October 25, 2006

Mr. Will Brown
Division of Watershed Protection
Bureau of Watershed Management
Pennsylvania Department of Environmental Protection
10th Floor, Rachel Carson State Office Building
P.O. Box 8555
Harrisburg, PA 17105-8555

Re: Draft Revision, Neshaminy Creek Total Maximum Daily Load (TMDL)
36 Pa. Bull. 4792 (August 26, 2006)

Dear Mr. Brown:

Citizens for Pennsylvania's Future (PennFuture) submits these comments on the draft revisions to the Total Maximum Daily Load (TMDL) for the Neshaminy Creek Watershed approved by the United States Environmental Protection Agency (EPA) in December, 2003. The draft revisions are presented in the "Neshaminy Creek Total Maximum Daily Load (TMDL) Assessment for Point Sources" submitted to the Department of Environmental Protection (DEP) on August 14, 2006 by the Penn State Institutes of the Environment ("2006 Assessment"). The 2006 Assessment states that it is intended to replace Sections D1 through D7 in the approved 2003 Neshaminy Creek TMDL document (2003 TMDL).

PennFuture is a public interest membership organization dedicated to creating a just future in which the environment, communities, and the economy thrive. One focus of PennFuture's work is to improve and protect water resources and water quality across Pennsylvania through public outreach and education, advocacy, and litigation.

In the comments below, PennFuture explains that the 2006 Assessment is correct to base proposed revisions to the 2003 TMDL on a study of the Neshaminy Creek watershed conducted in 2005, but should take a more cautionary approach by selecting a lower instream phosphorus concentration endpoint from within the range suggested by the 2005 study. PennFuture also explains that additional reductions in the wasteload allocations (WLAs) to the point sources are necessitated by the lack of reasonable assurance that reductions of phosphorus loads resulting from assumed reductions of nonpoint source sediment loads will actually occur.

1. The 2006 Assessment is correct to base proposed changes to the point source wasteload allocations on the 2005 study of the Neshaminy Creek watershed by Carrick and Godwin.

The 2003 TMDL did not take the usual approach of first determining a specific numerical instream criterion for the pollutant of concern, then plugging that figure into a model to derive allowable pollutant loads for particular stream segments, and finally allocating those overall

loads among the relevant point and nonpoint sources. Instead, the analysts performed multiple runs of the STREAMPLAN-PA model and selected point source discharge inputs that yielded reduced instream phosphorus concentrations at the critical low-flow condition, including at "the most difficult points in the watershed." (2003 TMDL, p. 245) The modeled instream phosphorus concentrations ranged from 0.36 to 0.80 mg/l with the discharge limits for point sources set at 1.0 mg/l at existing flows, and from 0.32 to 0.64 mg/l with the point source discharge limits set at 0.8 mg/l at maximum permitted flows. (p. 253) Without explaining why DEP believed that instream phosphorus concentrations in these ranges would eliminate nuisance growth of algae, the TMDL declared that "[t]he Department believes that these reductions will remove the impairments to Neshaminy Creek and its tributaries, and allow the waters to meet water quality standards." (p. 245)

A recent study has shown that the instream phosphorus concentrations DEP considered acceptable in 2003 are too high, and that further reductions in the phosphorus loads from the point source discharges are needed to alleviate the impairment of the Neshaminy Creek watershed. As part of its efforts to develop nutrient statewide or ecoregion-specific water quality standards for the waters of the Commonwealth, DEP funded a study of the Neshaminy Creek watershed during 2005 that was intended to determine, among other things, a watershed-specific maximum instream concentration of phosphorus that would avoid nuisance algae growth during critical conditions, and thus could serve as a TMDL endpoint. The results of that study fill a significant data gap that existed at the time of the drafting and approval of the 2003 TMDL, when DEP was unable to start from such an instream target concentration and work backwards to individual WLAs and corresponding effluent limitations for the point sources, but instead selected the effluent limitations and made a comparatively uninformed judgment that the resulting (modeled) instream concentrations would not result in nuisance growth of periphyton. Among the revelations of the 2005 study was that the entire range of instream phosphorous concentrations the 2003 TMDL judged acceptable (0.32 to 0.80 mg/l) exceeds the concentration at which nuisance levels of periphyton growth are expected to occur in the Neshaminy Creek watershed (0.23 mg/l).

