Santa Ana River Wasteload Allocation Model Update

BASIN MONITORING PROGRAM TASK FORCE

September 18, 2019

SAWPA

GEOSCIENCE

Overview

- Responses to Comments on Draft TM No. 5
- Responses to Comments on Draft TM No. 6
- Responses to Comments on Draft Summary Report

Responses to Comments on Draft TM No. 5

Summary of Comments for Draft TM No. 5 - Estimating Off-Channel Recharge from Natural Precipitation

Source	No Action Necessary	Minor Edit	Additional Explanation or Table/ Figure	Additional Analysis	Need to Discuss with the Task Force	Total No. of Com-ments
	Corresponding Comment Number					
EVMWD	-	-	-	-	1	1
IEUA/ CBWM	3, 7, 8	1, 2, 6	4	-	5	8
OCWD	-	1, 2	-	-	-	2
Risk Sciences	-	2, 5, 8	1, 3, 4, 7	-	6, 9	9
Valley District	2	3	1	-	-	3
					Total	23

Comments on Draft TM No. 5 from EVMWD – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	2.2	2	How these values compare with the values estimated in the SAR Integrated Groundwater flow model? Add a discussion about this.	Out of scope of work. Will proceed based on input from the Task Force

Comments on Draft TM No. 5 from IEUA/CBWM – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	General	-	What is the regulatory purpose of this document? What question is the regulatory question it answering and how will the information reported be used by the Task Force, its members, or the Regional Board? This is not explained in the document.	No regulatory purpose. Provides an indication of another source of high quality recharge not currently considered by the WLAM. See Risk Sciences comment #1. *("in addition, I believe it is important to note that off-channel recharge of natural precipitation is something that must be calculated in order to derive an accurate estimate of stormwater runoff to the streams. So, if we have accepted that the stream flow calibrations are reasonably accurate, then we have also implicitly accepted that the estimates of off-channel percolation must be reasonably accurate as well. This updated WLAM, and the previous WLAMs, all calculate off-channel recharge. This is just the first time that we've asked for the calculated values to be reported out.")*

Comments on Draft TM No. 5 from IEUA/CBWM – Comment No. 2

No.	Section	Pg.	Comment	GEOSCIENCE Response
2	General	-	The term "off-channel recharge" as used in TM-5 refers to the deep infiltration of precipitation that is assumed to reach groundwater. It is not clear how estimates of this recharge term have any value in the regulatory process to assess with the wasteload allocation to the Santa Ana River. The TM should explain how the information presented in this TM would be used to inform the Basin Plan SNMP process and related wastewater discharge permits.	Provides an indication of another source of high quality recharge not currently considered by the WLAM. See Risk Sciences comment #1. *("in addition, I believe it is important to note that off-channel recharge of natural precipitation is something that must be calculated in order to derive an accurate estimate of stormwater runoff to the streams. So, if we have accepted that the stream flow calibrations are reasonably accurate, then we have also implicitly accepted that the estimates of off-channel percolation must be reasonably accurate as well. This updated WLAM, and the previous WLAMs, all calculate off-channel recharge. This is just the first time that we've asked for the calculated values to be reported out.")*

Comments on Draft TM No. 5 from IEUA/CBWM – Comment Nos. 3-4

No.	Section	Pg.	Comment	GEOSCIENCE Response
3	General	-	There are other "off-channel recharge" components that that have more significant groundwater quality implications and they are not discussed. Without this context the information presented in the TM has no meaning.	This illustrates the limitation of surface water modeling and highlights the importance of using an integrated groundwater/ surface water model for giving a more comprehensive understanding of groundwater recharge.
4	General	-	The volume of precipitation that infiltrates past the root zone depends in part on whether the overlying land on which it falls is irrigated or not. There is no discussion of that in the text. Is irrigation considered in the model, and if so, how?	Yes, irrigation flow is included in the model. Land use is discussed in Section 3.2.3 of the Summary Report and TDS/TIN in Runoff is discussed in Section 3.2.9.1. Additional explanation will be added to the text.

Comments on Draft TM No. 5 from IEUA/CBWM – Comment No. 5

No.	Section	Pg.	Comment	GEOSCIENCE Response
5	General	-	There is no detail to support the TM findings. At a minimum, the TM should report: a. a water budget table produced that starts with precipitation at the land surface and shows the fate of the precipitation; b. a mass balance table that shows the mass entering the soil from precipitation, stored in the soil, mass lost/gained due to geochemical processes and mass discharged to groundwater. As to mass lost/gained due to geochemical processes, there are other TDS and nitrate loads that need to be considered and described, e.g., TDS and nitrate of fertilizers applied to the land surface.	Out of scope of work. Will proceed based on input from the Task Force

Comments on Draft TM No. 5 from IEUA/CBWM – Comment Nos. 6-7

No.	Section	Pg.	Comment	GEOSCIENCE Response
6	General	-	The TDS and TIN concentrations that are assigned to the off-channel recharge are not comparable to the streambed recharge in the Santa Ana River because the evapotranspiration and transport processes that affect the TDS and nitrate concentrations in the off-channel recharge can be more significantly altered in transport than in the streambed infiltration in the Santa Ana River.	Statement will be added
7	General	-	What is the significance of the specific years analyzed in Table 1 and averaged in Table 2-1? Why not use the same planning period used for the WLAM streambed infiltration estimates and provide comparable statistics?	RFP indicated that calibration period should be used.

Comments on Draft TM No. 5 from IEUA/CBWM – Comment No. 8

No.	Section	Pg.	Comment	GEOSCIENCE Response
8	General	-	What is the significance of the GMZs included and excluded from the evaluation? Why are Chino North GMZ analyzed give that it is not part of any other assessment within the required WLAM analysis?	The GMZs were designated in the RFP. Chino North doesn't have a streamflow component so was not analyzed for streambed percolation, but represents a large area that has a significant amount of deep percolation from precipitation.

Comments on Draft TM No. 5 from OCWD – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	2.2	2	Section 2.2 states that one of the objectives of the WasteLoad Allocation Model (WLAM) is to estimate off-channel recharge from natural precipitation. Please add some explanation of the role or potential use of these estimates in the WLA. What is the purpose of the estimates and what are they/can they be used for?	Additional explanation will be added per Risk Sciences comment #1 *("in addition, I believe it is important to note that off-channel recharge of natural precipitation is something that must be calculated in order to derive an accurate estimate of stormwater runoff to the streams. So, if we have accepted that the stream flow calibrations are reasonably accurate, then we have also implicitly accepted that the estimates of off-channel percolation must be reasonably accurate as well. This updated WLAM, and the previous WLAMs, all calculate off-channel recharge. This is just the first time that we've asked for the calculated values to be reported out.")*

Comments on Draft TM No. 5 from OCWD – Comment Nos. 2

No.	Section	Pg.	Comment	GEOSCIENCE Response
2	2.2	3	In Table 2-1, we assume that the model-calculated off-channel recharge from natural precipitation and the associated TDS/TIN concentrations for the Orange County management zone are only calculated for the geographic area within the HSPF model boundary show in Figure 1 of TM-5, not the entire Orange County management zone. Please clarify this in TM-5.	Clarification will be added

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	2.2	2	Section 2.2, First Paragraph: The last sentence indicates that recharge from natural precipitation is calculated within the HSPF model. I believe it would be helpful to provide a bit more detail describing how this value is calculated. In addition to the actual amount of rainfall that occurs, what other key parameters influence this calculation (e.g. land cover, soil type, antecedent moisture)? In addition, I believe it is important to note that off-channel recharge of natural precipitation is something that must be calculated in order to derive an accurate estimate of stormwater runoff to the streams. So, if we have accepted that the stream flow calibrations are reasonably accurate, then we have also implicitly accepted that the estimates of off-channel percolation must be reasonably accurate as well. This updated WLAM, and the previous WLAMs, all calculate off-channel recharge. This is just the first time that we've asked for the calculated values to be reported out.	Land cover, soil type, etc. is described in Section 3.0 of the Summary Report. Additional detail will be added. Statement will be added.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 2

No.	Section	Pg.	Comment	GEOSCIENCE Response
2	2.2	2	Section 2.2, Second Paragraph: The first sentence refers the reader to Figure 2. However, since the term "percolation" appears in three separate places within the diagram, readers may become somewhat confused. I think it would be helpful to highlight the key path of interest which tracks down the far left side of the flow schematic (e.g. Precipitation → Infiltration → Deep Percolation). Perhaps these specific lines and arrows can be colored red for emphasis. As I interpret this diagram, I am assuming that any percolation that occurs thru the "Potential Direct Runoff" path is already captured as streambed recharge, right?	Percolation also occurs during the runoff phase. Additional clarification will be added.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 3

