PHILADELPHIA WATER
EST. 1801
Howard M. Neukrug P.E., Water Commissioner

To: Ms. Lenka Berlin
US EPA Region III, 3WP30
1650 Arch Street
Philadelphia, PA 19103

RE: Wissahickon Creek TMDL

Ms. Berlin,

The Philadelphia Water Department (PWD) appreciates the opportunity to provide comments on the draft total phosphorus TMDL Wissahickon Creek Watershed. The Wissahickon Creek and its tributaries are important amenities in northwest Philadelphia, serving as the centerpiece of Wissahickon Creek Valley Park in the Fairmount Park system. The Wissahickon Creek also contributes a portion of the supply of water to the Queen Lane Drinking Water Treatment plant located on the Schuylkill River. PWD shares EPA's motivation to improve the water quality of the Wissahickon Creek for drinking water supply, recreation and aquatic life.

While the water quality of the Wissahickon Creek continues to struggle with the influences of upstream development and point source discharges, PWD supports EPA efforts to effect positive change in the watershed. However, PWD respectfully disagrees with the use of a total phosphorus TMDL as the regulatory vehicle to force stormwater management in the Wissahickon Creek watershed. There are many other regulatory and non-regulatory tools available to manage stormwater in the Wissahickon Creek watershed and PWD fully supports a broad range of solutions to tackle this complex issue.

The draft total phosphorus TMDL presents phosphorus loading in wet weather conditions as significant a source as the year round point source discharges, widely accepted as the source of nutrient enrichment in the Wissahickon Creek watershed. EPA's attempts to technically justify the phosphorus loading during wet weather as largely responsible for elevated instream phosphorus concentrations leads to many technical and conceptual errors as noted in the following PWD comments on the TMDL development process, critical period, baseline calculation, waste load allocation calculation, and additional technical comments.

PWD is committed to working with watershed stakeholders towards a TMDL alternative that identifies science-based and quantifiable goals for stormwater management and watershed restoration. Given the many concerns with the draft total phosphorus TMDL detailed below, PWD requests that EPA withdraw this TMDL and put their full support behind the implementation of BMPs, ordinances and green infrastructure techniques to manage stormwater in the Wissahickon Creek watershed.

Following are PWD comments on the draft total phosphorus TMDL, divided into categories that include the TMDL development process, critical period, baseline calculation, waste load allocation calculation and additional technical comments.

TMDL DEVELOPMENT PROCESS

1. PWD is unable to comment meaningfully on many aspects of the TMDL because the draft TMDL documentation is lacking critical details and EPA was unable to respond to our request for clarification and additional information in a timely manner. Specifically, due to the lack of documentation regarding the determination of MS4 baseline total phosphorus loading, simulation of filamentous algae and algal periphyton, algal scouring and sediment-phosphorus interactions, it is impossible to reasonably ascertain whether there are additional issues with EPA's approach for developing the TMDL and waste load allocations. Therefore, the proposed TMDL does not provide information adequate enough for impacted parties to review and comment on elements of the TMDL which are absolutely critical to the TMDL's development, accuracy, legitimacy and success. We strongly urge EPA to withdraw the TMDL and make the missing information available so that we may have the opportunity to fully and fairly review and comment on the draft TMDL.

   PWD's comments below are therefore based on the limited amount of information provided, information which we again believe is insufficient to fully and fairly review and comment on the proposed TMDL.

2. PWD reviewed the draft total phosphorus TMDL and supporting documentation as quickly as possible and made a request for additional information on June 29, 2015. PWD made it clear in its request for information that we did not want to place an unnecessary burden on USEPA or its contractor to produce new information. We only requested readily available files and information. For the original land use, soil and land surface slope GIS data requested, PWD stated that references to publicly available data sources (*e.g.*, DVRPC 2005 land use) would be sufficient. The draft total phosphorus TMDL does not cite these sources by data source and year. With respect to other GIS data sources, it is clear from the presentations, draft TMDL report and supporting documents that EPA developed a number of derivative GIS data sets as part of the TMDL process. For example, the draft TMDL report includes maps of modeled reaches and subcatchments, hydrologic response units (HRUs), as well as a series of land use maps by municipality (pg. 24 Figure 2-1, pg. 39 Figure 4-1, Appendix E Figures H-1 through H-16, respectively). PWD requires these readily available GIS data that were created in support of the TMDL in order to properly evaluate the TMDL, especially given that the area loading rates are critical in determining the baseline phosphorus loading from MS4 sources.