Building on similar research in the nearby Skippack Creek watershed completed in 2004,[1] the Neshaminy Creek study resulted in a final report submitted to DEP in December 2005 (Carrick and Godwin (2005)).[2] The report finds that the Neshaminy Creek watershed is not nutrient limited, and has very high periphyton concentrations and a dominance by pollution-tolerant algal species that reflect an advance stage of eutrophication. (pp. 4-7) The report further concludes that:

-- "[A]lgal chlorophyll levels in stream that range from 100-150 mg/m^2 are considered to be excessive or at nuisance levels[.]

-- "[A] reasonable target would be an average of 50-100 mg/m^2 in the stream[.]

[1] Carrick, H.J. 2004. Using periphyton to estimate TMDL endpoints and assess impairment in an urban-suburban stream (Skippack Creek, Pennsylvania).

[2] Carrick, H.J., and C.M. Godwin. 2005. TMDL endpoint estimates for a urban-suburban stream based upon in-stream periphyton assemblages (Neshaminy Creek, Pennsylvania).

-- Based on the application of two regression models to the Neshaminy Creek data, "[i]n-stream [total phosphorus] concentrations of 80 and 227 µg/l . . . are projected to achieve in stream periphyton concentrations of 50-100 mg/m^2 respectively."

-- "No significant differences were observed between model and empirical chlorophyll estimates, indicating that [the regression] models provide reliable estimates for periphyton-nutrient relationship."

-- Nevertheless, the target instream phosphorus criteria should be "fine-tuned with additional studies that can reduce uncertainty in the chlorophyll-nutrient relationship."

Carrick and Godwin (2005), p. 8.

The changes proposed in the 2006 Assessment are based on the 2005 Carrick and Godwin study. Citing that study, the 2006 Assessment selects a TMDL target instream phosphorus concentration of 227 µg/l (or 0.23 mg/l), and then proceeds through the usual TMDL modeling process in order to translate that instream target into maximum phosphorus loads for specific stream segments. For the reasons explained in Comment No. 2, immediately below, PennFuture takes issue with the 2006 Assessment's selection of the maximum level of the range suggested by Carrick and Godwin (0.23 mg/l) as the target instream phosphorus concentration. Though PennFuture objects to the selection of that specific figure, there is no doubt that the 2006 Assessment's methodology is a vast improvement over that of the 2003 TMDL. The 2005 Carrick and Godwin study has provided a critical piece of information that was missing in 2003, namely a scientifically-derived instream target concentration from which to begin. It is particularly appropriate to revise a TMDL based on such a figure where, as here, the study took place over the course of a year in the same stream to which the TMDL applies, the results of the study are consistent with the results of an "extensive worldwide periphyton survey" (Carrick and Godwin (2005), p. 8 & Figure 1), and calibration against observed instream conditions confirms that both models employed "provide reliable estimates for [the] periphyton-nutrient relationship." (Id., p. 8)

DEP is correct to revise the 2003 TMDL using the new information provided by the 2005 Carrick and Godwin study. As PennFuture explains in the next comment, however, DEP should select a lower maximum instream phosphorus concentration from the range suggested by Carrick and Godwin.

2. The precautionary principle demands that the instream phosphorus concentration selected as the TMDL endpoint be lower than 0.23 mg/l.

Carrick and Godwin find that algal chlorophyll begins to become a nuisance at a concentration of 100 mg/m^2, and that "[a] reasonable target would be an average of 50-100 mg/m^2 in the stream$_{[.]}$" Using the average of the results from two regression models, that range

of periphyton levels corresponds to a range of maximum instream phosphorus concentrations of 80 to 227 µg/l. Without mentioning that Carrick and Godwin presented their figures as ranges, the 2006 Assessment simply selects the top end of each range and establishes an instream TMDL endpoint of 227 µg/l total phosphorus.