No.	Section	Pg.	Comment	GEOSCIENCE Response
3	2.2	3	Table 1 and Table 2-1: It appears that these tables are based on an initial assumption that the average concentration of TIN in natural rainfall is 2 mg/L. Please provide a reference citation to support this assumption. Is the nitrogen present in the natural rain as it falls from the sky or is the nitrogen leached from the soil as the precipitation percolates to groundwater?	2 mg/L represents the TIN concentration of recharge from precipitation, which includes nitrogen leached from the soil during percolation. Additional explanation will be added.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 4

No.	Section	Pg.	Comment	GEOSCIENCE Response
4	2.2	3	Table 1 and Table 2-1: These tables show that natural precipitation percolating to groundwater has an average TDS concentration in the range of 219-224 mg/L. Please provide a reference citation to support this assumption. Is this the average TDS concentration in the actual rainfall or is it the salinity of the precipitation AFTER it percolates through the surface soils? I was under the impression that natural rain was extremely low in conductivity and had a TDS concentration near zero.	As explained in the Summary Report Section 3.2.9.1, dry deposition is included (additional loading from irrigation). Additional explanation will be added.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 5

No.	Section	Pg.	Comment	GEOSCIENCE Response
5	2.2	3	Table 1 and Table 2-1: Do the estimates of average TDS and TIN concentrations take into account variations in land use? For example, rain that falls on an acre of undeveloped natural landscape and percolates to groundwater will have a different TDS and TIN concentration than precipitation that falls onto and percolates below a dairy. Just need some additional clarification about what it is that is being reported here: the water quality at the moment the rain hits the ground or the water quality when that precipitation ultimately percolates to and reaches the underlying aquifer.	Variation in land use is considered by the HSPF model (See Summary Report Section 3.2.3). Reported values represent the water quality of recharge water. Clarification will be added.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 6

No.	Section	Pg.	Comment	GEOSCIENCE Response
6	2.2	3	Table 1 and Table 2-1: Both tables are based on annual estimates for the period from 2007 thru 2016 (water years). I was expecting that Technical Memorandum #5 would provide annual estimates for the same hydrological period (e.g. 1959-2016) specified in Task 2a (as described in Task 5 of the RFP).	RFP also specifies a calibration period from 1959-2016. However, the model ended up being calibrated from 2007-2016. Therefore, this analysis was done using the model calibration period. 2012 land use was used for model calibration and would not be representative of conditions in 1959. Will proceed based on input from the Task Force.

Comments on Draft TM No. 5 from Risk Sciences – Comment No. 7

No.	Section	Pg.	Comment	GEOSCIENCE Response
7	2.2	3	Table 1 and Table 2-1: I believe it would be useful to summarize the volume of deep percolation water from off-channel recharge in the same manner that we have done for the TIN & TDS concentrations in streambed recharge (e.g. 1, 5, 10, 20, 67-year average recharge volumes). This could be done using graphs similar to those shown in Appendix H. We would need two graphs for each of the five GMZ's; one representing the current land use condition and another representing recharge in the 2040 land use condition. There is no need to produce graphs for TDS and TIN concentrations in off-channel recharge because these values do not vary much from year to year.	Figures and tables will be created.

Comments on Draft TM No. 5 from Risk Sciences – Comment Nos. 8-9

No.	Section	Pg.	Comment	GEOSCIENCE Response
8	2	2	It would be prudent to note, somewhere near the beginning of the report, that the WLAM only accounts for off-channel recharges to the extent necessary to calculate the volume of stormwater runoff likely to flow into the Santa Ana River and its major tributaries. These off-channel recharges are NOT part of the waste load allocation itself as the WLA applies only to streambed recharges.	Statement will be added.
9	-	-	The draft report covers the six GMZs specified in Task 5 of the RFP. How much would it cost to add the San Timoteo, Yucaipa and Beaumont GMZs to this report?	We would need about 1 day to complete this out of scope work, which would be around $1,500. We will proceed based on input from the Task Force.

Comments on Draft TM No. 5 from Valley District – Comment Nos. 1-3

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	2.2	3	Table 2-1: Please include methodology used to calculate the average TDS and TIN concentrations for the annual deep percolation of precipitation for WY2007-2016. a. The average TDS concentrations are similar across the GMZ's for WY2007-2016. b. The average TIN concentration of 2 mg/L seems high for natural precipitation.	Methodology is same as explained during calibration. Reference to Section 3.2.9 of Summary Report will be added. 2 mg/L represents the TIN concentration of recharge from precipitation, which includes nitrogen leached from the soil during percolation. Additional explanation will be added.
2	Figures	Figure 1	Figure 1: Please provide a description of the various colored stream reaches in the explanation section.	Already included as Legend entry for Stream Reach. The different colors represent different reaches.
3	Tables	Table 1	Table 1: Please include methodology used to calculate the average TDS and TIN concentrations for the annual deep percolation of precipitation for WY2007-2016.	Concentrations are calculated by the HSPF model. Additional clarification on methodology will be added to text.

Responses to Comments on Draft TM No. 6

Summary of Comments for Draft TM No. 6 - 2017 WLAM HSPF Retrospective Run

Source	No Action Necessary	Minor Edit	Additional Explanation or Table/ Figure	Additional Analysis	Need to Discuss with the Task Force	Total No. of Com-ments
	Corresponding Comment Number					
IEUA/ CBWM	1, 4, 5	2	6	-	3, 7	7
OCWD	3, 16	1, 2, 4-11	15	12, 13, 14	-	16
Risk Sciences	25	1-10, 12-15, 17-21, 23, 24, 26, 31-34, 37, 40, 41	16, 22, 27, 29	28, 30, 35, 39	11, 36, 38	41
					Total	64

Note: Blue numbers indicate that responses that are still in progress

Comments on Draft TM No. 6 from IEUA/CBWM – Comment Nos. 1-2

No.	Section	Pg.	Comment	GEOSCIENCE Response
1			What is the regulatory purpose of this document? What questions is it answering and how will the information reported be used by the Task Force, its members, or the Regional Board? This is not explained in the document and thus makes it difficult to review the work.	No regulatory purpose. As explained in Risk Sciences Comment #2, the RMR provides another way to evaluate WLAM performance.
2			The title of Task 6 is confusing. It seems that you can either estimate what occurred; or measure what occurred. You cannot estimate what "actually" occurred. The phrase "estimate the actual" is used in the TM and is misleading. Everything produced by the model is an estimate.	Phrase will be reworded.

Comments on Draft TM No. 6 from IEUA/CBWM – Comment Nos. 3-4

No.	Section	Pg.	Comment	GEOSCIENCE Response
3			The use of the term "retrospective" is confusing. How is the "retrospective run" different than the calibration run? If there is no difference, then new terminology should not be introduced, or it should be stated clearly that they are one-in-the-same.	Using terminology from the RFP. The RMR is not quite the same as the calibration period because includes 2005 and 2006. Can rephrase based on decision of Task Force.
4			The discussion of the results for many of the GMZs is very difficult to follow and understand as written. Given the absence of an explanation of the purpose of the TM and how the information will be used, it is difficult to provide a suggestion for improvement.	Additional discussion is provided in context of the Summary Report

Comments on Draft TM No. 6 from IEUA/CBWM – Comment Nos. 5-6

No.	Section	Pg.	Comment	GEOSCIENCE Response
5	Figures	Figure 1	The content in Figure 1 is not as described in the text at the end of the first paragraph in Section 1.1	Figure 1 was included to provide a general project location. This figure is not needed in the larger, inclusive Summary Report
6		17	On Page 17, the TM concludes that "the TDS and TIN concentrations of the retrospective run did not exceed the TDS or TIN objectives for SAR Reach 3 or Reach 2." Since about 2015, the Task Force has engaged in discussions about the increase in the summertime TDS concentration of the Santa Ana River and how it has exceeded the Reach 3 objective. This is not evident based on the "retrospective run". This suggests a problem with the model calibration or how the information is analyzed for comparison to the regulatory metric. It seems that it would be more valuable to compare the model output to measured data.	Model-calculated vs. measured data is already provided in calibration figures/tables for all years except 2005/2006. Will add another figure to show data from 2005 as well (although model is not calibrated to this period).

Comments on Draft TM No. 6 from IEUA/CBWM – Comment No. 7

No.	Section	Pg.	Comment	GEOSCIENCE Response
7			The Reach 2 metrics computed for the "retrospective" run should be compared to the estimates made by the Santa Ana River Watermaster and by SAWPA in the SAR Annual Report.	Represents out of scope work. Will proceed based on input from the Task Force

Comments on Draft TM No. 6 from OCWD – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1		3	On page 3, the text says 'The calibrated 2017 WLAM HSPF developed under Task 2 was run using historical daily precipitation data and historical discharge data to estimate the actual volume and quality of water recharged to the Beaumont, San Timoteo, Bunker Hill-B, Colton, Riverside-A, Chino South, Upper Temescal Valley, Prado Basin, and Orange County GMZs for the period from Water Year (WY) 2005 through 2016. The results of this retrospective run are summarized in the following sections for each GMZ. These results are also shown in comparison to the model-calculated projections from the scenario runs under the same hydrologic conditions. The updated scenario results were presented in the Summary Report (GEOSCIENCE, 2019) and the major scenario assumptions are summarized in the following table. Publicly owned treatment work (POTW) discharge assumptions for the scenario runs are also summarized in attached Table 1. Discharge locations are shown on Figure 2.' The reference to Table 1 is incorrect. Please confirm that the scenario results were not changed (that the scenarios were not run with historical water quality data for the treatment plant discharges). Please add text to explain that one additional run was done and that this run is called the 'retrospective mode' and that the results from this run are compared to previous scenario runs – it says that to some extent in the draft TM but the description needs to be more clear.	Reference seems correct: Scenario assumptions are summarized in Table 1. Scenarios were not changed, but results are provided for comparison. This will be clarified in the text.

