Comment Response Document
Regarding the Total Maximum Daily Loads of Phosphorus to Southeast Creek
Queen Anne's County, Maryland

Introduction

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Total Maximum Daily Loads (TMDLs) of phosphorus to Southeast Creek. The public comment period was open from November 22, 2002 to December 21, 2002. MDE received three sets of written comments.

Below is a list of commentors, their affiliation, the date comments were submitted, and the numbered references to the comments submitted. In the pages that follow, comments are summarized and listed with MDE's response.

List of Commentors

Author	Affiliation	Date	Comment Number
Eileen McLellan, Ph.D.	Chester Association	December 19, 2002	1 through 13
Patricia Gleason	U.S. Environmental Protection Agency	December 20, 2002	14 through 22
Marie Rameika	Town of Church Hill	December 20, 2002	23 through 47

Comments and Responses

1. The commentor requested a public hearing regarding the TMDL of phosphorus to Southeast Creek.

   Response: Comments received by the Department have been considered in preparing the final draft TMDL document to be submitted to the Environmental Protection Agency (EPA). While the Department has determined that comments submitted by the commentor do not necessitate or warrant a change at this time in the actual TMDL calculations as contained in the draft document, the Department welcomes the opportunity to meet for the purpose of discussing the issues raised as early in the coming year as is convenient. As there appears to be insufficient broader interest in this draft TMDL to warrant a formal public hearing at this time, the Department believes such a meeting would provide ample opportunity to both further explain the draft TMDL as submitted, and address the formal comments presented as well as any other questions the commentor may have.

2. The commentor stated that the chlorophyll *a* standard of 50 µg/l used by MDE as a surrogate water quality criterion for phosphorus is nearly twice the level proposed by the Chesapeake Bay Program in its revised draft criteria and more than 10 times the level proposed by the U.S. Environmental Protection Agency (EPA) in its draft ecoregional nutrient criteria for the Atlantic Coastal Plain. The commentor questioned why MDE developed a TMDL using

standards which will soon be revised and requested information regarding the time frame and procedure for subsequent revision of the TMDL.

Response: States are required to make water quality determinations based on existing water quality standards. Those cited in the comments are all proposed values, and they do not address poorly flushed tidal waters. Threshold values of chlorophyll *a* have been used for over a decade, under authority of the State's narrative criteria, to evaluate eutrophic conditions and set water quality endpoints consistent with the designated uses of a water body. This has allowed the State to make water quality management decisions that support the mandatory water quality standards and are consistent among the regulated community. Through common usage and public review, literature and other published material, and site-specific data, Maryland has found that 50 µg/l provides adequate protection of a water body's designated uses in poorly flushed tidal systems, which applies to the present case (Thomann, R.V. and Mueller, J.A. 1987. Principles of Surface Water Quality Modeling and Control. Harper and Row, Publishers, New York).

Draft criteria for chlorophyll *a*, being considered by the EPA Chesapeake Bay Program, are not going forward as numeric criteria at this time due to technical considerations. EPA will pursue numeric criteria in the future.

MDE has developed the TMDL using standards that provide adequate protection of the State's waters. The time frame and procedure for revision will follow the "Five-Year Watershed Cycling Strategy" explained in the Assurance of Implementation section of the TMDL main document. If the water quality criteria are revised within these five years, the TMDL will be revised accordingly.

3. The commentor stated that MDE identifies the critical condition for eutrophication as the low flow season, but ignores a second critical condition, namely the drop in dissolved oxygen levels, which occurs in eutrophic waters during night time hours due to algal respiration. The commentor added that recent monitoring by Maryland Department of Natural Resources (DNR) has documented variations of several mg/l in dissolved oxygen (DO) levels during a 24-hour period. The commentor requested an explanation regarding how the proposed TMDL will ensure that DO remains above the 5 mg/l threshold during these diurnal fluctuations (i.e., treat DO as an acute as well as chronic criterion).

