



MEMORANDUM

To: Erik Nilssen, Mimi Moss, Courtney Walker
From: Karin Peternel
Date: August, 2016
Subject: Douglas County Lake Tahoe TMDL Baseline Load Revision

Overview

Initial conversion of all connected catchments in Douglas County from PLRM V1 to PLRM V2 has been completed. As expected, due to changes to the Lake Tahoe TMDL Tools through the Stormwater Tools Improvement Project, there is an increase to the overall baseline load. This memorandum details this increase and includes an estimate of the revised load reductions required to meet future TMDL milestones. Overall results remain consistent with the original baseline modeling using PLRM V1, aside from the changes due to the road pollutant loads that will be detailed herein. Please note that the Stateline Stormwater Association (SSWA) catchments were not modeled in PLRM V2. These were modeled using PLRM V1 by Nichols Consulting Engineers (NCE) towards the evaluation of potential improvements to Edgewood and SSWA's stormwater treatment facilities. For now, their baseline load as modeled in V1 will be carried over into the revised baseline.

Revised Baseline Pollutant Load and Credit Targets

Table 1 details the revised baseline and credit targets that will be necessary to meet the 2021 (21%) and 2026 (34%) milestones using PLRM V2. The 2016 target is maintained as that determined in the County's Stormwater Load Reduction Plan (SLRP – 41 Credits). The remaining targets are updated to meet the revised baseline modeling.

Table 1. Revised baseline FSP load reduction and credit targets for 2021 and 2026 milestones.

Pollutant Loading			
	FSP (lbs/year)		
PLRM V1 (SLRP Estimate)	83,000		
PLRM V2 (Revised Estimate)	96,000		
(Difference)	+13,000		
		SLRP Estimate	Revised Credit Target
2016 10% Load Reduction Goal (PLRM V1)	8,300	41 Credits	41 Credits (no change)
2021 21% REVISED Load Reduction Goal	20,200	87 Credits	101 Credits
2026 34% REVISED Load Reduction Goal	32,700	141 Credits	164 Credits

PLRM V2 Modeling

Converting the catchments from PLRM V1 to PLRM V2 was primarily a GIS-based exercise. Jurisdictions were provided with GIS files of land use, soil type, percent imperviousness, and drainage connectivity. Using original PLRM V1 and SLRP catchment boundary outlines, the GIS program extracted the input information for each catchment into a format that could be recognized by PLRM. PLRM was then used to upload the information for each catchment into a model. Catchment inputs (area, land uses, soils) were compared for each catchment between the two versions of the model to ensure consistency, and minor changes were made to some V2 models as a result. Minor changes such as changing an assigned land use layer of ‘roads’ to CICU or MFR was made for areas where the GIS land use layer identified the area as a road instead of a parking lot, for example, where road operations do not take place.

As expected and described in the County’s Annual Stormwater Report (March 15, 2015), use of the revised Lake Tahoe Tools would likely result in a change in baseline load and number of clarity credits required to meet the TMDL targets. This was due primarily to changes in FSP concentrations assigned to different road segments through the Stormwater Tools Improvement Project. As expected, this has resulted in an increased baseline load, which means there will be an increased load reduction target.

Changes Resulting from Stormwater Tools Improvement Project Affecting Pollutant Loads

As stated, the primary change to PLRM V2 as a result of the Stormwater Tools Improvement Project was a change to pollutant loads from roadways through assigned characteristic effluent concentrations. As shown in Table 2, roads in PLRM V1 in the Lake Tahoe Basin were classified as primary or secondary (highway versus local road), with an associated ‘risk’ (steepness, amount of traffic, etc.). Roads in Douglas County are all considered secondary. Through the Stormwater Tools Improvement Project and now applicable to PLRM V2, these “road risks” were reclassified to “road scores” that correspond to a Road RAM observation (1.4, 2.0, etc.), and were assigned a revised FSP concentration (mg/L).

Table 2. Road Risk conversion to Road Score through Stormwater Tools Improvement Project.