3. EPA made presentations on the total phosphorus TMDL at a stakeholder meeting at the Pennsylvania DEP 11/14/2014 and again at a public meeting 6/10/2015. These presentations were not substantially different, and our interpretation of the information in the presentations and limited number of files that have been provided to date is that the modeling effort in support of the TMDL was completed in 2011 and 2012. EPA has thus had three years to share this work with the stakeholders in the Wissahickon Creek Watershed. In this time, watershed stakeholders could have been collaborating to collect

more data and possibly improve the model. Yet when the draft TMDL was released 5/20/2015 EPA initially suggested that stakeholders would have only 45 days to review. This exemplifies an imbalance in the EPA approach to working with stakeholders in the Wissahickon Creek Watershed. If the draft total phosphorus TMDL is so technically challenging as to require multiple years of modeling studies, the stakeholders should be given adequate time to review these studies and provide comments. While we appreciate the fact that EPA extended the public comment period by 26 days to 7/30/2015, we still feel this is inadequate given the lack of clarity in the draft TMDL report and EPA's inability to respond to our request for additional information in a timely manner.

4. PWD understands that USEPA manages a large number of TMDL studies and has limited funding available for each TMDL. We do not, however, feel it is appropriate to cite lack of funding as a reason to not provide the information requested [XX within the public comment period XX]. For example, PWD responded quickly to EPA's original request for Wissahickon Creek data in 2011. As illustrated by Appendix A: Wissahickon Creek Observed Data Report, PWD provided dozens of files for observed water quality data, hydrology, atmospheric data, aquatic life, as well as many others. Given that the information requested by PWD 6/29/2015 is readily available and is a work product paid for by the EPA, PWD considers this request to be reasonable.

5. Similarly, PWD feels it is not unreasonable for EPA's contractor to answer basic questions about the modeling work that was performed in support of the TMDL. Although documentation of the model computer code may not have been part of EPA's original scope of work, external communication is a basic business function. PWD does not consider it unreasonable for EPA's contractor to respond to written questions about the work performed.

6. This draft total phosphorus TMDL is an inappropriate regulatory vehicle to manage stormwater in the Wissahickon Creek watershed. There are many other regulatory and non-regulatory tools available to manage stormwater in the Wissahickon Creek watershed and PWD fully supports a broad range of solutions to tackle this complex issue.

CRITICAL PERIOD

7. The approach used to develop the draft total phosphorus TMDL identifies the entire algae growing season from April 1 to October 31 as the critical period to control nuisance algae blooms. The origin of this extended critical period from April 1 to October 31 is the *2007 Development of Nutrient Endpoints for the Northern Piedmont Ecoregion of Pennsylvania: TMDL Application* (2007 Endpoint Report). The 2007 Endpoint Report does not perform any seasonal statistics or comparative data analysis of variations in monthly total phosphorus and algae concentrations. The 2007 Endpoint Report mentions the temporal context of algae only once in the report in a sentence on page 24 that defines the algae growing season from April 1 to October 31 as the critical

period to apply the total phosphorus endpoint given this time period is *"...typically the time during which the greatest risk of deleterious algal growth exists."*

The only available justification for this extended critical period provided by EPA implies that because algae are growing there is a risk for 'deleterious algal growth'. This justification leads to an overly conservative extended critical period and should be re-defined to reflect when nuisance algal densities occur in the Wissahickon Creek according to observed data.

8. The seven month critical period in the draft total phosphorus TMDL, defined as the algal growing season from April 1 to October 31, directly conflicts with the definition of a three month algal growing season from July 1 to September 30 in the *2012 EPA Evaluation of Nutrients as a Stressor of Aquatic Life in the Wissahickon Creek, PA* (2012 Stressor Report). The objective of the 2012 report is to *"...evaluate support for the basis that nutrients are a stressor on the condition of aquatic life in Wissahickon Creek, Pennsylvania."* The analyses in the 2012 Stressor Report are based on observations from July to September, and conclude that during this period nutrient enrichment is a stressor to aquatic life in the Wissahickon Creek. The critical period in the draft total phosphorus TMDL should be re-defined because it is inconsistent with the 2012 Stressor Report, a report commissioned by EPA to demonstrate how nutrient enrichment is a cause of stress contributing to aquatic life impairment in the Wissahickon Creek.

