



Aug. 23, 2019

via E-mail

TO: Johnson Yeh, Geosciences

FROM: Tim Moore, Risk Sciences

CC: Mark Norton, SAWPA

RE: Comments on WLAM Technical Memorandum #6

- 1) Pg. 3, Section 2.0: 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.
- 2) Pg. 3, Section 2.0: 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.
- 3) Pg. 3, Section 2.0: 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.
- 4) Pg. 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.
- 5) Pg. 3, Section 2.1: 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.

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- 6) Pg. 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.
- 7) Pg. 4, Section 2.1.1: 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)?
- 8) Pg. 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.
- 9) Pg. 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.
- 10) Pg. 8, Section 2.1.3: 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).
- 11) Pg. 8: There 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.
- 12) Pg. 10, Section 2.1.5: 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.

- 13) Pg. 12, Section 2.1.7: 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.
- 14) Pg. 13, Section 2.1.8: RIX, Rialto and the City of Riverside's discharges also contribute significant flows to the PBMZ.
- 15) Pg. 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.
- 16) Pg. 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?
- 17) Pg. 14, Section 2.1.9: 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.
- 18) Pg. 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.
- 19) Pg. 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.

- 20) Pg. 16, Section 2.2.1: 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.
- 21) Pg. 16, Section 2.2.1: 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.
- 22) 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.
- 23) 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.
- 24) Appendix A: Scenarios D, E & F should be deleted from all graphs and tables in the Appendix.
- 25) 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.
- 26) Appendix A: The tables and graphs lack Table #'s and Figure #'s to identify each one individually.
- 27) 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.

- 28) 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.
- 29) 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.
- 30) 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.
- 31) 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.
- 32) 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.
- 33) 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.
- 34) 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.
- 35) 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.
- 36) 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.

- 37) 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.
- 38) Appendix Pgs. A-28 & A-29: Annual discharge volumes appear to be for the full water year. Since the relevant objectives apply only during baseflow conditions, the blue bars should be re-computed for the August-September baseflow condition only.
- 39) 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.

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

- 40) Appendix Pg. A-33: Why are no values reported in the Retrospective column for 2005 thru 2008?
- 41) 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.