Technical Memorandum_____

Significant Phosphorus and Sediment Point and Non-Point Sources in the Johnson Pond Watershed

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TMDLS for phosphorus and sediment are being proposed in the Johnson Pond watershed for annual average conditions. 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 different point sources. 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, and were based on in-stream monitoring data (see Tables in Appendix A). The NPS loads for sediments were determined using land use loading coefficients. The land use information was based on 1994 Maryland Office of Planning data and 1997 Farm Service Agency data. The total NPS sediment 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 (U.S.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 6,784 lb/yr and 752 lb/yr respectively, while the sediment loads are estimated to be 2,615 T/yr and 34 T/yr respectively.

The computation of the phosphorus and sediment TMDLs are presented in the report *Total Maximum Daily Loads of Phosphorus and Sediments for Johnson Pond.* The annual TMDL for phosphorus is 5,093 lbs/yr and the TMDL for sediment is 2,132 T/yr. Tables 1 through 4 provide one possible scenario for the distribution of phosphorus and sediment loads.

The annual TMDL **for Phosphorus *(*lbs/yr*):* WLA = WLA_{Delmar} + WLA_{Perdue}**

WLA = {0.65 mgdx0.5 mg/l x 8.34x 365) +(0.16 mgd X 0.3 mg/l x 8.34 x 365)} = 1135 lbs/yr

LA = TMDL - WLA - MOS = 5,093 -1135 -509 = 3,449 lbs/yr = 1,564,466 g/yr

TABLE 1
Phosphorus Loads attributed to Significant Point Sources for Annual Average TMDL

Source Name	Permit Number	TP Load lb/year	Flow mgd	Concentration mg/l
Delmar WWTP	MD0020532	989	0.650	0.50*
Perdue, Inc WWTP	MD0000060	146	0.160	0.30*

* With a NPDES permit limit of 1.0 mg/l total phosphorus, the Delmar WWTP currently has an average effluent concentration of 0.44 mg/l ; with a NPDES permit limit of 0.5 mg/l, the Perdue WWTP has an average effluent concentration of 0.1 mg/l.

Nonpoint sources were estimated on the basis of observed in-stream data. Thus, it is not possible to show a distribution between different land uses.

TABLE 2

Loads attributed to Significant Point Sources for Annual Average Flow Sediment TMDL

Source Name	Permit Number	Sediment Load T/year	Flow mgd	Concentration mg/l
Delmar WWTP	MD0020532	27	0.650	30
Perdue, Inc WWTP	MD0000060	6.6	0.160	30

TABLE 3

Loads attributed to Significant Non-Point Sources for Annual Average Flow Sediment TMDL

Land Use Category	Area	Sediment Loads		
	Acre	T/ac/yr*	T/yr	% total
Agriculture	10197	0.22	2244	85.8 % of total
Forest	10547	0.007	74	2.8%
Urban	4249	0.07	297	11.4 %
Total	**24993**		**2615**	**100 %**

* Chesapeake Bay Program, Phase IV Sediment Areal Loading Rates for various land uses. (CBP model segment 420)

The NPS sediment 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 NPS load and the Load Allocation (LA) for NPS load by the NPS load (NPS Load - LA Load)/(NPS Load) as follows:

TABLE 4

NPS - S LOAD	**_**	**LA - S LOAD**	**=**	**NPS - S LOAD REDUCTION**	**% REDUCTION**
2615 T/yr	_	1974 T/yr	=	641 T/yr	24.5 %

Maryland anticipates that, when considering detailed implementation, opportunities and priorities for nonpoint source reductions will vary throughout the watershed. For example, giving consideration to transport losses from different parts of the watershed could suggest more cost-effective means of achieving the overall goal. In addition, 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. The Maryland Department of the Environment (MDE) expressly reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to achieve water quality standards.