   Response: Although the model is applied in steady state, it is capable of generating estimates of daily maxima and minima for DO. The second critical condition, noted by the commentor, is addressed by ensuring that the daily minimum DO meets water quality criteria.

4. The commentor noted that MDE's calculated loads are based on modeled (not measured) flows, and stated that accurate knowledge of flows is as essential for accurate calculation of loads as is accurate measurement of concentrations. The commentor requested that a detailed discussion of the method used to estimate flows, and a justification of any assumptions used in this method, be provided. The commentor also requested that MDE conduct an error

analysis to indicate the variability in modeled loads that would result from likely errors in the flow estimation using this method.

Response: Freshwater flows were calculated on the basis of delineating the Southeast Creek drainage basin into nine subwatersheds (See Figure A9 in Appendix A of the draft document). These subwatersheds closely correspond with the DNR's 12-digit basin codes. Where necessary, the subwatersheds were refined to assure they were consistent with the 20 segments developed for the Southeast Creek Eutrophication Model.

The flows for the subwatersheds were estimated using an average of the flows from the USGS gages #01493000, #01493112, and #01493500 located near the Southeast Creek. A ratio of flow to drainage area was calculated and then multiplied by the area of the subwatersheds to estimate the high and low flows. For both high flow and low flow, each subwatershed was assumed to contribute a flow to the Southeast Creek mainstem. These flows and loads were assumed to be direct inputs to the model.

This methodology to estimate flows is based on previously a well documented, and accepted method developed by USGS. It has been used many times on previous projects developed by the State of Maryland and other states also. The department believes that the results obtained by this accepted method, does not warrant additional analysis.

5. The commentor stated that MDE has developed a TMDL for total phosphorus, yet algal growth is dependent on soluble reactive phosphorus. The commentor requested that a conceptual model for the relationship between phosphorus sources and eutrophication in Southeast Creek be provided, which addresses the following issues:

    - The extent to which each source contributes soluble reactive phosphorus;
    - The mechanism (groundwater flow or surface runoff) by which soluble phosphorus is delivered to the Creek (Table 5 indicates that dissolved phosphorus concentrations are higher in the low-flow season, suggesting groundwater transport);
    - The mechanism and extent of transformation of other forms of phosphorus to the bio-available form, for example during low dissolved oxygen events, and the implications of this for control of particulate phosphorus; and
    - The relationship between soluble reactive phosphorus and total phosphorus used to calculate the TMDL based on total phosphorus.

    Response: For nonpoint sources, the concentrations of the nutrients nitrogen and phosphorus are modeled in their speciated forms. The WASP5.1 model simulates phosphorus as ortho-phosphate (PO_4) and organic phosphorus (OP). Ortho-phosphate represents the dissolved forms of phosphorus. The dissolved forms of nutrients are more readily available for biological processes such as algae growth that can affect chlorophyll *a* levels and dissolved oxygen concentrations. For low flow conditions, the speciation of the nonpoint source loads were calculated using data obtained at water quality stations within the Southeast Creek Basin. For average flow conditions, the speciation was based on the results of the EPA Bay Program watershed model.

For the point source loading, the phosphorus concentrations simulated by the model are considered in the same speciated forms as described above. The Church Hill WWTP discharges directly into Southeast Creek (water quality model, segment 20). The point source loading used in the calibration of the model were calculated from actual WWTP flows and concentrations reported to MDE and stored in MDE's point source database.

The extent to which each source contributes soluble phosphorus can be estimated from these loadings as explained above, and total loads from each source are shown in Appendix A of the TMDL document.

It is assumed that the mechanism (groundwater flow or surface runoff) by which soluble phosphorus is delivered to the Creek is by both groundwater flow and surface runoff. The observed data would account for both mechanisms of transportation. The mechanism and extent of transformation of other forms of phosphorus, such as organic phosphorus, to the bio-available form is calculated by the model through the phosphorus cycle. For example, organic phosphorus is converted to dissolved inorganic phosphorus (the bio-available form) using a temperature dependent mineralization rate.

