FINAL

Technical Memorandum_____

Significant Phosphorus Nonpoint Sources and Point Sources and in the Southeast Creek Watershed

EPA requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of the impairing pollutant. The TMDL analysis for Southeast Creek addresses total phosphorus (TP) loads during low flow conditions (May, 1 – October, 31) and average annual conditions. This technical memorandum identifies, in detail, the significant surface water discharges of TP used as modeling input when computing the TMDL. Maryland Department of the Environment (MDE) expressly reserves the right to allocate the loads among different sources in any manner that is reasonably calculated to achieve water quality standards

Nonpoint Sources

TMDLs are being established in Southeast Creek watershed for both low flow and average annual conditions. The nonpoint source loads that were used in the model account for both "natural" and human-induced components. Low flow nonpoint source loads were based on in-stream monitoring data. The nonpoint source component of the low flow TMDL is 130 lbs/month. Insufficient data are available to distribute the low flow nonpoint source load among different land use categories.

The average annual nonpoint source loads were determined using land use loading coefficients. The land use information was based on 1997 Maryland Office of Planning data. The total nonpoint source 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[1]. The Chesapeake Bay Program nutrient loading rates represent loads delivered to the stream, for the year 2000 assuming Best Management Practice (BMP) implementation at levels consistent with current Maryland's Tributary Strategy progress, and account for atmospheric deposition, loads from septic tanks, and loads coming from urban development, agriculture, and forestland.

Table 1 provides one possible scenario for the distribution of average annual phosphorus nonpoint source loads between different land use categories.

[1] U.S.EPA Chesapeake Bay Program, "Chesapeake Bay Program: Watershed Model Application to Calculate Bay Nutrients Loadings: Final Findings and Recommendations," and Appendices, 1996.

Table 1
Nonpoint Sources Phosphorus Loads Attributed to Significant Land Use for Southeast Creek Average Annual TMDLs

Land Use Category	Percentage of Nonpoint Source Load	Nonpoint Source Load (lbs/yr)
Mixed Agricultural	96.32%	18,376
Urban	2.05%	391
Forest and Other Herbaceous	1.10%	210
Atmosphere Deposition[2]	0.54%	103
Total	100%	19,078

It must be noted that these loads are based on broad-scaled estimates. Efforts are underway to update the Chesapeake Bay model, and MDE anticipates that better estimates of land use and loading rates will be available in the future.

Point Sources

There is one point sources contributing nutrient loads to Southeast Creek, the Church Hill Wastewater Treatment Plant (WWTP). Waste load allocation have been made to the source based on its approved water and sewerage plan discharge flow. Table 2 below provides the point source phosphorus effluent inputs used in the water quality model to determine the maximum phosphorus load that Southeast Creek can accept during low flow and annual average flow conditions. The water quality model requires additional information about other substances associated with point source effluents.

Table 2
Flows and Phosphorus Loads Attributed to the Significant Point Sources Used to Compute the Low Flow (May – October) and the Average Annual Flow TMDL[1]

Point Source Name	Permit Number	TP Load			Flow		Concentration
		kg/day	*lbs/month*	*lbs/yr*	*gpd*	*m^3/s*	*mg/l*
Church Hill	MD0050016	1.8170	121.85	1,462.15	80,000	0.0035	6.00

[2] The atmospheric deposition load is attributable to deposition only to surface water, atmospheric deposition to land surfaces is included in the loads attributed mixed agriculture, forest and other herbaceous, and urban land uses.

Supplemental information for these other substances, as well as phosphorus, is shown in Table 3.

Table 3
Additional Assumptions for Low Flow and Annual Average Flow TMDLs

Parameter	Church Hill
CBOD	3.2814 kg/day
NH_4	1.5899 kg/day
ON	0.3483 kg/day
NO_{2-3}	0.1514 kg/day
PO_4	1.5283 kg/day
OP	0.2898 kg/day
Minimum Effluent DO	5.0 mg/l
Total Nitrogen	2.0896 kg/day (6.90 mg/l)
Total Phosphorus	1.8171 kg/day (6.0 mg/l)
Flow	0.0035 m^3/s (80,000 gpd)

NOTE: This table is supplied for those who wish to assess the WASP modeling.

b. 1 kg = 2.2046 lbs Note that dissolved oxygen (DO) is expressed in milligrams per liter.