The "Precautionary Principle" counsels decisionmakers to err on the side of, and to resolve uncertainties in favor of, protecting public welfare and the environment. The federal TMDL regulations expressly incorporate this principle in providing that TMDLs must be established with a "margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." 40 C.F.R. § 130.7(c)(1). In light of the remaining "uncertainty in the chlorophyll-nutrient relationship" acknowledged by Carrick and Godwin (2005), p. 8, the 2006 Assessment inappropriately fails to take the required cautionary approach and selects a maximum instream phosphorus concentration (227 µg/l) corresponding to the point at which periphyton begins to become "excessive" or a "nuisance" in the stream (100 mg/m^2). Instead of reflexively picking the numbers at the top of Carrick and Godwin's ranges, the 2006 Assessment should have taken a more conservative course of selecting lower figures that provide an adequate margin of safety to ensure that the periphyton concentration will drop to and remain below the nuisance level of 100 mg/m^2.

To provide the required margin of safety, the target periphyton concentration selected should be no higher than the midpoint of Carrick and Godwin's range – 75 mg/m^2 – and the TMDL endpoint should be set no higher than the instream phosphorus concentration corresponding to that 75 mg/m^2 level.[3] This change would in turn require reductions in many of the WLAs and corresponding NPDES permit phosphorus concentration limits set forth in the 2006 Assessment.

3. The lack of reasonable assurance for the assumed nonpoint source load reductions necessitates further reductions in the point source wasteload allocations and corresponding effluent limitations.

For TMDLs like the Neshaminy Creek watershed TMDL that include both WLAs to point sources and Load Allocations (LAs) to nonpoint sources, EPA's TMDL guidance states that "the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable." EPA, "Guidelines for Reviewing TMDLs under Existing Regulations Issued in 1992" (May 20, 2002), p. 4 (emphasis added). If the agency cannot provide "reasonable assurances" that load reductions assigned to nonpoint sources will be realized, it must further reduce the WLA(s) and tighten the enforceable effluent limits on the point source(s) in order to fulfill the requirement of ensuring that the overall load will be reduced below the level at which impairment of water quality standards begins. See 40 C.F.R. § 130.7(c)(1).

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[3] Applying the method used by Carrick and Godwin, this maximum phosphorus concentration would be the average of the two phosphorus concentrations corresponding to the periphyton level of 75 mg/m^2 using the two regression models. Carrick and Goodwin (2005), p. 8. For the Cattaneo (1987) regression model, a target instream total phosphorus concentration of 145 µg/l would correspond to the periphyton concentration of 75 mg/m^2.

The 2006 Amendment assumes that the releases from several impoundments and other nonpoint sources will not exceed maximum "allowable" concentrations and loads listed in Table 10. The maximum "allowable" total phosphorus concentrations listed for two of these sources, the Core Creek Dam (0.5 mg/l) and the Galena Dam (0.42 mg/l), are considerably lower than the 0.8 mg/l the 2003 TMDL assumed to be representative of the water discharged from those impoundments. The 2006 Assessment does not explain this apparent discrepancy, and more generally, it provides no reasonable assurance that the unpermitted, nonpoint sources listed in Table 10 will achieve the unenforceable, "allowable" concentration and load figures listed in that table.

More important, the overall success of the TMDL is dependent on achieving both the wasteload reductions from the point sources in accordance with Section D of the TMDL and the "nutrient reductions associated with sediment TMDLs described in Section C." (2006 Assessment, Sec. D7) Section D7 of the 2006 Assessment discusses the "reasonable assurance of implementation" solely in terms of the assurance that point sources will achieve the reductions required by the revised Section D of the TMDL. This reasonable assurance for point source load reductions, however, usually is not an issue. It is provided by the requirement that NPDES permits must be "consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7." 40 C.F.R. § 122.44(d)(1)(vii)(B) (incorporated into Pennsylvania law by 25 Pa. Code § 92.2(b)(14)).

