



## Status Summary for Phosphorus Offsets Credits Generated by LEAMS (2011-2018)

- 1) The 2004 TMDL included a conservative presumption that LEAMS would reduce phosphorus loads being released by sediments at the bottom of Lake Elsinore by 35%. In 2004 the pre-LEAMS sediment load was estimated to be 33,160 kg/yr; 35% of that load equals 11,606 kg/yr. Subtracting 11,606 kg/yr from 33,160 kg/yr equals a net residual sediment load of 21,554 kg/yr. The 2004 TMDL specified a Total Maximum Daily Load of 28,584 kg/yr. By subtracting the post-LEAMS sediment load of 21,554 kg/yr from the TMDL of 28,584 kg/yr we conclude that there is approximately **7,030 kg/yr of net TP offset credits available**. If we assume that LEAMS must be operated a minimum of 2,000 hours/year in order to generate these offsets, then that works out to an average of about 3.5 kg of TP offset credits per hour of LEAMS operation. This is the value that was used to compute and allocate any excess offset credits licensed to other stakeholders for LEAMS operations in CY2016, CY2017 and CY2018.
  
- 2) Independently, Dr. Alex Horne has made three separate estimates of the total phosphorus reduction attributed to LEAMS. The annualized average of his three estimates is 60,263 kg/yr.

**Table 1: Estimated TP Credits Generated by LEAMS**

Report Date	Data Period	Calculated P-Offset
Nov. 25, 2013	2010-11	97,069 kg/yr <sup>1</sup>
March 5, 2015	2014	77,413 kg/yr <sup>2</sup>
April 2, 2018	2017	6,309 kg/yr <sup>3</sup>
<b>Unweighted Annual Average</b>		<b>60,263 kg/yr</b>
<b>Cumulative Total (2011-2018)</b>		<b>482,109 kg</b>

The problem here is that Dr. Horne's estimate of the amount of phosphorus reduction attributable to LEAMS is nearly two times greater than the total amount of phosphorus being released by the lake bottom sediments as described in the 2004 TMDL (60,263 kg/yr vs. 33,160 kg/yr, respectively). Further analysis is required to resolve this inconsistency. Until then, and for the purpose of licensing offset credits to other stakeholders, TP reductions from LEAMS will continue to be computed using the more conservative values previously approved by the Regional Board, State Board and EPA in the 2004 TMDL.

<sup>1</sup> Dr. Alex Horne. Lake Monitoring Program and Nitrogen and Phosphorus Offset Demonstration Program for Discharges of Nitrogen and Phosphorus to Lake Elsinore. November 25, 2013 (see Table 2 on page 4).

<sup>2</sup> Dr. Alex Horne. Nitrogen and Phosphorus Offsets Due to Aeration Mixing in Lake Elsinore, California for the Year 2014. March 5, 2015 (see Table 5a on page 11).

<sup>3</sup> Dr. Alex Horne. Nitrogen and Phosphorus Offsets Due to Aeration Mixing in Lake Elsinore, California for the Year 2014. April 2, 2018 (see Table 5a on page 16).

- 3) The 2004 TMDL specifies a wasteload allocation of 3,721 kg/yr of TP for recycled water discharged to Lake Elsinore. EVMWD NPDES permit includes an effluent limit for TP of 8,186 pound/year (3,713 kg/yr) to implement this wasteload allocation based on a 5-year running average. In addition, the 12-month running average TP concentration cannot exceed 0.5 mg/L. EVMWD is required to offset any TP in excess of these discharge limits. For the period from January 1, 2011 thru December 31, 2018 EVMWD has consistently complied with both the mass-based limit and the concentration-based limit in their NPDES permit. Therefore, the District was not required to rely on any of the TP offsets generated by LEAMS in order to maintain compliance with their current effluent limits.
  
- 4) The draft revised TMDL (2019) would require EVMWD to offset any TP in excess of the natural reference condition target of 0.32 mg/L. Historically, the TP concentration in the recycled water discharged to Lake Elsinore has averaged about 0.38 mg/L. It is not known whether EVMWD can achieve the more stringent effluent limit by altering its wastewater treatment operations or if the District may need to rely on some of the TP offset credits generated by LEAMS to maintain compliance in the future. What is certain is that EVMWD will not have any need for TP offset credits in the period from 2011 thru 2018.
  
- 5) Any excess phosphorus offset credits not needed by EVMWD to assure compliance for the recycled water discharged to Lake Elsinore are reserved for use by the City of Lake Elsinore and the County of Riverside to demonstrate compliance with the TMDL load reduction requirements in their MS4 permit. Under the proposed TMDL, these agencies would be required to offset all phosphorus loads in excess of 0.32 mg/L for their runoff that reaches Lake Elsinore.