Comments on Draft TM No. 6 from OCWD – Comment Nos. 2-4

No.	Section	Pg.	Comment	GEOSCIENCE Response
2			Please explain the differences between the 'Retrospective Mode' simulation and the calibration simulation presented in the previous technical memorandum. What are the differences in assumptions in the Retrospective Mode simulation compared to the calibration simulation?	The RMR has the same assumptions as the calibration run, except that flow and water quality data from the previous WLAM were included for 2005 and 2006. Clarification will be added to text.
3			Were non-tributary discharges such as discharges from OC-59 included in the Retrospective Mode simulation?	Yes, they were. OC-59 discharges in the RMR are summarized in the Summary Report Table 3 and detailed in Appendix B.
4			Please state the source of the flow rate and water quality data used to define historical parameters for each discharger.	This is discussed in Section 2 of the summary report. Reference back to this section will be added for clarification.

Comments on Draft TM No. 6 from OCWD – Comment Nos. 5-7

No.	Section	Pg.	Comment	GEOSCIENCE Response
5			Some of the table numbers referenced in the text are not correct. For example, the text says in several locations 'As shown in Tables 2 and 3 and …' but these are not the correct table numbers. An example are the table numbers listed on page 16, 'Predicted water quality results from the scenario runs for surface water below Prado Dam and at Santa Ana are presented in attached Tables 2 and 3'.	Table numbers will be updated
6			Are Tables 2-10, 2-11, 2-12, 2-13, and 2-14 labelled correctly? Should they be labelled a 'retrospective run'?	Titles will be corrected
7			Section 2.1.7 includes a discussion of the proposed TDS and TIN objectives for the Upper Temescal Valley GMZ (820 mg/L and 7.9 mg/L). Please add to this section a discussion of whether these proposed objectives are in management zones where there are no existing objectives in the Regional Board's Basin Plan.	Clarification will be added

Comments on Draft TM No. 6 from OCWD – Comment Nos. 8

No.	Section	Pg.	Comment	GEOSCIENCE Response
8			Concerning Section 2.1.8 and the tables labeled Table 2: Summary of TDS Model Results for Scenario A-F and Retrospective Mode and Table 3: Summary of TIN Model Results for Scenario A – F and Retrospective Mode." [note: correct typo in title of Table 3 from TDS to TIN]: This section is confusing as written. Please add text that explains the reasons that ambient groundwater quality for TDS/TIN was not computed after 1997. Explain that the determination of assimilative capacity for groundwater is separate from the determination of assimilative capacity in surface water. Please add text to describe the PBMZ in detail that explains why this is considered by the Regional Board as a surface water management zone. Listing the TDS and TIN objectives as ranges (on page 13 and in Table 2-11) makes it difficult to compare the objectives with model results. Please list any applicable objectives for different water bodies separately in both the text and tables rather than listing a range. The note attached to Table 2-11 concerning baseflow objectives is confusing without proper context. Consider adding this text to a more comprehensive discussion of how the Basin Plan treats the PBMZ. Consider creating a separate section for PBMZ instead of a subsection in the groundwater recharge section. The current text includes PBMZ in Section 2.1 Groundwater Recharge but PBMZ is not a groundwater management zone. PBMZ is not an easy fit as a surface water zone in the same manner as the other surface water bodies in the watershed. Please consider also changing Table 2: Summary of TDS Model Results for Scenario A – F and Retrospective Mode by taking the Santa Ana River-Reach 3, Prado Basin (the PBMZ) out of the groundwater section, for the reasons stated above. The PBMZ does not have its own objectives so there should be none listed. Please note that these changes should also be considered for the Summary Report, Section 6.1.8 and Table 6-8.	Additional discussion will be added. TDS and TIN objectives for PBMZ will be removed. PBMZ discussion will be moved.

Comments on Draft TM No. 6 from OCWD – Comment Nos. 9-11

No.	Section	Pg.	Comment	GEOSCIENCE Response
9		15	Text on page 15 states 'As shown in Tables 2 and 3 and in the graphs provided in Appendix A, the TDS and TIN concentrations from the retrospective run did not exceed the TDS or TIN objectives for Orange County GMZ.' The numbers in Table 2 and Table 3 do not appear to be correct.	Table numbers will be updated
10			Text on page 17 states 'There are currently no objectives or ambient surface water concentrations for Reach 2.' Is there some text missing from this sentence? Is this referring to TIN or nitrate objectives?	Text will be corrected.
11	Appendix	Appendix A	In Figure A-25, the text box covers up some of the lines on the graph – please resize the text box.	Figure will be modified

Comments on Draft TM No. 6 from OCWD – Comment No. 12

No.	Section	Pg.	Comment	GEOSCIENCE Response
12	Appendix	Appendix A	In Figure A-28, is '12-Year Volume Weighted Average for TDS at Below Prado Dam (364 mg/L)' based on August only values? If yes, please explain why the value is seemingly low. The value of 364 mg/L is smaller than any of the individual data points plotted in the figure.	No, it is not based on August only values. This will be recalculated.

Comments on Draft TM No. 6 from OCWD – Comment No. 13

No.	Section	Pg.	Comment	GEOSCIENCE Response
13			We have some questions about the 681 mg/L TDS value for August only for the SAR at below Prado Dam shown in Table 2-13. There were multiple years between 2005 and 2016 when the SAR at Below Prado Dam historical observed TDS concentration exceeded 700 mg/L yet the maximum simulated August only average value in the Retrospective Run was 681 mg/L. The Retrospective Run appears to be underestimating the TDS concentration for the SAR at below Prado Dam. Also, the 681 mg/L TDS value for August only for the SAR at below Prado Dam seems low considering the estimated value of 659 mg/L for the maximum 1-year volume weighted average for the OC Management Zone from Table 2-12.	Analysis is still in progress.

Comments on Draft TM No. 6 from OCWD – Comment No. 14

No.	Section	Pg.	Comment	GEOSCIENCE Response
14			Please prepare a plot for the Retrospective Run showing the historical TDS data for the SAR at below Prado Dam and the model simulated TDS value for the SAR at below Prado Dam for each day simulated in the model period of 2005 to 2016.	Plot will be created.

Comments on Draft TM No. 6 from OCWD – Comment No. 15

No.	Section	Pg.	Comment	GEOSCIENCE Response
15			Please add a discussion/summary section to the report. The results of the Retrospective Run are compared to the scenario runs for each management zone but there is no discussion of the results from an overall perspective. Example questions that could be answered in a discussion/summary section include: a. How do the Retrospective Run results inform the scenario run results? b. How may the Regional Board/Task Force potentially use the results of the Retrospective Run in interpreting and utilizing the results of the scenario results? c. Are there any recommendations to change the model for existing runs or future scenario runs based on the results of the Retrospective Run?	Additional discussion will be added

Comments on Draft TM No. 6 from OCWD – Comment No. 16

No.	Section	Pg.	Comment	GEOSCIENCE Response
16			Until we can have additional discussions about the Retrospective Run and resolve some of the questions raised in our comments, OCWD is not comfortable with using the results of the Retrospective Run for any work or evaluations by the Basin Monitoring Program Task Force.	Comment noted. We will schedule a meeting with OCWD to resolve any additional questions/concerns.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 1

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	2	3	Please provide additional detail on the input data used to characterize actual discharges from POTWs for the Retrospective Model Run (RMR). Was daily flow data used for each those discharges or the monthly average of daily flows (as reported on the DMR)? The same question applies to the TDS and TIN concentrations used in the RMR. Please confirm that the dataset used for the RMR will be included on CD of electronic files at the conclusion of the project.	Discharges used for RMR are the same as those used for the model calibration. These data are described in the Summary Report Section 2.5 and are provided in Appendix B. This will be clarified in the report.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 2

No.	Section	Pg.	Comment	GEOSCIENCE Response
2	2	3	It would help to note that this task is very similar to the calibration step earlier in the project. The only difference is that the new WLAM model (2017) was calibrated using data from water years 2007 thru 2016 and the RMR evaluated data from water years 2005 thru 2016 after WLAM-2017 was calibrated. Since the model was calibrated to fit most of this data, the RMR is designed to show how well it performs when compared to the data from those same years. It would also help to note early in the document that the 2020 scenarios are calibrated for the 2012 land use condition which fits in the middle of the RMR evaluation period.	Clarification will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 3-4