9. In addition to being inconsistent with the 2012 Stressor Report, the seven month critical period in the draft total phosphorus TMDL is also inconsistent with the critical period of the *2003 Nutrient and Siltation TMDL for Wissahickon Creek* (2003 Nutrient TMDL). The 2003 Nutrient TMDL, designed to achieve and maintain dissolved oxygen criteria during periods of nutrient enrichment, uses a critical period based on an adjusted 7Q10 to represent low streamflow conditions when nutrient concentrations are the greatest. PWD recognizes the draft total phosphorus TMDL is intended to reduce nuisance algae and the 2003 Nutrient TMDL is intended to maintain dissolved oxygen criteria. PWD supports the intention of the 2003 Nutrient TMDL to base the critical period on conditions when high nutrient and low dissolved oxygen conditions co-occur. The draft total phosphorous TMDL critical period makes no attempt to target the conditions where high phosphorus and high algae densities co-occur, and instead uses the critical period to encompass periods when normal densities of algae occur.

10. The draft phosphorus TMDL critical period from April to October includes wet weather conditions that are acknowledged by EPA as periods when algae is scoured from substrate and removed from the Wissahickon Creek in the 2003 Nutrient TMDL, 2007 Endpoint Report and the 2012 Stressor Report. EFDC code was even modified to accommodate wet weather scour effects for this TMDL modeling effort (page 4, draft total phosphorus TMLD report). Such conditions should be removed from the critical period in order to recalculate a baseline load and waste load allocations representative of conditions that contribute to nuisance algae development, as opposed to wet weather conditions that remove nuisance algae from the Wissahickon Creek.

11. The draft total phosphorus TMDL implies on page 15 that the simulated duration of the critical period and months prior to the critical period are required to account for sediment adsorption of TP and the release of TP from the sediment to the water column. Such a consideration, that adds months to the critical period and simulation, may be reasonable when developing a TMDL for a lake but is not reasonable when developing a TMDL for the Wissahickon Creek given the bed composition and flashy hydrological conditions. In Philadelphia the bed composition is primarily coarse inorganic substrates (*e.g.*, cobble and gravel) that do not adsorb phosphorus.

12. The multiple concerns with the extended critical period in the draft total phosphorus TMDL all contribute to an overestimate of the baseline total phosphorus load. The baseline load includes wet weather conditions that scour algae and remove it from the system. Such conditions should be removed from the critical period of a TMDL intended to reduce nuisance algae. The same wet weather conditions are also falsely implicated as conditions that contribute phosphorus to the sediment, which in Philadelphia is primarily composed of coarse substrates that do not absorb phosphorus. While PWD fully supports EPA and PADEP efforts to reduce nutrient impairment and nuisance algae in the Wissahickon Creek, wet weather conditions should be removed from the critical period of the draft phosphorus TMDL. There are many existing regulatory vehicles and non-regulatory solutions that are more appropriate to address the influence of stormwater on the Wissahickon Creek than this draft total phosphorus TMDL.

MS4 BASELINE LOAD CALCULATION

13. The baseline load presented in Table 5-4 is overestimated given inaccuracies in the modified GIS data used to calculate the land use areas as presented in Figure 4-1. Aside from the obvious misplacement of the county boundary in Figure 4-1, there are two golf courses in the Wissahickon Creek watershed in Philadelphia that are incorrectly assigned to the 'recreation' instead of 'golf' land use category; the 18-hole Walnut Lane Golf Course and the 9-hole Philadelphia Cricket Club. Using Table 5-4 to back-calculate the approximate phosphorus load contributed in pounds per acre per year, given such load and slope information was not provided in the draft report, the approximate load from golf is 1.96 pounds per acre per year (2904.69 pounds per year/1482.15 acres). In comparison, the approximate load from the category recreation B (REC_B) is 3.4 pounds per acre per year (3604.91 pounds per year/1058.53 acres) and the approximate load from the category recreation C (REC_C) is 6.83 pounds per acre per year (3585.32 pounds per year/525.23 acres). It is unclear from the information provided what land use category, REC_B or REC_C, Walnut Lane and Philadelphia Cricket Club were assigned. Given this comparison of relative load, both recreation categories have a higher load than that assigned to golf courses, overestimating the baseline phosphorus load contributed from Philadelphia. The baseline MS4 load from Philadelphia needs to be re-calculated to correct for this error.