The ratios of total nutrients to dissolved nutrients used in the model scenarios represent values that have been measured in the field.

6. The commentor stated that MDE has calibrated the model using data from upstream tributaries, yet the model is being used to predict water quality in the mainstem of Southeast Creek. The commentor requested a clarification regarding why tributary, rather than mainstem, data was used for model calibration and why there was no independent verification of the model using a separate (or split) data set.

   Response: The calibration makes use of both non-tidal tributary data and data in the tidal mainstem of Southeast Creek. The non-tidal data is used to characterize nonpoint source loads. The data from the tidal mainstem was used for comparison with the model output.

7. The commentor stated that the low-flow model calibration for ammonia and organic nitrogen shown in A14 and A15 do not appear to be a very good fit, and requested an explanation regarding this matter.

   Response: The primary focus of this modeling effort was to assess the effects of nutrients on the mainstem of the Southeast Creek. The results of the model are used to support making management decisions in a consistent manner among different settings. The calibration plots for the mainstem of the river are reasonably accurate, and support results that are consistent with regulatory decision-making methods used elsewhere in Maryland. For all model output parameters in the calibration of the model, the simulated water quality captures the trend in the observed data.

   Models are not perfect, as there are always some parameters that are oversimulated or undersimulated. The key is to follow the trend of the observed data and to be within a reasonable data range.

8. The commentor noted that Figures 11 and 12 in the draft document compare "baseline" and "future" scenarios for low-flow and average annual flow conditions; although nutrient loadings are reduced in the "future" scenario compared to the "baseline" scenario, DO levels are shown as lower in the "future" scenario than in the "baseline". The commentor stated that lower nutrient levels would be expected to lead to higher, not lower, DO levels and requested an explanation for this counter-intuitive result.

   Response: Although the DO concentration model output reflects minimum DO, one of the sources of DO in the water column is chlorophyll *a* (i.e., photosynthesis). If the chlorophyll *a* concentration decreases, the DO will decrease slightly also. It can be noted the slight change in DO takes place only where chlorophyll *a* concentrations changed.

9. The commentor stated that the "future" scenario assumes that the Church Hill WWTP is operating at full capacity; however, future growth in the watershed is just as likely to occur through the development of rural subdivisions relying on septic as through the building of homes connected to the WWTP. The commentor requested information regarding the assumptions made pertaining to future growth in the watershed and explicitly set aside a portion of the load or wasteload allocation to accommodate this.

   Response: The TMDL guidance requests the use of the most critical scenario to develop the TMDL. MDE used the approved water and sewer plan for the WWTP in question, which states what would be the maximum future flow expected from the plant. It is also a way to include of margin of safety into the TMDL. Using the maximum allowable flow is more conservative than assuming that the future growth is most likely to occur through the development of rural subdivisions relying on septics as through the building of homes connected to the WWTP.

10. The commentor stated that the load/wasteload allocation implies that point source loads will be allowed to increase to current WWTP capacity while nonpoint loads will be expected to decrease by up to 61%, and requested an explanation for "the inequitable treatment of point and nonpoint sources".

    Response: The TMDL results do not allow for an increase to current WWTP capacity beyond what is already in the approved water and sewer plan. The waste load allocation will limit the concentration of total phosphorus to 6 mg/l.

    The 61% reduction in non-point sources refers to the annual load allocation only. Note that the load allocation for the low flow TMDL requires only a 19% reduction of the nonpoint source loads.