No.	Section	Pg.	Comment	GEOSCIENCE Response
3	2	3	For those that may not be familiar with water years, it would help to add a footnote to the end of the first sentence indicating that WY 2005-2016 runs from Oct. 1, 2004 thru Sept. 30, 2016. It includes the wet winters of 2005 and 2011 but not the wet winter of 2016-17.	Water Year footnote will be added to Introduction
4	2	3	Table 2-1: The results of the RMR were intended to be compared only to the 2020 scenarios (Sc. A, B & C). All references to the other (2040) scenarios can be deleted from the discussion, tables and graphs.	2040 references will be removed

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 5-6

No.	Section	Pg.	Comment	GEOSCIENCE Response
5	2.1	3	It would be helpful to reference the associated tables and graphs in the appendix at the outset of each sub-section discussing results for the individual management zones.	References will be added
6		4	Table 2-2 (and all subsequent similar tables): Please add a column describing the 12-year volume-weighted average recharge for TDS and TIN and the average annual volume of water recharged. These values are in the Appendix tables and charts and should be brought forward into the summary tables in the main report.	12-year weighted averages will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 7

No.	Section	Pg.	Comment	GEOSCIENCE Response
7	2.1.1	4	Is the last paragraph on this page intended to explain why the TIN concentrations exhibit an unusual spike in 2016 (see Appendix pg. A-2)?	Yes, this will be clarified in the text.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 8

No.	Section	Pg.	Comment	GEOSCIENCE Response
8		6	Table 2-4: There are bolded values shown in this table. The narrative discussion should note that this is "authorized degradation" in accordance with the maximum benefit demonstration previously approved by the Regional Board. In addition, there is nothing in the footnotes to the table or the narrative text that explains why some numbers are shown in red font. Since the adjacent column is labeled "Compliance Period" some may mistakenly interpret the red highlighting to imply that some sort of violation occurred in the past. It is important to explain that only the 10-year running average is used to assess whether the approved wasteload allocation is likely to assure compliance with the related water quality objectives.	Clarification will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 9

No.	Section	Pg.	Comment	GEOSCIENCE Response
9		7	Table 2-5: It is important to include an explanation indicating that, while this data accurately represents historical water quality at YVWD, it is not representative of current TIN concentrations in this effluent. The treatment plant was upgraded and the discharge now consistently complies with the more restrictive permit limit of 6.7 mg/L for TIN.	Statement will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 10

No.	Section	Pg.	Comment	GEOSCIENCE Response
10	2.1.3	8	Discussion of the Sterling Natural Resource Center discharge may be confusing since that plant has not been built yet and did not operate during the RMR evaluation period. It is only important to note because it may explain why the actual historical recharge differs somewhat from the 2020 model runs (which do include SNRC for some scenarios).	Will be removed in Final Report

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 11

No.	Section	Pg.	Comment	GEOSCIENCE Response
11	-	8	The is no evaluation of recharge to the Bunker Hill-A GMZ as it was not required in the project Scope of Work. However, since TDS and TIN concentrations in this GMZ exceed the applicable water quality objective, the new Recycled Water Policy may require that a Salt and Nitrate Management Plan be developed for the aquifer. It would be helpful to show that the stream flow recharge occurring in this GMZ is, in fact, meeting those objectives. The Task Force should discuss adding this analysis to the current project. The same is true for TIN in the Lytle GMZ.	This would be out of scope work. Will proceed based on input from the Task Force

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 12-13

No.	Section	Pg.	Comment	GEOSCIENCE Response
12	2.1.5	10	The discussion at the bottom of the page regarding the City of Riverside's planned discharges to the uppermost portion of Reach 3 are not relevant to this Tech Memo focusing on actual historical results when no such discharges occurred. This paragraph belongs in the Main WLAM report not TM#6.	Will be removed in Final Report
13	2.1.7	12	The actual discharges from EMWD and EVMWD to Temescal Creek are extremely rare and persist for only a very short time. This differs significantly from the assumptions that were used to model the maximum discharge scenarios, especially for EVMWD. It also explains the large difference between the 1-year, 5-year and 10-year values. This should be explained in the narrative text.	Additional explanation will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 14

No.	Section	Pg.	Comment	GEOSCIENCE Response
14	2.1.8	13	RIX, Rialto and the City of Riverside's discharges also contribute significant flows to the PBMZ.	Additional clarification will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 15

No.	Section	Pg.	Comment	GEOSCIENCE Response
15		14	Table 2-11: The PBMZ does not have its own separate water quality objectives. However, the objectives of the streams which flow into the PBMZ continue to apply to those streams in the PBMZ. Moreover, as already noted in the text, there is no groundwater recharge occurring in the PBMZ, so these objectives are not terribly relevant. The Basin Plan explicitly states that, for the purposes of protecting the downgradient groundwater basin (e.g. Orange County GMZ) the summer baseflow objective for Reach 3 and the 5-year moving average for Reach 2 should be used. Since the summer baseflow is discussed in Section 2.1.10, I think it best to simply delete the values in the Objective column for Table 2-11. The primary purpose of this table is to show the actual volume weighted average TIN and TDS for the stream flows converging in the PBMZ as these values do, in fact, differ from the summer baseflow estimates.	Objectives will be removed and note will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 16-17

No.	Section	Pg.	Comment	GEOSCIENCE Response
16		14-15	Tables 2-11 and 2-12: why do the values for TIN and TDS in the 1-year and 5-year periods differ from each other by so much? The water quality in Reach 2 between Prado Dam and Imperial Highway should look quite similar to the water quality immediately above Prado Dam in the PBMZ convergence zone. Is there significant additional stormwater runoff entering Reach 2 below Prado Dam?	In process of resolving
17	2.1.9	14	The text should make clear that the USACE discharge did not occur during the RMR evaluation period. However, it is included in Scenario A (Max. Discharge) for the 2020 projection. This is only useful for interpreting any discrepancy between the actual observed values and the estimates produced by the WLAM for the various discharge scenarios.	Clarification will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 18-19

No.	Section	Pg.	Comment	GEOSCIENCE Response
18	2.1.8	14	Table 2-11 (and all other similar Tables throughout): The "Ambient" column should be re-labeled to indicate that it is the 2015 estimate of ambient water quality in each GMZ and cite to the D.B. Stephens/CDM report where that data came from. This citation is also missing from the Reference section on pg. 19.	Clarification and reference will be added
19	2.2.1	16	Footnote #2: The RMR focuses on water years 2005 thru 2016. This footnote should be revised to describe the number of storm-influenced observations that were excluded from the calculation for these dates not the entire 67-year modeling simulation period.	Footnote will be modified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 20

No.	Section	Pg.	Comment	GEOSCIENCE Response
20	2.2.1	16	Geosciences should do a global search and replace throughout all reports to eliminate the phrase "August Only" and use the phrase "Baseflow Average." The Basin Plan describes this as flow and water quality conditions which prevail, principally during August and September, when the contribution from stormwater runoff and rising groundwater is at its annual minimum. It also excludes any anthropogenic water transfers that may occur during this monitoring period. "August Only" is an unofficial colloquialism that is used as short-hand to quickly convey a more complex concept.	Terminology will be changed and documented in the Final Report

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 21

No.	Section	Pg.	Comment	GEOSCIENCE Response
21	2.2.1	16	Were the State Project water transfers included in RMR analysis? Seems like they should be because we are trying to see how well the model matches up with what actually occurred. But, it is also important to know what water quality would have been without these transfers. Any suggestions as to how to separate and show both conditions? At a minimum, we should explicitly identify the months/years when these water transfers occurred.	OC-59 discharges are listed in the Summary Report in Table 3 and detailed in Appendix B. Additional detail will be added to the text

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 22

No.	Section	Pg.	Comment	GEOSCIENCE Response
22	Tables	Tables 1 and 2	Tables 1 and 2 (preceding Appendix A): These table repeat the assumptions used to develop the Predictive projections for the six scenarios but have very little to do with the RMR analysis. Some explanation is needed for why they are included with TM#6; otherwise some readers may mistakenly assume the values shown in these tables for the POTWs were used in the RMR calculations. In addition, it would be more useful to include some tables summarizing the actual average annual daily flows for each of the POTWs for each of the 12 years along with the average annual TIN & TDS values for each of these discharges in each of these years. The electronic appendices will provide the more detailed data used to perform the actual RMR calculations.	Table was included to provide assumptions for scenario runs, since they were included for comparison. Can add summary table with average flows for RMR period.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 23-25