14. All approximate areal loading rates, or "potency factors", for TP loading by land use categories are back-calculated below in Table 1. The potency factor applied to the land use category All Other Parking (PK_IMP) is nearly an order of magnitude higher than all other land use categories. This approximate TP loading of 42.23 pounds per acre per year is far greater than any published values, including EPA TMDL Protocol that identifies maximum roadway loading of 1.335 pounds per acre per year (*U.S. Environmental Protection Agency. 1999. Protocol for Developing Nutrient TMDLs. EPA 841-B-99-007. Office of Water (4503F), United States Environmental Protection Agency, Washington D.C. 135 pp.*) This incorrect potency factor for the land use category All Other Parking (PK_IMP) should be corrected to align with EPA TMDL Protocol and the baseline MS4 TP loads should be recalculated to correct for this error.

15. The total area of All Other Parking (PK_IMP) presented in Table 5-4 is incorrect when compared to the total of All Other Parking presented in Appendix E. Summarizing Appendix E, the total of All Other Parking is 1012.08 acres. Similarly, the total area for Community Services Parking (PK_COMSER) differs between Table 5-4 (648 acres) and Appendix E (209.36 acres). The correct parking areas should be used in accordance with the correct potency factors as discussed in the prior comment to correct the baseline MS4 TP load.

16. Given the unclear origin of the land use areal loading rates and their inconsistency with EPA TMDL protocol, PWD reviewed the accumulation rates and maximum storage capacities in the LSPC model input file "WissaMS4_revised_7_10_14.inp" (available at http://www.epa.gov/reg3wapd/tmdl/Model%20Files/LSPC%20Executable%20Model%20and%20Input%20Files/WissaMS4_revised_7_10_14.inp) to understand how the baseline load was calculated. Even with slope considerations and land use considerations, only four unique combinations of accumulation rates and maximum storage rates are assigned to twenty two different land use categories including two different soil types (Table 1). Table 1 above includes three additional columns to present this comparison; the land use code, average monthly accumulation rate, and average monthly maximum storage rate from LSPC input files as provided by EPA.

    For example there is no distinction in the assignment of monthly accumulation and storages rates according to soil type for the residential land uses (RES_SIN_B and RES_SIN_C), yet according to PWD's analysis approximate potency factors the RES_SIN_C land use category (6.82 pounds per acre per year) has nearly twice the approximate TP loading of the RES_SIN_B land use category (3.43 pounds per acre per year).

Table 1: Sample of Table 5-4 from Draft Total Phosphorus TMDL, PWD Calculation and LSPC Input

Modeled Land Use Code	Total Area (acres)	Baseline TP Load (lbs/year)	Allocated TP Load (lbs/year)	PWD Calculated Potency Factor, Baseline TP Load / Total Area (Pounds per year per acre)	Land Use Code	Ave. Accumulation Rate ACQOP, pounds per acre per month*	Ave. Maximum Storage SQOLIM, pounds per acre per month*
AG_B	768.73	1,130.94	46.99	**1.47**	01	0.068	0.174
AG_C	1,939.61	4,967.27	116.35	**2.56**	02	0.068	0.174
COM_IMP	1,307.99	1,280.63	230.15	**0.98**	03	0.006	0.027
COM_SER	1,377.05	6,969.14	161.68	**5.06**	04	0.295	0.407
GOLF	1,482.15	2,904.69	43.18	**1.96**	05	0.068	0.174
IND_IMP	579.12	559.93	25.7	**0.97**	06	0.006	0.027
MINING	119.81	241.88	129.57	**2.02**	07	0.068	0.174
PK_AG	5.56	26.27	10.36	**4.72**	08	0.295	0.407
PK_COMSER	646.68	1040.9	262.03	**1.61**	09	0.295	0.407
PK_IMP	574.86	24,277.63	573.56	**42.23**	10	0.295	0.407
REC_B	1,058.53	3,604.91	326.75	**3.41**	11	0.295	0.407
REC_C	525.23	3,585.32	185.15	**6.83**	12	0.295	0.407
RES_MUL	1,994.15	13,858.35	406.77	**6.95**	13	0.295	0.407
RES_ROW	210.64	1,468.62	103.47	**6.97**	14	0.295	0.407
RES_SIN_B	14,358.04	49,313.23	932.29	**3.43**	15	0.295	0.407
RES_SIN_C	4,219.97	28,798.41	495.94	**6.82**	16	0.295	0.407
TRAN_IMP	512.09	499.16	182.22	**0.97**	17	0.006	0.027
UTL	333.94	1,639.75	59.7	**4.91**	18	0.295	0.407
VAC	1,327.09	6,627.3	217.27	**4.99**	19	0.295	0.407
WATER	303.34	1,473.43	1,473.43	**4.86**	20	0.055	0.069
WOOD_B	4,364.72	1,869.07	1,869.07	**0.43**	21	0.055	0.069
WOOD_C	2,621.79	1,373.34	1,373.34	**0.52**	22	0.055	0.069
Total	40,631.09	157,510.17	9,224.97	-	-	-	-