The more important dimension of the "reasonable assurance" requirement is the assurance that nonpoint sources will not exceed the LAs assigned to them by the TMDL, or conversely, that they will achieve all load reductions assumed by the TMDL. This dimension of the "reasonable assurance" requirement usually is more problematic because there is no permitting mechanism for nonpoint sources through which assigned load reductions may be translated into enforceable effluent limitations.

Though the proposed WLAs in the 2006 Assessment generally are more stringent than the corresponding figures in the 2003 TMDL, they remain premised on the unfounded assumption that all of the nonpoint source nutrient reductions associated with sediment set forth in Section C of the TMDL will be achieved.[4] The "Reasonable Assurance of Implementation" subsections in Section C contain, with some variations, the assertions that: 1) "Implementation of best management practices (BMPs) in the affected areas to increase infiltration and sediment control measures should achieve the loading reductions goals established in the TMDL;" and 2) "The implementation of such BMPs will likely occur in the watershed as a result of PADEP's Proposed Comprehensive Stormwater Management Policy." Section C's repetition of these

[4] Although referring to these sediment load sources as "nonpoint" sources, the 2003 TMDL follows EPA's guidance for sediment loads from watersheds to which the Municipal Separate Storm Sewer System (MS4) regulations apply and assigns a sediment WLA (rather than a LA) to each subwatershed, and to each land use category within the subwatershed. Although the relevant municipalities' MS4 NPDES permits would have to be consistent with these WLAs, the 2003 TMDL does not suggest that the MS4 NPDES permits provide reasonable assurance that the "nonpoint" source load reductions outlined in Section C of the TMDL will be achieved.

formulaic statements, however, does not provide reasonable assurance of future load reductions. For example, the TMDL provides absolutely no reason to believe that DEP's Comprehensive Stormwater Management Policy will reduce the sediment load from the "cropland" land use category by the assumed amount of 405,000 lbs/yr in the Mill Creek Subwatershed (in which the total nonpoint source reduction assumed is 620,000 lbs/yr), or will reduce the sediment load from "cropland" by the assumed amount of 450,000 lbs/yr in the Core Creek Subwatershed, which is virtually the entire reduction assigned to the nonpoint sources in that subwatershed. Because the TMDL fails to present data, along with a specific plan or strategy for each subwatershed, demonstrating that BMPs will be implemented for the relevant land use categories identified for each subwatershed and will achieve the specific sediment loading reductions assigned to each of those categories, it fails to provide the required "reasonable assurances" that the assumed sediment load reductions from nonpoint sources will be achieved.

Section C of the 2003 TMDL concerning nonpoint sources is relevant to the consideration of the 2006 Assessment's revised version of Section D concerning point source because Section D takes as a premise that the nonpoint source load reductions assumed in Section C will occur. Because a reasonable person reading the 2003 TMDL would not be assured that the nonpoint source sediment reductions assumed in Section C will occur, it fails to provide reasonable assurance that the associated phosphorus load reduction of 11,740 pounds per year will occur. 2006 Assessment, Sec. 3.4 and Table 11. As a result, the WLAs in Section D must be reduced commensurately in order to satisfy the requirement of ensuring that the impairment of Neshaminy Creek's uses will be remedied. 40 C.F.R. § 130.7(c)(1).

In sum, as explained in Comment No. 1, the 2005 Carrick and Godwin study of Neshaminy Creek provides a reasonable and sufficient basis for revising the approved 2003 TMDL. For the reasons set forth in Comments Nos. 2 and 3, however, the WLAs in Section D of the TMDL must be reduced from the levels set forth in the draft revisions presented in the 2006 Assessment.

Thank you for your consideration of these comments. You may reach me at 717-214-7920 if you have any questions.

Sincerely,

Kurt J. Weist
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Harrisburg Office

cc: Michelle M. Moses, Bureau of Regulatory Counsel