No.	Section	Pg.	Comment	GEOSCIENCE Response
23	Appendix	Appendix A	Appendix A, All Tables: Please show the volume-weighted average for all 12 years in the RMR evaluation period at the bottom of the Retrospective column for both TIN & TDS.	Average will be added
24	Appendix	Appendix A	Appendix A: Scenarios D, E & F should be deleted from all graphs and tables in the Appendix.	Graphs and Tables will be modified
25	Appendix	Appendix A	Please confirm that the 12-year volume-weighted average shown in the legend of each table is actually the volume-weighted average of 4,380 days and not the arithmetic mean of the 12 individual volume-weighted annual averages.	12-year volume-weighted average is the volume-weighted average of 4,380 days

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 26-27

No.	Section	Pg.	Comment	GEOSCIENCE Response
26	Appendix	Appendix A	Appendix A: The tables and graphs lack Table #'s and Figure #'s to identify each one individually.	Tables and graphs will be referred to by page numbers in the Final Report (e.g., A-12)
27	Appendix	Appendix A	Appendix Pg. A-3: Retrospective maximum for both TDS and TIN are considerably higher than predicted by any of the 2020 scenarios. Add explanation at bottom of table or point reader back to discussion of Beaumont and YVWD earlier in the document. Same issue for S.T. GMZ on pgs. A-4, A-5 & A-6.	Additional explanation will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 28

No.	Section	Pg.	Comment	GEOSCIENCE Response
28	Appendix	Appendix A	Appendix Pg. A-14: Triennial ambient water quality updates show that average TIN concentrations in the Riverside-A GMZ have been trending up for the last 15 years and now sits around 5.6 mg/L. This does not seem to be consistent with Geosciences graph showing that the 12-year volume weighted average recharge is only 5.4 mg/L over the same general time period. Most likely due to higher TIN concentrations in areas of the GMZ not under the influence of the river. Same issue appears evident for Chino South on pages A-16 & A-17. Please double-check.	In process of resolving

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 29

No.	Section	Pg.	Comment	GEOSCIENCE Response
29	Appendix	Appendix A	Appendix Pg. A-19: Unusually steep downward trend in volume-weighted annual TDS for the Upper Temescal Valley GMZ. Seems to mirror reductions in discharge/recharge volume. The large right-Y axis masks this relationship. Consider using smaller maximum Y-value on this axis. Would also help to add footnotes showing how little wastewater was actually discharged to this reach in the RMR evaluation period.	Affected by EMWD discharge, which was discontinued in 2014. Additional discussion will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 30

No.	Section	Pg.	Comment	GEOSCIENCE Response
30	Appendix	Appendix A	Appendix Pg. A-21: Table shows that TDS was less than 100 mg/L and TIN was less than 1 mg/L in 2014, 2015 & 2016. Not clear how this can be true if stormwater runoff is assumed to be about 150-200 mg/L in TDS and about 2-3 mg/L in TIN. Even with zero wastewater in this reach, the TIN & TDS should be higher.	As mentioned in Section 3.2.9.1, TDS and TIN in stormwater runoff ranged from 67 to 232 mg/L and 0.5 to 2.0 mg/L, respectively. This shouldn't be confused with model-calculated concentrations for deep percolation, which includes dry deposition and a concentrating effect from percolation, reported in Section 7 of the Summary Report. Part of this may be due to numeric error. Low flows can cause low TDS values. We will review the data and remove these errors.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 31-33

No.	Section	Pg.	Comment	GEOSCIENCE Response
31	Appendix	Appendix A	Appendix Pg. A-22: Table legend shows "Annual Recharge to PBMZ = 14,708 acre-ft/yr" but page 13 of TM#6 states that no recharge occurs in the PBMZ. Please resolve this contradiction.	A footnote will be added similar to the one on Summary Report Table 6-8. Most of the streambed recharge in Prado Basin Management Zone is assumed to be temporary and largely become rising water. However, some percolation is assumed to occur upstream of River Rd.
32	Appendix	Appendix A	Appendix Pg. A-22: Table shows the TDS objective for PBMZ is 700 mg/L. This is the Reach 3 baseflow objective and should be described as such.	Legend will be corrected
33	Appendix	Appendix A	Appendix Pg. A-25: Legend states that the 12-year volume-weighted average for TDS in SAR-Reach 2 overlying the OC-GMZ is 251 mg/L, but the graph shows something closer to 540 mg/L. Probably a typo in the legend.	Typo will be corrected

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 34-35

No.	Section	Pg.	Comment	GEOSCIENCE Response
34	Appendix	Appendix A	Appendix Pg. A-26: Legend states that the 12-year volume-weighted average TIN in SAR-Reach 2 overlying the OC-GMZ is 0.8 mg/L, but the graph shows something closer to 2.1 mg/L. Another typo? All TIN data in the Retrospective column on pg. A-27 is greater than 1.4 mg/L. This data cannot possibly produce a volume-weighted average of 0.8 mg/L.	Typo will be corrected
35	Appendix	Appendix A	Appendix Pg. A-22 thru 27: as noted earlier, the TIN and TDS values in the PBMZ and in Reach 2 below Prado should be very similar. Please reconcile or provide explanation for apparent differences.	Recharge in PBMZ only occurs in the upper section, above River Rd. and above the influence of rising water. Reach 2 below Prado includes the higher TDS from rising water. Clarification will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 36

No.	Section	Pg.	Comment	GEOSCIENCE Response
36	Appendix	Appendix A	Appendix Pg. A-28: TDS objective at this location is for baseflow conditions (e.g. average of August and September data w/o storm influenced flows). Please confirm that the retrospective line represents just this baseflow condition.	Currently, this concentration is calculated for August-only, following the convention used in the previous WLAM reports but modified based on findings from Risk Sciences (removed days influenced by storm events). Changing this value would require out of scope work to recompile and analyze precipitation for September to identify storm events. Will proceed based on input from the Task Force

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 37

No.	Section	Pg.	Comment	GEOSCIENCE Response
37	Appendix	Appendix A	Appendix Pg. A-28: Legend indicates the blue line represents the 12-year volume-weighted average for TDS at below Prado Dam and states the value is 364 mg/L. However, all points on the black line representing the RMR evaluation are much higher than 364 mg/L. The latter value does not appear to be computed for just the summer baseflow conditions. Same concern for Appendix Pg. A-29. Please verify and revise.	Legend will be corrected. 12-yr average shown is not August-Only. This will be recalculated

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 38

No.	Section	Pg.	Comment	GEOSCIENCE Response
38	Appendix	Appendix A	Appendix Pgs. A-28 & A-29: Annual discharge volumes appear to be for the full water year. Singe the relevant objectives apply only during baseflow conditions, the blue bars should be re-computed for the August-September baseflow condition only.	Currently, this concentration is calculated for August-only, following the convention used in the previous WLAM reports but modified based on findings from Risk Sciences (removed days influenced by storm events). Changing this value would require out of scope work to recompile and analyze precipitation for September to identify storm events. Will proceed based on input from the Task Force

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 39

No.	Section	Pg.	Comment	GEOSCIENCE Response
39	Appendix	Appendix A	Appendix Pgs. A-30 the TIN & TDS values shown in the Retrospective columns of this table do not match well with the baseflow TIN & TDS values reported by SAWPA in the annual reports of Santa Ana River water quality (see TDS summary table below). Same problem occurs in the graphs on pages A-31 and A-32. Please cross-check your observed values with those reported by SAWPA and resolve the inconsistencies.	In process of resolving

Summary of SAWPA's Annual Reports of SAR Water Quality: TDS Only (mg/L)

Water Year	Volume-Weighted Annual Average	5-Yr. Running Avg.	Baseflow Average	N of Samples for Baseflow
2017-18	625	539	720	18
2016-17	408	539	705	15
2015-16	560	573	554	18
2014-15	522	508	623	17
2013-14	582	554	601	11
2012-13	621	537	692	13
2011-12	598	520	646	20
2010-11	517	522	500	25
2009-10	450	524	667	21
2008-09	533	506	631	21
2007-08	504	458	624	21
2006-07	607	455	621	17

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 40-41

No.	Section	Pg.	Comment	GEOSCIENCE Response
40	Appendix	Appendix A	Appendix Pg. A-33: Why are no values reported in the Retrospective column for 2005 thru 2008?	Table will be updated
41	Appendix	Appendix A	Appendix Pages A-28 thru A-35: consider reducing the maximum value on the right side Y-axis by 50% (from 1 million down to 500k) so that the smaller bars are easier to see. It would also help to add an explanation that the flows in SAR at Santa Ana are essentially stormwater runoff that OCWD was unable to capture, divert and recharge.	Explanation will be added to the text

Responses to
Comments on Draft Summary Report

Summary of Comments for Draft Summary Report

Source	No Action Necessary	Minor Edit	Additional Explanation or Table/ Figure	Additional Analysis	Need to Discuss with the Task Force	Total No. of Com-ments
	Corresponding Comment Number					
Risk Sciences	43-45, 47, 49-51	1, 3-16, 18, 19, 22-27*, 30-38, 40-42, 53, 55	2, 21, 39, 52	20, 28, 29, 46, 48, 54	17	54
					Total	54