*Organic P only, Soluble Reactive P loading rate is set to zero for all land use categories

17. It is unclear from the draft total phosphorus TMDL, and the additional modeling information shared with PWD, the extent to which MS4s influence average phosphorus concentrations over and above the widely acknowledged nutrient enrichment attributed to upstream point sources. The influence of MS4s on average phosphorus concentrations is assumed by EPA to be of significant magnitude, because this assumption is a foundation of the justification for including MS4s in the draft total phosphorus TMDL. However, nowhere is this assumption discussed, proven or demonstrated.

    In order for the listed MS4s to understand and review their alleged influence on phosphorus concentrations in the Wissahickon Creek during dry weather periods, EPA should perform and present a sensitivity analysis on the baseline condition with and without MS4 sub-basin loading. Results should present an analysis of the influence of MS4s on algal densities, including the influence of wet weather scouring.

18. It is unclear from the draft total phosphorus TMDL, and the additional modeling information shared with PWD, the extent to which sediment diagenesis influences the calibrated EFDC results and calculation of the baseline TP load. This is of critical importance to Philadelphia given the bed composition in Philadelphia is primarily coarse inorganic substrates such as cobble and gravel that do not adsorb phosphorus, and the assumption inherent in the draft TMDL that the Philadelphia MS4 is contributing phosphorus to this type of substrate during wet weather conditions. The adsorption of phosphorus to sediment during wet weather conditions must be assumed by EPA to be of significant magnitude, because this assumption is a foundation of the justification for including MS4s in the draft total phosphorus TMDL and for the extended duration of the critical period. However, nowhere is this assumption discussed, proven or demonstrated.

    In order for the listed MS4s to understand the influence of applied sediment diagenesis on the calculation of their baseline TP load, EPA should perform and present a sensitivity analysis composed of model runs of the baseline scenario with and without the sediment diagenesis module turned on in LSPC and EFDC. EPA should provide EFDC model time series output and summary statistics of phosphorus fluxes from the sediment to the water column for each grid cell. EPA should also provide calculation of the baseline TP load and periphyton densities with and without the sediment diagenesis module enabled.

19. It is unclear what observed data the sediment diagenesis module is calibrated to because EPA has not presented any sediment data that includes phosphorus concentrations observed in sediment throughout the Wissahickon Creek under a variety of streamflow

conditions. EPA should present the observed data used to calibrate the sediment module in order for listed MS4s to perform a review and provide comment.

20. EPA uses a methodology that assumes the TP loading rates from all MS4s in the Wissahickon Creek watershed are equivalent. Such an allocation method fails to recognize the differences in implementation of structural and non-structural BMPs between MS4 sources. Since 2006, Philadelphia has implemented a number of structural and non-structural controls that serve to reduce the loading of sediment and other stormwater pollutants to the Wissahickon Creek and its tributaries. The EPA methodology falsely ignores the differences in MS4 loading rates among municipalities that implement stormwater management practices. The Philadelphia baseline TP load should be reduced to reflect the implementation of stormwater management practices since 2006.