PLRM V1 Road Risk Designation	PLRM V2 Baseline Road Score
PHR – Primary High Risk	1.4
PMR – Primary Moderate Risk	1.7
PLR – Primary Low Risk	2.0
SHR – Secondary High Risk	2.0
SMR – Secondary Moderate Risk	2.3
SLR – Secondary Low Risk	2.6

This resulted in increases in the characteristic runoff concentrations (CRCs) of pollutants from the different road classes as modeled in PLRM V2. Using an average of all the FSP concentrations in each road risk/road score in the models from PLRM V1 and PLRM V2, Table 3 details the predominant reasons for changes in the baseline load between PLRM V1 and V2 in Douglas County:

Table 3. Difference in FSP concentration for each road type between PLRM V1 and PLRM V2. A road risk of SHR in PLRM V1 corresponds to the same road in PLRM V2 that is now referred to as “road score 2.0” (Table 2); (correspondingly, SMR = 2.3, SLR = 2.6). For example, for every 1 acre of SLR road class modeled in PLRM V1 there were 153 pounds of FSP produced in the model; now using PLRM V2, for every 1 acre of the same road there are 705 pounds of FSP produced in the model (see last row).

PLRM V1 Road Risk Designation	PLRM V1		PLRM V2 Road Risk Score	PLRM V2	
	Average FSP (mg/L)	FSP load produced from 1 acre of road (lbs/year)		Average FSP (mg/L)	FSP load produced from 1 acre of road (lbs/yr)
SHR	284	910	Road Score 2.0	334	1078
SMR	123	389	Road Score 2.3	272	835
SLR	47	153	Road Score 2.6	231	705

As evidenced from this table, moderate risk roads typical of roads in Douglas County on average had 2 times the amount of FSP produced from moderate risk roadways and nearly 4 times the amount of FSP produced on low risk roadways, based on the Lake Tahoe Tools Revisions. This is due solely due to the changes in the Stormwater Tools Improvement Project.

Table 4. Table 4 from Annual Stormwater Report (2016) showing estimated difference between potential Lake Clarity Credits modeled between PLRM V1 (projected) and V2. Credits with asterisk (*) are estimates based on the original baseline; PLRM V2 models have not been completed so we cannot estimate the load reduction.

UPC	Description	Pollutant Controls	Year Implemented	Estimated FSP Load Reduction (lbs/year)	PLRM V1 Estimated Credits	PLRM V2 Estimated Credits
CR02	Cave Rock GID WQIP Retrofit	Bed/filter dry basin	2015	1000	5	6
PW01	Pinewild Condominiums	Parcel BMPs	2004-2013	400	2	2
LC01	Logan Creek GID	Treatment vaults, infiltration basins	2007	680	3	*3
LR01	Lakeridge GID WQIP	Dry basins, treatment vaults	2006	460	2	*2
KUC	Kahle Drive WQIP	Wet basin, treatment vaults	2006	1,600	8	*16
LV01	Lake Village HOA WQIP Ph 1	Dry basin, infiltration basins, treatment vaults	2006	1,200	6	*5
EWCC	Comm/resid from Ponderosa west to Terrace View	Parcel BMPs	2004-2013	700	4	5
BCC, EWCH	N. Benjamin Drive to Upper Andria Drive	Advanced Road Operations	2014	800	4	7
EWCA	Comm. core on south corner of Hwy 207	Parcel BMPs	2004-2013	1,600	8	3
TOTAL ESTIMATED FSP LOAD REDUCTION (10% through 2016)				8,440	42	44

Table 5 details the model results comparing the PLRM V1 baseline loads referred to in the SLRP versus the revised baseline loads using PLRM V2. There is a 16% increase in FSP, 15% increase in TP and 2% increase in TN for Douglas County’s revised baseline load. Catchments in bold are those to which an additional connectivity factor applies due to their drainage to Edgewood Creek (refer to Tech Memo 1 and 2). Catchments with no pollutant load are those that are not considered to be connected to Lake Tahoe and were not modeled in the SLRP or accounted for in the original baseline. Table 7 (at the end of this report) is the same information sorted by FSP load produced.

Figure 1 details the revised baseline pollutant load, ranked by catchment, in units of lbs/yr/acre, similar to Figure 4B from the Baseline and Existing Conditions Technical Memorandum (December 2013).

Table 5. Comparison of baseline pollutant loads using PLRM V1 and PLRM V2 (All units lbs/year).