Note: Blue numbers indicate that responses that are still in progress

* Missing #23

Comments on Draft Summary Report from Risk Sciences – Comment Nos. 1-2

No.	Section	Pg.	Comment	GEOSCIENCE Response
1	5.1	72	Pg. 72, Section 5.1, last paragraph; the report states that: "…the 67-year period used for the model simulation is not representative of conditions 67 years into the future." This wording may cause some to conclude that the WLAM is seriously flawed because it is not "representative." I recommend re-wording this to say: "When running the simulation model, it is assumed that the range of meteorological conditions expected to occur should fall within the same range of conditions that have been observed over the previous six decades. This is not meant to imply that the actual pattern of rainfall over the next 67 years will look exactly like the last 67 years."	Text will be modified
2			Would it be possible to prepare some sort of Cumulative Frequency Distribution graph, using daily flows at Prado Dam, to illustrate the very wide range of conditions evaluated by the simulation model?	Figure will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 3-4

No.	Section	Pg.	Comment	GEOSCIENCE Response
3	5.3.1.1	73	Pg. 73, Section 5.3.1.1: Need to make clear that the USACE discharge occurred in Reach 2 of the SAR (below Prado Dam). On page 74, the text states that this discharge was temporary. Please identify the start and end dates for that project. The draft report acknowledges that USACE's dewatering discharge was assumed to occur for the entire duration of Scenario A, but it should also state that it was not included in any of the other Scenarios (B thru F).	Will clarify in text
4	5.3.1.2.3	76	Pg. 76, Section 5.3.1.2.3: Text states that Corona WWTP #3 is due to be decommissioned in 2020. So, while it was included in the calibration (because it was operating in that period) it was not included in any of the Scenarios, right?	Correct; will clarify in text.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 5-7

No.	Section	Pg.	Comment	GEOSCIENCE Response
5	5.3.1.2.4	76	Pg. 76, Section 5.3.1.2.4: delete the word "contractually" from the second sentence.	Text will be modified
6	5.3.1.2.4	76	Pg. 76, Section 5.3.1.2.4: add the word "only" after "0.5 MGD" and before "during extreme wet weather."	Text will be modified
7	5.3.1.3	77	Pg. 77, Section 5.3.1.3: First paragraph states that OC-59 water transfers were not included in any of the Predictive Scenario runs. However, I think they were included in the Retrospective run discussed in Section 8, right?	Correct; will clarify in text

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 8-9

No.	Section	Pg.	Comment	GEOSCIENCE Response
8	5.3.1.3	77	Pg. 77, Section 5.3.1.3: Second paragraph indicates that a diversion capacity of 500 cfs was assumed for the various scenario runs. Is this appropriate for the 2020 condition? The current capacity is only about 200 cfs. When will the increased diversion capacity actually become available?	Diversion modification was completed in November 2018. Will clarify in text.
9	5.3.2	78	Pg. 78, Section 5.3.2: I do not understand the text that explains how the diversion capacity was increased from 200 cfs to 500 cfs starting in January of 2002. Why wouldn't we just use 200 cfs for all the 2020 scenarios and 500 cfs for all the 2040 scenarios? This discussion appears to be more related to the issue of calibration than to results from the predictive scenario runs.	Clarification will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 10-11

No.	Section	Pg.	Comment	GEOSCIENCE Response
10	5.3.5	79	Pg. 79, Section 5.3.5: Text states that the volume of rising water at Riverside Narrows and in the vicinity of Prado Dam were assumed to be the same as the average monthly rising water from the calibration period. Please provide the numeric value that was used based on that assumption.	Reference to Table 23 will be added.
11	5.4.1.1	79	Pg. 79, Section 5.4.1.1: What numeric TIN & TDS values were used to represent the USACE dewatering discharge in Scenario A?	Averages will be added (currently provided in Table 20)

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 12-13

No.	Section	Pg.	Comment	GEOSCIENCE Response
12	5.4.1.2.2	80	Pg. 80, Section 5.4.1.2.2: Since there is no existing permit and no historical record to characterize SNRC's dischargers, what numeric TIN &TDS values were used in the predictive simulations? I know this information is presented in a table much later in the document but, in some of the atypical cases (like USACE & SNRC) it is a good idea to repeat the information in the narrative text.	Text will be modified
13	5.4.1.2.5	81	Pg. 81, Section 5.4.1.2.5: Last sentence of first paragraph states that the BPA is expected by the end of FY2018 or early 2019. Since we are now at the end of 2019, I think this should be revised to say "sometime in 2020."	Text will be modified

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 14-15

No.	Section	Pg.	Comment	GEOSCIENCE Response
14	5.4.3	82	Pg. 82, Section 5.4.3: text states that the City of Riverside has presented data to support a higher N-loss coefficient. It is more accurate to state that: "The Regional Board has approved a higher nitrogen loss coefficient for the lower portion of Reach 3 overlying the Chino South GMZ based on site-specific scientific studies prepared and submitted by the City of Riverside."	Text will be modified
15	6	83	Pg. 83, Section 6.0: The rolling 10-year average is intended to identify periods of prolonged drought and to provide a surrogate indication of what might be expected to occur in response to projected climate change in the region.	Text will be modified

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 16-17

No.	Section	Pg.	Comment	GEOSCIENCE Response
16	6	83	Pg. 83, Section 6.0, second paragraph: change "…. and designate a use of assimilative capacity" to "…and identify conditions where a potential use of assimilative capacity may occur."	Text will be modified
17	6.1	83	Pg. 83, Section 6.1: text states that streambed recharge in Reach 4 of San Timoteo Creek was only evaluated for the segment of the stream below the City of Beaumont's outfall. There is no technical justification for this approach and it produces a biased and inaccurate picture of the probable impact on the underlying aquifer. All streambed recharge from Reach 4 of STC to the Beaumont GMZ should be included in the calculation.	Per WEI description of calculation area (see pg. 6 of Scenario 8 WLAM Addendum). Will proceed based on input from the Task Force

For streambed recharge to groundwater, note that the model results are only representative of those reaches of the SAR and its tributaries where wastewater discharges can flow, commingle with other waters, and percolate to groundwater. Other stream reaches, where wastewater is absent, were excluded from the computation of compliance metrics. For example, in the Beaumont GMZ, streambed recharge and quality were only computed for reaches downstream of wastewater effluent discharge locations; storm water that percolates in the unlined reaches upstream of the discharge

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 18

No.	Section	Pg.	Comment	GEOSCIENCE Response
18	6.1.2	87	Pg. 87, Section 6.1.2: Table 6.2 improperly compares the recharge quality to the Original Antidegradation Objectives in the Basin Plan and, as a result, shows all of the TIN values in boldface type. As noted in the text, water quality in the lower reaches of San Timoteo Creek is largely driven by the discharges from YVWD and the City of Beaumont. These discharges must comply with effluent limits designed to meet the Maximum Benefit objectives approved by the Regional Board. Therefore, the text should indicate that the increased TIN concentration in the recharge is an "authorized degradation" provided that it continues to comply with the 5.0 mg/L objective in the Basin Plan.	Text and table will be modified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 19

No.	Section	Pg.	Comment	GEOSCIENCE Response
19	6.1.3	88	Pg. 88, Section 6.1.3: Revise text to say: "Since there are not POTW outfalls discharges in San Timoteo Creek Reach 1…" In addition, there is mention of SNRC forthcoming discharges to City Creek which also overlies the Bunker Hill-B GMZ. Please correct this omission.	Text will be modified. SNRC is mentioned.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 20

No.	Section	Pg.	Comment	GEOSCIENCE Response
20	6.1.4	90	Pg. 90, Section 6.1.4: Since there are not POTW outfalls anywhere near SAR-Reach 4, it is difficult to understand what is driving the higher TIN concentrations shown in Scenario A. In addition, there is only a 560 acre-foot difference between Scenario A (max discharge) and Scenario B (expected discharge). With so little change in flow, what is causing the disproportionately higher TIN in the streambed recharge? Since effluent from Beaumont & YVWD recharges in STC before the confluence with SAR-Reach 5, I assume what we may be seeing here is the effect of SNRC's proposed discharge, right?	In process of resolving

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 21

No.	Section	Pg.	Comment	GEOSCIENCE Response
21	6.1.5	91	Pg. 91, Section 6.1.5: I believe the Task Force previously directed Geosciences to prepare separate analyses for SAR-Reach 3 and SAR-Reach 4 where they overlie the Riverside-A GMZ. Nearly all of the recharge shown in Table 6-5 occurs in Reach 4 above the influence of rising groundwater (with higher TDS) that occurs in Reach 3.	Text and tables can be added. No recharge occurs in Reach 3.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 22-24 (no 23)