21. According to the 2003 Nutrient TMDL, EPA states that PADEP data observed a slight increase in total phosphorus at only one dam in the Wissahickon Creek (Gross Dam). Using the observed data, EPA concluded that the impacts of entrained sediment behind the dams contributing phosphorus to the water column during low flow conditions 'were determined minimal'. It is unclear from the information provided in the draft total phosphorus TMDL whether or not the sediment behind the dams are simulated to have 'minimal' influence similar to PADEP findings presented in the 2003 Nutrient TMDL. While the text implies this to be true, there is no presentation of data or baseline simulation results available to review.

WASTE LOAD ALLOCATION CALCULATION

22. EPA does not adequately describe how the waste load allocations are calculated. Given the lack of clarity in the calculation of the baseline TP load it is equally unclear how the waste load allocations were derived.

23. EPA has not demonstrated the waste load allocations accomplish the stated objective of an average phosphorus concentration from April to October of 40 µg/L and a reduction in nuisance algal densities. EPA should provide model input and output files of the modeled waste load allocation scenario in LSPC and EFDC, as well as statistics that present the resulting periphyton densities, nutrient and dissolved oxygen concentrations and how they contrast with the baseline scenario.

24. Given the evidence provided by EPA, PWD has no confidence that the reductions in phosphorus imposed on point sources and MS4s achieve the EPA phosphorus objective of 40 µg/L. Additionally, PWD has no confidence that the reductions in phosphorus

imposed on point sources and MS4s are not overly restrictive and actually reduce phosphorus below the EPA phosphorus objective.

25. Any changes in modeling setup, GIS information, potency factor inputs, methodology or other adjustments that lead to a re-calculation of the baseline TP loads should also trigger a re-calculation of the waste load allocations. PWD has identified multiple errors that should trigger a recalculation of the baseline and adjustments to the LSPC and EFDC models. The correction of not only PWD, but all errors and modeling changes identified in the public comment period should trigger a recalculation of the baseline TP load and waste load allocations.

26. EPA has not presented how the 2003 Nutrient TMDL waste load allocations are incorporated into the LSPC and EFDC models. It is critical the 2003 Nutrient TMDL endpoints are incorporated into the simulations supporting the draft total phosphorus TMDL, given that algae growth is supported by both phosphorus and nitrogen. EPA should provide model input and output detailing how the 2003 Nutrient TMDL waste load allocations are incorporated into model simulations for the draft total phosphorus TMDL. This is to ensure that the desired reduction in nuisance algae is driven by both the 2003 Nutrient TMDL and additionally decreased by the draft total phosphorus TMDL. Regulated point sources and MS4s must have confidence that the influence of the 2003 Nutrient TMDL on algal densities is not being overlooked in the development of the draft total phosphorus TMDL, and that they are not penalized for any such oversight.

ADDITIONAL TECHNICAL COMMENTS

27. The TMDL model report states that DMRs were used to develop point source loadings for NPDES permitted point sources in the LSPC and EFDC models, and Tables 2-12 and 3-1 also indicate that daily flow monitoring data are collected. However, for four facilities (*i.e.*, Abington, Ambler, Upper Dublin and Upper Gwynedd), the model uses permitted effluent discharge rather than observed daily effluent discharge.

28. The wastewater discharge rate for North Wales Borough WWTP (PA0022586) is included despite the fact that the facility is no longer discharging. The influence of the North Wales Borough WWTP should be removed from the hydrological and water quality simulation.

29. The TMDL documentation does not contain sufficient detail about how the flow from Plymouth Meeting Quarry (formerly Corson's Quarry) was incorporated in the hydrologic model. The report states that the discharge is 'an average of 12.5 cubic feet per second (CFS) '. Presumably the flow from the quarry would be lower during a

period of extended drought, or the critical low flow condition. It is inconsistent to use a low flow statistic (*e.g.*, 7Q10) for some flow sources and a long-term average for other sources.

30. The TMDL documentation does not contain sufficient detail about how the streamflow from Plymouth Meeting Quarry (formerly Corson's Quarry) was calculated. PWD has made several discharge measurements of the flow in Lorraine Run and also identified a period in the discharge record for USGS gage 01474000 (Wissahickon Creek at Ridge Avenue) when the discharge from the quarry was temporarily interrupted. These observations suggest that the actual flow is closer to 8 CFS and not the 12.5 CFS average stated in the TMDL documentation.