	Catchment	Connectivity	ORIGINAL BASELINE ESTIMATE PLRM V1			REVISED BASELINE PLRM V2		
			FSP	TP	TN	FSP	TP	TN
1	4H01	100	1,260	8	41	1,242	8	40
2	BCA	0	-	-	-	-	-	-
3	BCB	100	6,453	30	130	6,950	35	137
4	BCC	66	3,272	21	84	2,454	14	50
5	CR01	100	1,038	4	12	793	3	9
6	CR02	100	1,648	10	56	1,661	7	39
7	CR03	100	510	2	7	539	2	7
8	DC04	100	973	8	37	1,420	7	28
9	DC05	20	108	1	3	5	0	0
10	DC07	100	26	1	2	30	1	6
11	DC08	100	32	1	3	33	1	3
12	DCA	100	3,039	9	41	3,865	16	63
13	DCB	60	1,128	5	18	1,103	4	15
14	DCD	100	15	-	1	10	-	1
15	DCE	100	363	4	18	128	1	6
16	EP01	0	-	-	-	-	-	-
17	EP02	0	-	-	-	-	-	-
18	EP03	0	-	-	-	-	-	-
19	EW02	100	19	-	2	18	-	2
20	EWCA	60	3,152	12	41	2,411	14	48
21	EWCB	60	965	5	25	1,792	11	34
22	EWCC	60	4,081	20	81	5,542	25	100
23	EWCD	60	560	4	20	989	11	30
24	EWCE	60	168	1	6	372	2	9
24	EWCF	60	-	-	-	-	-	-
25	EWCG	60	9,146	41	179	10,442	65	253
26	EWCH	60	4,526	20	86	7,146	39	138
27	GB01	80	4,719	25	110	5,915	26	102
28	HW01	0	-	-	-	-	-	-
29	LC01	100	456	2	10	497	2	9
30	LP01	100	257	2	9	304	2	9
31	LR01	100	1,447	8	34	1,790	8	27
32	LV01	80	2,848	13	55	2,601	11	48
33	LV02	80	1,149	6	28	1,178	5	20
34	MB01	100	332	2	10	445	2	7
35	NV01	100	1,073	4	18	1,102	4	15
36	NV02	80	1,166	7	32	1,219	6	28
37	OP01	60	2,551	12	55	3,641	15	53

	Catchment	Connectivity	ORIGINAL BASELINE ESTIMATE PLRM V1			REVISED BASELINE PLRM V2		
			FSP	TP	TN	FSP	TP	TN
38	OP02	100	866	6	27	929	6	29
39	PT01	100	182	1	5	92	1	3
40	PW01	100	608	4	19	635	4	17
41	RH01	20	690	3	9	721	3	10
42	RH02	20	55	-	1	59	0	1
43	RH03	20	320	1	5	439	2	5
44	RH04	20	451	3	12	868	3	12
45	SK01	80	504	4	21	897	4	14
46	SK02	100	1,353	10	47	1,692	7	25
47	SSWA		12,855	59	306	12,855	59	306
48	UP01	100	126	3	10	147	3	13
49	WW01	0	-	-	-	-	-	-
50	ZC01	100	202	2	8	450	3	10
51	ZC02	100	3,285	14	64	4,833	17	64
52	ZH01	60	1,828	9	42	2,119	9	32
53	ZK01	40	260	1	6	461	2	5
54	ZP01	100	1,017	5	25	1,218	5	18
Percent Difference V1 vs V2:						+16%	+15%	+2%

Additional Baseline Information – SSWA Casino Corridor

As stated, Nichols Consulting Engineers (NCE) performed the PLRM modeling for SSWA and the Edgewood properties and they were not re-modeled the SLRP process. However, the load contribution and subsequent reduction due to the implementation of private parcel BMPs of the SSWA system is significant and will likely be redeemed by the County. Therefore, PLRM V1 and V2 models were populated with the same information as extracted from the GIS using PLRM V2. Table 6 shows the difference in loading as a result. These catchments flow into Edgewood’s pond system that is part of their BMP certification, and therefore a reduction factor is applied. However, the comparison between the PLRM V1 and V2 inputs is so close that once the reduction factor applied, it should not change the County overall baseline very significantly.

Table 6. Baseline SSWA pollutant loads under PLRM V1 and V2.

Section of SSWA	PLRM V1 FSP (lbs/yr)	PLRM V2 FSP (lbs/yr)
SSWA East (Montbleu, Harrah’s)	10,076	10,058
SSWA West (Harvey’s, Hard Rock)	9,506	9,404
Lake Parkway West	1,389	2,002
Lake Parkway East	2,259	2,644
TOTAL	23,230	24,108

Figure 1. Revised baseline pollutant load rank (lbs/yr/acre)