11. The commentor stated that the current discussion of "reasonable assurances" that nonpoint load reductions will be achieved is inadequate, because it fails to consider:

    - The extent to which various sources are contributing bio-available phosphorus and the mechanism by which it is delivered to the Creek;

- The extent to which BMPs are currently being implemented;
- The opportunity for implementing additional BMPs (i.e if BMPs are currently in place on 85% of the sources, will implementation on the additional 15% be adequate to reduce loads to the prescribed allocation?);
- The efficiency of pollution reduction that can be expected from these BMPs (which relates back to the discussion on the delivery of bio-available phosphorus); and
- The feasibility of implementing these BMPs as a result of socio-economic constraints or opportunities.

Therefore, the commentor requested a more detailed discussion of anticipated nonpoint load reductions.

Response: See the response Comment 5 for the response to the first bullet.

The purpose of a TMDL analysis is limited to determining the maximum loading limit that meets existing water quality standards. Neither the Clean Water Act nor current U.S. Environmental Protection Agency regulations direct states to develop a detailed implementation plan as part of the TMDL development and approval process. Although formal implementation planning is currently beyond the scope of the TMDL development process, Maryland is committed to enforcing applicable laws and supporting initiatives necessary to implement this and other TMDLs.

The TMDL analysis methodology considers all sources, including background contributions. It sets a limit on nutrients irrespective of the specific source of the loads, including natural background loads. The TMDL analysis is limited to determining the loading limit. The development of an implementation plan for achieving the loading goal established by the TMDL analysis is beyond the scope of this undertaking. The suggestion to conduct a study of specific sources would be more appropriate in the context of identifying the most cost effective nonpoint source controls as part of an implementation planning effort.

The calculated NPS allocation is implicitly the sum of the individual load allocations. The sub-allocation of the allowable NPS load to individual sources is a detailed implementation issue, which is beyond the scope of the TMDL. The technical memorandum *Significant Phosphorus Nonpoint Sources and Point Sources and in the Southeast Creek Watershed* describes viable individual allocation to each land use category. The technical memorandum provides information that is intended to facilitate future stakeholder dialog on implementing planning. MDE can revise the TMDL and allocations in the future if warranted by experiences gained through future implementation efforts.

12. The commentor stated that, although MDE is not required to submit an implementation plan to EPA for approval, under the continuing planning process it is required to update water quality management plans once a TMDL is approved. The commentor requested a description of the procedure and timetable by which MDE will work with the Upper Eastern Shore Tributary Team, the Chester River Association and other stakeholders to develop an update to the water quality management plan that incorporates the Southeast Creek TMDL.

Response: MDE works with all Tributary Strategy Implementation Teams in coordination with DNR on an on-going basis. The TMDL provides information for the Tributary Teams to target their efforts in the larger context of the Tributary Strategies, and MDE helps with interpretations of the TMDL results. It is the Department's expectation that the Chester River Association will work in coordination with the Tributary Team; however, MDE will be willing to work directly with the Association. MDE is also awaiting the new federal TMDL regulation to ascertain how the US Environmental Protection Agency expects TMDLs to be reflected in Water Quality Management Plans.

13. Please describe provisions for a monitoring program to ensure that the TMDL is implemented and effective, and describe the circumstances under which it would be revised.

Response: As explained is Section 5.0 of the TMDL report, Maryland uses a five-year watershed cycling strategy to manage its waters. Pursuant to this strategy, the State is divided into five regions and management activities will cycle through those regions over a five-year period. The cycle begins with intensive monitoring, followed by computer modeling, TMDL development, implementation activities and follow-up evaluation. The choice of a five-year cycle is motivated by the five-year federal National Pollutant Discharge Elimination System (NPDES) permit cycle. The continuing cycle will ensure that every five years intensive follow-up monitoring will be performed. Thus, the watershed cycling strategy establishes a TMDL evaluation process that assures accountability. This provides a minimal baseline to which additional monitoring could be considered, particularly associated with assessing nonpoint source loads.

In addition, TMDLs are revised if standards change, or if new information or analytical tools indicate that substantial changes in the existing TMDL would result from a new analysis.

14. The commentor suggested including a brief discussion of the modeling results showing a decreased DO concentration (although within the water quality criteria) resulting from the marked reductions of chlorophyll a under the "future" TMDL model scenarios.