**Table 3: TP Credits Reserved to Offset MS4 Runoff from City of Lk. Elsinore & Co. of Riverside**

TP to Lk. Elsinore	City of Lake Elsinore	County of Riverside	Total
Est. Existing Annual Load	443 kg/yr	1,823 kg/yr	2,266 kg/yr
Annual Load Allowed	409 kg/yr	1,106 kg/yr	1,515 kg/yr
<b>Est. Offset Needed</b>	<b>34 kg/yr</b>	<b>716 kg/yr</b>	<b>750 kg/yr</b>
<b>8-Year Offset Sum (2011-18)</b>	<b>272 kg</b>	<b>5,728 kg</b>	<b>6,000 kg</b>

In the 8-year period from 2011 to 2018, the City of Lake Elsinore and the County of Riverside used 6,000 kg of the 56,240 kg in available net TP offset credits generated by LEAMS. Thus, at the conclusion of 2018, there was 50,240 kg in residual unused TP offset credits available.

- 6) Any excess phosphorus offset credits not needed by EMVWD, the City of Lake Elsinore and the County of Riverside are made available to others thru a licensing agreement. These offset credits may be used by other dischargers to demonstrate compliance with their own TMDL load reduction requirements in the MS4 permit. Under the proposed TMDL, these agencies will be required to offset all phosphorus loads in excess of 0.92 mg/L for their stormwater runoff that reaches Lake Elsinore.

**Table 4: Est. TP Loads and Potential Offsets Demand for Other Stakeholders Named in the TMDL**

Stakeholder	Est. TP Load (kg/yr)		Est. TP Offset Needed (kg)	
	Existing	Allowed	Annual Avg.	8-Year Sum
Banning	2	1	1	8
Beaumont	14	11	3	24
Canyon Lake	77	57	19	152
Hemet	180	112	68	544
Moreno Valley	610	422	187	1,496
Murrieta	14	9	4	32
Perris	336	248	89	712
City of Riverside	20	13	7	56
San Jacinto	58	36	22	176
Menifee	744	454	290	2,320
Wildomar	168	128	40	320
Caltrans	24	39	-15	-45
March JPA	35	29	6	48
March ARB	41	35	7	56
CAFOs	42	10	32	256
Irrigated Ag.	219	153	66	528
Non-Irrigated Ag.	776	109	666	5,328
Small Ag (<20 ac.)	139	40	98	784
<b>Total</b>	<b>3,484</b>	<b>1,906</b>	<b>1,590</b>	<b>12,795</b>

Note: Allowed loads were copied from Table 6-2 on page 6-7 of the 2018 TMDL Technical Report. Estimated annual load reductions (aka "Offsets Needed") were copied from Table 6-3 on page 6-8 of that same report. Estimated existing loads were computed by adding the allowed loads to the estimated offset needed. Some values do not total precisely due to numeric rounding.

- 7) The three LEAMS operating partners (EVMWD, City of Lake Elsinore and County of Riverside) began offering excess unused offset credits to others beginning in 2016. Since then, numerous stakeholders have elected to participate in the offset program by licensing a portion of the excess credits generated in calendar years 2016, 2017 and 2018. It should be noted that other stakeholders had no opportunity to license excess offset credit for the first five years of the 2004 TMDL's initial ten-year compliance period (i.e. 2011-2020). The number of LEAMS operating hours and number of offset credits licensed during the last three years by each stakeholder is summarized in the table below. TP offset credits licensed by WRCAC may be used by their dues-paying members to demonstrate compliance for irrigated and/or non-irrigated ag operations.

**Table 5: TP Offset Credits Licensed to Other Stakeholders Named in the TMDL**

Stakeholder	LEAMS Hours Licensed				TP Offsets Licensed (kg)				2011-18 Offsets	
	2016	2017	2018	Total	2016	2017	2018	Total	Needed	Diff.
Banning	0	0	0	0	0	0	0	0	8	-8
Beaumont	0	0	0	0	0	0	0	0	24	-24
Canyon Lake	17	17	17	51	59.5	59.5	59.5	179	152	+27
Hemet	47	47	47	141	164.5	164.5	164.5	494	544	-50
Moreno Valley	128	128	128	384	448	448	448	1,344	1,496	-152
Murrieta	3	3	3	9	10.5	10.5	10.5	32	32	0
Perris	48	48	48	144	168	168	168	504	712	-208
City of Riverside	5	5	5	15	17.5	17.5	17.5	53	56	-3
San Jacinto	1	1	1	3	3.5	3.5	3.5	11	176	-165
Menifee	128	128	128	384	448	448	448	1,344	2,320	-976
Wildomar	32	32	32	96	112	112	112	336	320	+16
Caltrans	10	10	10	30	35	35	35	105	0	+105
March JPA	5	5	5	15	17.5	17.5	17.5	53	48	+5
March ARB	3	3	3	9	10.5	10.5	10.5	32	56	-24
CAFOs	0	9	9	18	0	31.5	31.5	63	256	-193
Irrigated Ag.	0	0	0	0	0	0	0	0	528	-528
Non-Irrigated Ag.	0	0	0	0	0	0	0	0	5,328	-5,328
Small Ag (<20 ac.)	0	0	0	0	0	0	0	0	784	-784
WRCAC Members	0	14	47	61	0	49	164.5	214	0	+214
<b>Total</b>	<b>427</b>	<b>450</b>	<b>483</b>	<b>1,360</b>	<b>1,495</b>	<b>1,575</b>	<b>1,691</b>	<b>4,764</b>	<b>12,840</b>	<b>-8,443</b>