No.	Section	Pg.	Comment	GEOSCIENCE Response
22	6.1.6	93	Pg. 93, Section 6.1.6: While it is true that streambed recharge complies with both the water quality objectives, and poses no risk of degradation, it is important to note somewhere in the text that this recharge is actually significantly improving water quality in the Chino-South GMZ because the average TIN & TDS is so much lower than both the ambient receiving water and the associated basin plan objectives.	Text will be added.
24	6.1.7	94	Pg. 94, Section 6.1.7: the elevated (boldface) TIN values shown for the maximum discharge scenarios (A & D) are most likely being driven by the extremely conservative (high flow) discharge assumptions applied to both EVMWD & EMWD. The conservative nature of these assumptions was called-out earlier but should be repeated here. It may be appropriate to ask these two agencies to pull together some real-world historical data that more accurately describes their actual discharges to Temescal Creek over the last 15-20 years so that we can put the worst-case assumption of Scenario A in proper perspective.	Clarification will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 25-27

No.	Section	Pg.	Comment	GEOSCIENCE Response
25	6.1.8	95	Pg. 95, Section 6.1.8: revise text to say that: "…no significant percolation ~~is thought to~~ occurs in …" If this is true, then why does Table 6-8 show there is more than 14,600 acre-feet of recharge occurring in the PBMZ for all six scenarios?	Text will be modified. See Footnote 3. Recharge occurs in the upper portion of the PBMZ (above River Rd.)
26		97	Pg. 97, Table 6-8: shows water quality objective at Prado as TIN. Footnote in Basin Plan states that compliance with this objective is evaluated using Total Nitrogen measured in a filtered sample. Add footnote to table describing the objective more accurately.	Footnote will be added
27	6.1.9	98	Pg. 98, Section 6.1.9: need to be very clear that the USACE dewatering discharge occurs in Reach 2 below Prado Dam. This is one of several reasons why the results in Table 6-8, 6-9 and 6-10 appear so inconsistent with one another. See discussion below.	Text will be clarified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 28

No.	Section	Pg.	Comment	GEOSCIENCE Response
28		99	Pg. 99, Table 6-9: While the TDS values in this table are generally within 10% of those shown in Table 6-8, the TIN values are nowhere close to one another. The TIN values in Table 6-8 are nearly double those shown in Table 6-9. What accounts for the huge difference? Additional stormwater flowing in to Reach 2? The additional 25% N-loss that occurs as water percolates from Reach 2 to the OC-GMZ? Nitrogen removed by OC's Prado wetlands? The text must acknowledge and explain the discrepancy before we can have confidence in and rely on the WLAM results.	While TIN does decrease a little bit because of the N-loss, the difference may also be partly due to WLAM calibration in this area. Reach 2 is only calibrated to available water quality data at the Imperial gage. Calibration results show the WLAM slightly underestimates TIN at this location. Differences will be verified. Additional explanation will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 29

No.	Section	Pg.	Comment	GEOSCIENCE Response
29		101	Pg. 101, Table 6-10: The five-year running averages for TDS in this table are 100-200 mg/L lower than the values shown on the 5-year line of both Table 6-8 and Table 6-9. Table 6-10 seems to indicate that the highest 5-year average in Reach 2(below Prado) easily complies with both the surface water objective (650 mg/L) and the TDS objective for the underlying OC-GMZ (580 mg/L), but Table 6-9 shows the highest 5-year average for TDS exceeds both these values in all but Scenario D. In addition, Table 6-10 shows Scenario A & D have higher TDS than the other four scenarios but Table 6-9 reports the opposite is true. These discrepancies must be resolved before we can rely on the WLAM.	There are several factors which could be leading to these differences. 1st, and perhaps more important, Tables 6-8 and 6-9 reflect water quality for recharge and are reported with a 5-yr volume-weighted average. Table 6-10, on the other hand, reflects streamflow and is reported using a 5-yr moving average of the 1-yr volume weighted concentration. Therefore, the averages being compared were calculated using different methods. In addition, Table 6-9 (Orange County GMZ) includes RFM recharge. The rules built into the RFM makes the daily flow very consistent and the volume-weighted average isn't greatly affected by storm events. The 5-yr moving average shown in Table 6-10 (Streamflow in SAR below Prado Dam) is more influenced by storm events, which would cause the concentration to appear lower (more influence from higher quality water).

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 30

No.	Section	Pg.	Comment	GEOSCIENCE Response
30	9	118	Pg. 118, Section 9.0, first bullet: the text seems to imply that most of the difference observed between model predictions and stream gage values occurs at the lower end of the flow range ("near the limit of detection"). If so, then the text should note that errors at this end of the range are almost irrelevant because they have so little realworld effect on the actual recharges that occur.	Text will be clarified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 31

No.	Section	Pg.	Comment	GEOSCIENCE Response
31	9	118	Pg. 118, Section 9.0, second bullet: the sweeping claim made in the last sentence is extremely unsettling. More explanation and more detail are needed. Which gages, which years, which flows (high or low) are not within 15% of the true value? Is there a systematic bias to the low or high side? What effect does this have on the WLAM predictive analysis? At a minimum, it may be necessary to show how accurate or inaccurate the flow data is at the two most critical gages used in the WLAM: MWD crossing and Prado Dam.	Gage data accuracy is presented in Table 2-3. Reference will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 32

No.	Section	Pg.	Comment	GEOSCIENCE Response
32	9	118	Pg. 118, Section 9.0, third bullet: the text states that "…these deviations are not accounted for in the modeling…" It is more accurate to say that there is no way for the model to account for such deviations because they represent departures for the Standard Operating Procedures and, by definition, follow no predictable rule-based procedure.	Text will be clarified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 33

No.	Section	Pg.	Comment	GEOSCIENCE Response
33	9	118	Page 118, Section 9.0, fourth bullet: If the WLAM is unable to predict when the sand dike will be washed out or when it will be rebuilt, the text should indicate that the WLAM assumes this diversion structure remains in-place throughout all simulation conditions. This assumption does not alter the amount of flow estimated to flow through Prado Dam. And, it has only a slight effect on water quality. TDS will be overestimated because, without the dike, there is less evaporative loss in the Prado wetlands. TIN will be underestimated because, without the dike diverting flows, the Nloss that normally occurs in those wetlands will not happen. Neither is a big deal because the washouts happen in the winter and the dike is repaired long before we get to the August-September baseflow monitoring period that poses the biggest challenge for regulatory compliance.	Text will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 34

No.	Section	Pg.	Comment	GEOSCIENCE Response
34	9	119	Page 119, Section 9.0, fourth bullet: I believe Geosciences had daily discharge data for the POTWs, but I don't think we had daily measurements for TIN & TDS for each of these wastewaters. I assume we just used the monthly average, as reported on the DMRs, to represent each day in that month. If so, this is also a source of potential error that should be discussed in this paragraph.	Text will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 35

No.	Section	Pg.	Comment	GEOSCIENCE Response
35	9	120	Pg. 120, Section 9.0, last bullet: the 25% nitrogen loss assumption is used as a default value throughout the entire watershed (with limited exceptions in lower Reach 3 of the SAR and near some of EMWD's recharge basins). It was deliberately designed to be conservative and is not intended to be an accurate estimate of the site-specific nitrogen losses that actually occur in the various streambeds. Consequently, using this conservative assumption also creates something of a safety factor for the estimated TIN concentrations associated with streambed recharge.	Discussion will be added

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 36-37

No.	Section	Pg.	Comment	GEOSCIENCE Response
36	6	-	Tables 6-1 thru 6-10: the long-term (67-year) average should be shown on these tables. In addition, a footnote should be added to each table directing the reader to where the related data and graphs can be found in the appendices.	Averages and references will be added
37	6	-	All of Section 6: somewhere early on the document needs to state that every reference to "current" groundwater quality is based on the volume-weighted average of well samples collected in the 20-year period between 1996 and 2015. D.B. Stephens' final report should be cited and added to the Reference Section (it is presently missing). The Regional Board resolution which accepted these estimates (R8-2018-0027; March 23, 2018) should also be added to the Reference Section. Finally, it should be noted that these estimates are revised triennially and the next update will be published in early 2020.	Text will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 38-39

No.	Section	Pg.	Comment	GEOSCIENCE Response
38	Appendices	Appendix G	All graphs in Appendix G: it would help to adjust the left Y-axis to allow the graphics to spread out more and make it easier to discern the changes in the lines representing different averaging periods. This probably creates an issue with where to put the legend. So, at a minimum, the change suggested above is most critical for the CDF graphs. It would also help to add vertical grid lines to the CDF graphs.	Figures will be modified
39	Appendices	Appendix G	Appendix G: As noted earlier, the Task Force previously requested separate analyses for Reach 3 and Reach 4 of the Santa Ana River where these segments overlie the Riverside-A GMZ. Please prepare separate tables and graphs, splitting Reach 3 from Reach 4, to replace the unified tables and graphs presently shown in Appendix G for the Riverside-A GMZ.	Tables will be added (will be zero for Reach 3)