31. The TMDL documentation does not contain sufficient detail about how hydrological routing is performed in the model. On November 14, 2014 at a stakeholder meeting, Tetra Tech staff mentioned that routing is adjusted to accommodate 'losing reaches' in the Wissahickon Creek watershed. A detailed description of the hydrological routing and any assumptions of 'losing reaches' or adjustments made to routing to accommodate 'losing reaches' should be provided.

32. As illustrated in Figure 4-10 of the TMDL documentation, the model over predicts streamflow at the Ft. Washington USGS gage station. As illustrated in Figure 4-9 of the TMDL documentation, the model reasonably predicts streamflow at the Philadelphia USGS gage station given over prediction of the upstream watershed as mentioned in the prior comment. It should be explained how the over prediction of streamflow at Ft. Washington did not lead to over prediction of streamflow at Philadelphia.

33. The methodology overestimates the influence of wet weather phosphorus loading by falsely assuming algae in the Wissahickon Creek assimilate the same amount of nutrients during dry weather and wet weather. Dry weather conditions are more favorable for algae growth and the influence of wet weather loading should be excluded from the draft total phosphorus TMDL critical period.

34. EPA suggests that wet weather loading of phosphorus may be important due to interactions with creek bed sediments, but other than paraphrasing a 2003 DEP study of dams, no data were presented on measured TP fluxes into or out of sediments or how these relationships were modeled in EFDC.

35. PWD understands that the reactions between sediments and the overlying water are complex and under certain conditions P efflux from sediments may occur. However, Wissahickon Creek impoundments are relatively small and the creek bed in Philadelphia is predominantly coarse inorganic substrates such as cobble and gravel.

There is insufficient documentation explaining how the model simulates the sediment flux of TP in dry and wet weather conditions in Philadelphia given the coarse bed materials and lack of significant sediment deposits.

36. The TMDL documentation does not provide a sufficient explanation of how the model simulates the sediment flux of TP during the growing seasons when the dry weather TP concentration is decreased due to point source controls implied by the draft total phosphorus TMDL.

37. When totaled, Tables 5-4 and 5-5 include conflicting information that results in different baseline loads. The source of these conflicts should be explained and the influence of the error removed from the waste load and load allocations.

38. Hydrologic soil group data are not presented in the map or report and it is not possible to check that appropriate soil groups were assigned to the appropriate location in the Wissahickon Creek watershed.

39. There is insufficient documentation of the relative proportions of benthic algal classes simulated in the baseline and waste load allocation scenarios. In order to properly evaluate the TMDL PWD requires more information be provided about filamentous and periphyton benthic algae in the baseline and waste load allocation scenarios.

40. While algal data is limited, the periphyton calibration results in Appendix D are extremely high compared to observed data collected by PWD. PWD requests a detailed explanation of the calibration of algal parameters to explain this discrepancy. Based on information presented to date, the model does not appear to be calibrated for periphyton and is overestimating algal density in the baseline scenario.

41. Chemical addition for precipitation of phosphorus with metal salts (*e.g.*, ferric chloride or alum) will likely increase sludge production and solid waste disposal costs at upstream point sources. Furthermore, metal salts become increasingly less efficient at binding phosphorus as the concentration of reactive phosphorus decreases. The increase in TDS that results from chemical addition may further degrade water quality for sensitive macroinvertebrates. For example, many mayfly taxa are sensitive to increases in TDS/major ions and TDS influences the taste of finished drinking water. PWD would like EPA and PADEP to please consider the potential of increased TDS in the Wissahickon Creek as an unintended consequence of the implementation of this draft total phosphorus TMDL.

42. PWD requires documentation of the complete set of periphyton algorithms and variables applied in the EFDC model be provided, including but not limited to nutrient

uptake, the potential use of intracellular versus extracellular nutrient concentrations, periphyton scouring, the fate of scoured periphyton organic matter, light availability at the stream bottom, and any other processes affecting periphyton as it is necessary to fully and fairly review and comment on the draft TMDL.

43. Documentation was not provided on stream shading in EFDC. Complete documentation, including the underlying algorithms and calibration process for this specific model, is needed to interpret the file "TEMPORAL_SHADING.inp" and the column titled "SHADING" in the "lxly.inp" file and is necessary to fully and fairly evaluate the draft TMDL.

