Technical Memorandum_____

*Significant Phosphorus Point and Non-point Sources in the Unnamed Tributary of La Trappe Creek In-Stream Pond Watershed*_____

A Total Maximum Daily Load (TMDL) of phosphorus is being proposed for the UTLTC In-Stream Pond watershed for annual average conditions. The U.S. Environmental Protection Agency (EPA) requires that TMDL allocations account for all significant sources including both "natural" and human-induced components. This technical memorandum identifies the distribution of maximum allowable point source (PS) and nonpoint source (NPS) loads among different land use categories and the point source. These load contributions are conceptual values that are within the proposed TMDL thresholds. They represent viable individual allocations to each point source and land use category. Maryland expressly reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to achieve water quality standards.

The PS and NPS source loads for total phosphorus that were used in the lake model account for both "natural" and human-induced components. The NPS loads for phosphorus was determined using land use loading coefficients. The land use information was based on 1994 Maryland Office of Planning data. The total NPS phosphorus load was calculated by summing all of the individual land use areas and multiplying by the corresponding land use loading coefficients. The loading coefficients were based on the results of the Chesapeake Bay Model (EPA, 1991), which was a continuous simulation model. The loading rates account for both "natural" and human-induced sources. The current total NPS and PS phosphorus loads are estimated to be 470 lb/yr and 1,337 lb/yr, respectively.

The computation of the phosphorus TMDL is presented in the report *Total Maximum Daily Loads of Phosphorus for the Unnamed Tributary of La Trappe Creek (UTLTC)In-Stream Pond.* The annual TMDL for phosphorus is 384 lbs/yr, which includes 86 percent and 40 percent reduction of PS phosphorus and NPS phosphorus, respectively. Tables 1 through 3 provide possible scenarios for the distribution of phosphorus loads.

The annual TMDL for Phosphorus (lb/yr*):* WLA = WLA_{Trappe}

WLA = (0.144 mgdx0.3 mg/l x 8.34 lb/gal x 365 d/yr) = 132 lb/yr

FA = (0.056 mgdx0.3 mg/l x8.34 lb/gal x365 d/yr) = 124 lb/yr

LA = TMDL - WLA – F.A - MOS = 384 – 132 – 51 - 38 = 163 lb/yr = 73,937 g/yr

Point Source Name	TP Load *lb/year*	Flow *mgd*	TP Conc. *mg/l*
Trappe WWTP MD0020486			
Waste Load Allocation	132	0.144	0.3
Future Waste Load Alloc.	51	0.056	0.3
TOTAL	183	0.20	0.3

Table 1: Phosphorus Loads Attributed to Significant Point Sources for Annual Average TMDL

* With a NPDES permit limit of 0.3 mg/l total phosphorus for the Trappe WWTP.

Nonpoint sources were estimated on the loading rate coefficients for different land uses. The distribution between different land uses is shown in Table 2 below

Land Use Category	Area	TP Loads		
	Acre	**lb/acre/yr***	**lb/yr**	**% total**
Agriculture	160	1.43836	230	85
Forest	30	0.02428	1	1
Urban	53	0.70426	37	14
Total	**243**		**268**	**100**

Table 2: Loads Attributed to Significant Non-Point Sources for Annual Average Flow TP TMDL

* Chesapeake Bay Program, Phase IV Areal Loading Rates for various land uses. (CBP model segment 400)

The NPS load distribution under the TMDL, which is attributed to specific land uses, is based upon estimated reductions needed to achieve the target NPS goal. For the purpose of illustrating one possible scenario, the percent reductions needed to achieve the NPS goal are applied equally to each land use category within the watershed. The percent reduction can be calculated by dividing the difference between the current NPS load and the Load Allocation (LA) for NPS load by the NPS load (NPS Load - LA Load)/(NPS Load) as follows in Table 3:

NPS LOAD	–	LA LOAD	=	NPS LOAD REDUCTION	% REDUCTION
268 lb/yr	-	163 lb/yr	=	105 lb/yr	40 %

Table 3: Loads Attributed Equally to Significant Non-Point Sources for Annual Average Flow TP TMDL

Maryland anticipates that, when considering detailed implementation, opportunities and priorities for nonpoint source reductions will vary throughout the watershed. Cost-effectiveness will be considered in meeting the load reductions as part of any detailed implementation strategy. Any implementation strategy that might shift reductions among the land uses would be done in a manner that involves stakeholders and would not compromise the TMDL goal.

These loads are based on broad-scale estimates of land use and loading rates. Efforts are underway to update the Chesapeake Bay model, and Maryland anticipates that better estimates will be available in the future.

The nonpoint source loads that were used in the model account for both "natural" and human-induced components.

Reference

U.S. EPA, "Technical Support Document for Water Quality-based Toxics Control." Office of Water/OW Environment Protection (OW/OWEP) and Office of Water Regulations and Standards (OWRS), Washington, D. C., April 23, 1991.