1176	313	[From ATT5:] Water Quality Historically, there has been a large groundwater depression in the Stockton area which results in saline water migration from the Delta (from the west) (see O'Leary et al. 2015, Sources of high-chloride water and managed aquifer recharge in an alluvial aquifer in California, USA). The depression in groundwater elevation is shown in Figure 9-3 of the SED, although the arrows on that figure indicating groundwater movement notably do not indicate the flow from the Delta area eastward to the depression. In response to ongoing saline intrusion, local irrigation districts have switched some of their supply to surface water with the goal of reducing the groundwater gradient to slow or prevent saline intrusion in the region. Under any of the action alternatives, reduced surface water supplies will impact the ability of local agencies to continue this management action and result in increased pumping, consequently maintaining or exacerbating the gradient from the Delta towards the Eastern San Joaquin Subbasin. Another consequence of lowered groundwater elevations in the region will be to induce greater flow into wells from lower units. This alteration of the vertical flow profile may result in increased concentrations of naturally occurring contaminants such as arsenic, uranium, and other metals. The increases have the potential to exceed the drinking water maximum contaminant level and therefore increased cost (for treatment) and reliability of the groundwater supply.	Please see response to Comment 1176-334 regarding the scope of the groundwater impact analysis. Please see Master Response 3.6, Service Providers, for a discussion regarding impacts on groundwater quality.

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		While the SED does mention the occurrence of contaminants, and describes in general terms the downward flux of water due to pumping from deep aquifers, it does not address the concern that a larger fraction of pumped water may come from aquifers with higher metals contamination, and fails to provide an analysis of potential water quality effects beyond stating that for Alternatives 3 and 4 deleterious effects will be significant and unavoidable (Chapter 13, Table 13-1).	
1176	314	[From ATT5:] Sustainable Yield In chapter 9, the SED discusses and defines sustainable yield (used interchangeably with safe yield in SED) in the plan area in the context of historical conditions. Generally, sustainable yield is estimated by evaluating historical conditions under long term, annual average hydrologic conditions where water management is consistent. Under the SED alternatives, however, historical estimates of sustainable yield will no longer apply because the alternatives will impose a new set of water management actions which will impact the ability of local agencies to apply historical measures of sustainability to future projections under SGMA and GSP development. The SED explains that there are high levels of uncertainty and speculation in evaluating sustainable yield and overdraft conditions in the subbasins within the plan area. This results in a lack of confidence in any analysis of impacts and sustainable yield and calls in question the adequacy of the SED to assess impacts from the alternatives on groundwater conditions in either a programmatic or project specific basis. At the same time, the SED dismisses most of the deleterious consequences of increased pumping that could occur because of the alternatives with the statement that no significant reduction in groundwater levels will occur because the implementation of SGMA and that GSPs will prevent such from happening. This argument also fails to address the corollary reduction in water available to agriculture, and the attendant economic impact. In addition, the SED does not address the impact the alternatives will have on 2015 baseline conditions which are the basis under SGMA for evaluating sustainability. Since the alternatives will remove a source of supply previously relied upon, the reduction of surface water supplies themselves (with or without additional groundwater supplies) will impact groundwater conditions under a demand reduction scenario. Groundwater sustainability agencies must be formed for each medium and high priority subbasin by June 2017 and those in a condition of critical overdraft must be managed under GSPs by 2020. The high degree of planning, technical detail, coordination, and stakeholder involvement in the SGMA process appears to be markedly advanced compared to the SED, though both seek to address groundwater subbasin hydraulics at their core. It seems appropriate that GSPs and this phase of the Bay-Delta Plan be well-coordinated in their technical detail, consistency in methods and data, and completeness.	Please see response to Comment 1176-334.