44. The DMR data provided to PWD contained no phosphorus effluent data for January through December 2005 for North Wales STP and Upper Dublin STP; and no phosphorus effluent data for January through March 2005 for Upper Gwynedd STP. Given no data, how are these point sources modeled?

45. According to Card 03 in EFDC file "wq3dwc.inp" it appears the option for constant reaeration was selected. No information or justification for why this option was selected was provided nor was any information provided as to whether a sensitivity analysis was performed using other reaeration options.

46. In the EFDC file "Macalgmp.inp" it is not clear if the Monod or logistic function was selected to limit periphyton growth. According to the documentation in the draft Christina River TMDL, only the logistic function enables limitation at high velocities, i.e. scouring. Was that approach applied here? As mentioned in previous comments all of the variables in the header column are not explained in any documentation made available to PWD.

47. With respect to EFDC file "Peri_Macrophyte.inp" what is the significance of setting the variable "RZ_RMNLIMin" to zero? Does this mean that benthic sediment if always accessible as a nutrient source to periphyton?

48. With respect to EFDC file "Peri_Macrophyte.inp" please provide justification for setting the periphyton carbon:chlorophyll ratio at 0.05 mg C/ug Chl.

49. With respect to EFDC file "Peri_Macrophyte.inp" please provide justification for setting the same growth, metabolism and predation rates for both species of periphyton.

50. With respect to EFDC file "wqpsc.inp" please describe the process to develop daily concentration time series for the MS4 subbasins (*i.e.*, 1.out through 110.out) given that areal loading rates were the starting point

51. With respect to EFDC file "wqpsc.inp"please provide justification for using daily-scale loading to represent MS4 sub-basin inputs during wet weather. Given the small size of the Wissahickon Creek watershed, full day inputs of wet weather concentrations could potentially overestimate P loading from MS4 sub-basins.

52. With respect to EFDC file "wqpsc.inp" please explain the development of phosphorus effluent values for Upper Gwynedd STP and Abington STP that varied on a daily basis in 2005. The DMR data provided to PWD contained monthly averaged data, and not daily values.

53. With respect to EFDC file "wqpsc.inp" the DMR data for 2005 generally contains total phosphorus data, and only one orthophosphate value. How was total phosphorus data partitioned into the EFDC phosphorus species in developing the wqpsc.inp file for 2005?

54. With respect to EFDC file "qser.inp" please provide justification for having flows greater than zero during dry weather from the MS4 sub-basins (i.e., 1.out through 110.out).

55. With respect to EFDC file "aser.inp" the 2005 rainfall sums up to 1.22 inches. This is far less than the 41.58 inches from the NOAA NCDN QCLCD daily precipitation dataset. Is the aser.inp precipitation wrong, or was it not used in running the model?

56. The calibration of the EFDC periphyton simulation was based on only one observation at each station, and the simulated maxima across stations far exceeded the observed maxima. Considering that periphyton is the endpoint of concern, the extremely low number of observations used in validation is highly questionable and extremely problematic.

CONCLUSION

In summary, as stated in more detail in the body of these comments, we would request that the draft TMDL be withdrawn for the following reasons:

1. Lack of information enabling PWD to fully and fairly comment on the draft TMDL. This lack of information includes but is not limited to: GIS data processing and the assignment of areal loading rates (or "potency factors") by land use; determination of MS4 baseline total phosphorus loading, simulation of filamentous algae and algal periphyton, algal scouring and sediment-phosphorus interactions.

2. From the limited information that was provided numerous errors and mistakes were made rendering the TMDL so inaccurate that it cannot be used for regulatory purposes; these errors include but are not limited to the selection of critical period, land use categorization, assignment of areal loading rates by land use; and hydrologic representation of point sources. PWD respectfully disagrees with the incorporation of wet weather flows in this total phosphorus TMDL as the regulatory vehicle to force stormwater management in the Wissahickon Creek watershed. There are many other regulatory and non-regulatory tools available to manage stormwater in the Wissahickon Creek watershed. PWD requests that EPA withdraw this TMDL and fully support the implementation of BMPs, ordinances and green infrastructure techniques to manage stormwater in the Wissahickon Creek watershed.

Respectfully Submitted,

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