Positive values in the "Diff." column indicate stakeholder has more TP offset credits than needed.

**8) Summary of LEAMS Phosphorus Offset Credits (2011-2018)**

LEAMS Phosphorus Offset Credits (2011-2018)	Total Phosphorus
Total Net Offset Credits Available from 2011 thru 2018	56,240 kg
Offset Credits Reserved for Recycled Water (8 years)	0 kg
Offset Credits Reserved for City of Lake Elsinore MS4 (8 years)	272 kg
Offset Credits Reserved for County of Riverside MS4 (8 years)	5,728 kg
Offset Credits Licensed to Other TDML Stakeholders (8 years)	4,764 kg
<b>Residual Offset Credits Available (Unassigned &amp; Unlicensed)</b>	<b>45,476 kg</b>

### **Additional Notes and Clarifications:**

- 1) Dr. Horne estimates the phosphorus offset credits generated by comparing certain water quality parameters in the in the current monitoring year to the average water quality for those same parameters in the baseline years (2002-2006) before LEAMS began operations. Dr. Horne attributes 100% of any difference observed exclusively to the operation of LEAMS. However, there are a number of other factors which also be responsible for improving net water quality over the same time period including, but not limited to: the addition of recycled water to Lake Elsinore and implementation of BMPs in the surrounding watershed.
- 2) The Existing TP Load and TP Offset Needed shown in the tables above are annualized estimates based on long-term average rainfall. Since the 8-year period from 2011 thru 2018 was dominated by prolonged drought conditions, it is likely that the estimated loads and offsets shown in the tables is somewhat higher than what actually occurred during this time. However, because the winter of 2019 appears to be wetter than normal, the overall 10-year average may be relatively close to the long-term values used to develop the estimates shown in these tables. The true TP load should be calculated using actual yearly precipitation data in each stakeholder jurisdiction.
- 3) The estimated offsets needed should also be adjusted to account for any local Best Management Practices (BMPs) that have been implemented. Responsibility for determining the effectiveness of these BMPs and calculating the appropriate net offset demand rests with each stakeholder jurisdiction not the Task Force. All stakeholders retain discretionary authority to select their own preferred approach for achieving compliance. Stakeholders are under no obligation to participate in any offset program including LEAMS.
- 4) Although the WLA adopted in the 2004 TMDL is specified as a 10-year running average, EVMWD's current mass-based permit limit is expressed as a 5-year running annual average. This effluent limit should be changed to a 10-year running annual average to be consistent with the applicable wasteload allocation in accordance with 40 CFR §122.44[d][vii][B]. The revised TMDL proposes to make this adjustment so that all discharges to the lake are regulated based on the same averaging period.
- 5) The draft revised TMDL estimates that the nutrient flux from lake bottom sediments was 5.4 mg of TP per square meter per day in Lake Elsinore during pre-development natural reference conditions.<sup>4</sup> This translates into a load allocation of approximately 9,503 kg/yr.<sup>5</sup> This is about 67% less than the load allocation for TP that was assigned to Lake Elsinore's sediment-based loads in the 2004 TMDL.
- 6) The draft revised TMDL also estimates that the nutrient flux from lake bottom sediments was approximately 9.0 mg of TP per square meter per day in Lake Elsinore under the developed land use conditions that existed prior to adoption of the 2004 TMDL.<sup>4</sup> That translates into an estimated then-existing TP load of 15,838 kg/yr from the lake bottom sediments. This is about 52% less than previously estimated in the 2004 TMDL.
- 7) Using the DYRESM-CAYDM model for Lake Elsinore that was developed by Dr. Anderson, the TP nutrient flux from the lake bottom sediments is expected to be reduced by about 15% as a result of implementing various in-lake BMPs (incl. recycled water, LEAMS & fishery management).<sup>4</sup> This is about one-half the effectiveness level previously presumed for LEAMS in the 2004 TMDL. Additional watershed BMPs and in-lake mitigation measures will likely be needed under both TMDLs.

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<sup>4</sup> See Table 7-8 on pg. 7-27 of the 2018 TMDL Technical Report.

<sup>5</sup> See Table 6-7 on pg. 6-13 of the 2018 TMDL Technical Report.