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 40

No.	Section	Pg.	Comment	GEOSCIENCE Response
40	Appendices	-	At present, the appendices are organized by Scenario. I found this rather unwieldy as I flipped from the discussion in Section 6 to the supporting tables and graphs in the appendices. It may be helpful to reorganize them so that the six scenarios for each GMZ are grouped together; this would match the way the tables and discussion are presented in Section 6 and would make the cross-referencing easier to manage. Alternatively, perhaps Geosciences can leave the appendices just as they are but add hyperlinks to the PDF file so that the reader merely had to click the link to see the related temporal and CDF graphs for each scenario in each GMZ.	References will be added. Bookmarks are also included in the PDF to make moving through the document easier.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 41

No.	Section	Pg.	Comment	GEOSCIENCE Response
41	6	-	Tables 6-1 thru 6-10: the column entitled "Compliance Period" should be relabeled as: "Averaging Period." Otherwise some may mistakenly conclude that bold or red fonts imply an actual violation occurred based on some sort of non-compliance.	Tables will be modified

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 42

No.	Section	Pg.	Comment	GEOSCIENCE Response
42	Appendices	Appendix G	All tables and graphs in Appendix G: there is no 5-year average calculated for the first 4 years in the 67-year simulation period, no 10-year average calculated for the first 9 years in the 67-year simulation period, and no 20-year average calculated for the first 19 years in the simulation period. This is not consistent with the Task Force's past practice (see excerpt below from WEI's 2015 Final Report for Scenario 8). In previous WLAM projects, individual annual values from the end of the 67-year monitoring period were "rolled-over" to allow long-term averages to be computed for all 67-years. It is not important that the hydrology which occurred in the latter years does not accurately represent that which occurred in the years prior to 1949 because the goal here is to characterize a range of possible meteorological conditions not to forecast the specific sequence that may occur. It is important that all 67-years receive equal weight when calculating the long-term averages. By not calculating long-term averages for some years in the tables, the cumulative distribution function graphs that follow no longer provide accurate estimates of the probability of exceedance. This is particularly true for the 20-year average where the CDF graph omits 28% of the potential data-points.	Will update averages and add similar explanation

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 43-45

No.	Section	Pg.	Comment	GEOSCIENCE Response
43	Tables	-	Since the tables focus on Water Years 2007 thru 2016, I assume these tables reflect the calibration results for the WLAM not any of the predictive scenarios. Is that correct?	Correct
44	Tables	-	Consequently, the TDS & TIN values shown would be based on the actual concentrations discharged by the POTWs in those years not the maximum permitted concentrations. Is that correct?	Correct
45	Tables	-	If the Retrospective Analysis had been run on WY2007 thru 2016 instead of WY2005 thru 2016, would the results of that truncated RA be expected to be quite close to the results shown for the 10-year annual average shown in Tables 5 thru 18?	Correct

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 46

No.	Section	Pg.	Comment	GEOSCIENCE Response
46	Tables	-	Does this explain why the estimated TDS of streambed percolation in each of these tables does not appear to match the 10-year rolling average for the same 2007-16 period in the Tables shown in Appendix H? For example, Table 7 indicates the average TDS concentration for streambed percolation to the Colton GMZ for 2007-2016 is 236 mg/L. But, the Table shown on page H-20 indicates the average TDS concentration for the 10-year period ending in 2016 is 246 mg/L (Scenario B). Another example: Table 5 indicates the average TDS concentration for streambed percolation to the Bunker Hill GMZ for 2007-2016 is 198 mg/L. But, the Table shown on page H-15 shows the average TDS concentration for the 10-year period ending in 2016 is 257 mg/L (Scenario B). Is the difference due primarily to the fact that the Table in Appendix H include SNRC in Scenario B but Table 5 thru 18 do not because SNRC was not yet operating during the calibration period?	Appendix H represents Scenario B results (most likely discharge), while Tables 5 through 18 represent calibration (model-calculated based on observed data and actual discharge information). Therefore, the discharge assumptions are different. Additional differences could be caused by comparing the average streambed percolation over the calibration period to the 10-yr volume-weighted averages presented for the scenarios. Differences in discharge assumptions (not just the addition of SNRC) could contribute to increased concentrations seen in Scenario B.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 47-49

No.	Section	Pg.	Comment	GEOSCIENCE Response
47	Tables	-	Are the Annual Averages shown in the last row of each table the volume-weighted average of the 10-year period or the arithmetic mean of the individual volume-weighed annual averages?	Averages shown in Tables 5 through 18 represent the arithmetic mean of the individual volume-weighted annual averages.
48	Tables	Table 9	Looking at Table 9, why is the TDS concentration of the streambed recharge so much higher than the TDS concentration in the downstream outflow in nine out of ten years but not in 2007? Same question for TIN?	2007 is a very dry year; observed data shows a small stormwater peak. Therefore, there is less stormflow water to dilute concentrations in the water leaving the reach.
49	Tables	-	Have the streambed percolation values for TIN (shown in Tables 5 thru 18) already been reduced to account for the appropriate N-loss coefficient for each stream segment?	No - Tables 5 through 18 provide a mass balance for the stream, not the groundwater. Additional clarification will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment Nos. 50-51

No.	Section	Pg.	Comment	GEOSCIENCE Response
50	Tables	Table 14	Does the denitrification column shown in Table 14 represent N-losses in the surface stream or N-losses thru streambed percolation to groundwater?	As explained in Section 3.2.9.5, denitrification is not the same as nitrogen loss. Denitrification is the loss of nitrogen in surface flow due to the reduction of nitrate by faculative anaerobic bacteria while nitrogen loss is used to account for additional nitrogen loss as surface water percolates into the ground. Clarification will be added
51	Tables	Tables 15 and 16	Tables 15 and 16 show both "Rising Water" and "Streambed Percolation" in SAR-Reach 3 overlying the PBMZ. The difference (15,853 - 17,263) appears to suggest a small net recharge (1,410) to groundwater. This is not consistent with the statements made in the text of the main report.	Recharge occurs in the upper part of the PBMZ (above River Rd.). Clarification will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 52

No.	Section	Pg.	Comment	GEOSCIENCE Response
52	Tables	Table 15	Table 15 indicates that 10-year average TDS in the downstream outflow of the PBMZ is 442 mg/L. However, using data from the annual Watermaster reports, I calculate the mean of the ten annual values to be about 547 mg/L (see table below). What accounts for the 100 mg/L difference?	The 10-yr average TDS reported in Table 15 was calculated by the HSPF model using a daily timestep. Therefore, all stormflow events (contributing higher quality water) are included in the calculation. The annual values calculated in the Watermaster reports rely on measured data and ignore missing days (often storm events). Additional clarification will be added.

Water Year	Flow-weighted Average TDS
2007	607 mg/L
2008	504 mg/L
2009	533 mg/L
2010	450 mg/L
2011	517 mg/L
2012	598 mg/L
2013	621 mg/L
2014	582 mg/L
2015	522 mg/L
2016	541 mg/L
Mean	547 mg/L

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 53

No.	Section	Pg.	Comment	GEOSCIENCE Response
53	Tables	Table 15	Table 15 also shows that the TDS concentration of the rising groundwater into Reach 3 from the PBMZ (1,062 mg/L) is more than 500 mg/L grams higher that the TDS concentration of water percolating from Reach 3 into the PBMZ (575 mg/L). Am I correct in concluding that we can use these results to support WEI's previous conclusion that the recent exceedances of the baseflow TDS objective (700 ug/L) in the summer sampling program are due almost entirely to the very high TDS in rising groundwater and not the TDS concentrations in POTW discharges?	Yes, we believe so. Discussion will be added.

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 54

No.	Section	Pg.	Comment	GEOSCIENCE Response
54	Tables	Table 17	Table 17 shows the average TDS in upstream inflow to Reach 2 is 442 mg/L and the average TDS of local runoff to that same reach is 148 mg/L. By merging the two on a mass-balance basis, I estimate that the flow-weighted average combined TDS is about 402 mg/L. However, the table indicates that the average streambed percolation in Reach 2 is only 256 mg. I am not clear how the WLAM arrives at this estimate given the two input values.	In process of resolving

Comments on Draft TM No. 6 from Risk Sciences – Comment No. 55

No.	Section	Pg.	Comment	GEOSCIENCE Response
55	Tables	Table 28	Table 28 summarizes Annual Stormwater Spreading for Scenarios A-F in Orange County. Where does this "Stormwater Spreading" occur and how is it used in the WLAM? Is this the off-channel recharge basins or the in-channel spreading that is promoted by OCWD's T-levees? Since table purports to represent stormwater, why are the TDS concentrations so much higher than one normally associates with stormwater runoff?	This is the off-channel recharge calculated by the RFM. The concentration is based on that from the Imperial Gage. Text will be clarified.