Response: See the response to Comment 8.

15. The commentor requested an explanation regarding the rationale for assuming a lower sediment oxygen demand (SOD) value at the headwaters and higher SOD values toward the mouth of the creek during low flow conditions.

Response: No SOD measurements were taken in the Southeast Creek. However, SOD measurements were taken in the Chester River and two of its major tributaries in summer, 2001. One station at the confluence of the Chester River and the Southeast Creek show measurements between 1.34 g/m^2day and 3.16 g/m^2day. Corsica Creek, just downstream of the Southeast Creek, had three stations where measurements were taken. One station was at its mouth, another midway along the length of the river, and another at its headwaters. The SOD values in Corsica River clearly show a gradient with the highest values at the mouth and the lowest values at the headwaters. In June, the values ranged from 2.15 g/m^2day to 1.75 g/m^2day; in July, the values ranged from 3.88 g/m^2day to 2.37 g/m^2day; and in August the values ranged from 2.53 g/m^2day to 1.42 g/m^2day. SOD values used for modeling were

estimated from the Chester River SOD measurements, and used as a starting point in the calibration of the model. These estimated vales were adjusted until a reasonable fit was obtained between the model's results and the observed water column DO data.

16. The commentor requested an explanation regarding the basis for using a temperature of 23.1 degrees Celsius in non-tidal waters for the average annual flow model scenario (i.e., the second model scenario).

    Response: Observed data from 1999 shows an average temperature of 26.1 degrees C for the tidal area of the Creek. The same data shows an average summer temperature of 20.6 degrees C for the non-tidal area of the Creek. The difference 26.1 – 20.7 = 5.4 degrees C, was applied to the historical maximum summer temperature for DNR data of the Chester River watershed. DNR data show a maximum summer temperature of 28.5 degrees C, for tidal waters. The difference 28.5^{o} C – 5.4^{o} C yields a temperature of 23.1^{o} C. This temperature was used in the non-tidal waters for the average annual flow model scenario.

17. The commentor requested that salinity be included in Table A1.

    Response: Salinity Laboratory Protocols will be included in Table A1.

18. In reference to the kinetic constants in Table A8, the commentor stated that the light formulation switch of "1" represents the DiToro/default method.

    Response: The light formulation switch of "1" represents the DiToro formulation. Table A1 has been corrected accordingly.

19. In reference to the kinetic constants in Table A8, the commentor requested an explanation of the basis for the initial estimate of the reaeration constant.

    Response: The initial values were taken from past modeling studies of Potomac River (Clark and Roesh, 1978; Thomann and Fitzpatrick, 1982; Cerco, 1985), and of Mattawoman Creek (Haire and Panday, 1985; Panday and Haire, 1986; Domotor et al., 1987), the Patuxent River (Lung, 1993), and recent modeling conducted on Maryland's Eastern Shore.

20. The commentor requested that MDE comment on the organic phosphorus low-flow calibration curve, as the curve does not seem to capture the data trend in the middle of the creek.

    Response: See response to Comment 7.

21. The commentor requested the revised WASP model input files.

    Response: MDE has responded to the request.

22. The commentor requested a public hearing regarding the TMDL of phosphorus to Southeast Creek.

Response: Please see the response to Comment 1 above.

23. The commentor expressed concern regarding the age of data used within the document and calculations.

Response: Federal guidance stipulates that TMDLs are to be developed using the best readily available data, provided the data is sufficient. The data used to develop the proposed TMDL meets both the criteria of being sufficient, and of being the best data readily available.

24. The commentor stated that the Church Hill WWTP is not the only point source that currently discharges into Southeast Creek; the Eastern Pre-Release Unit (EPRU) WWTP also discharges to Southeast Creek (Note: this facility is referred to in the TMDL document as the "Eastern State Correctional Camp). Furthermore, the commentor stated that the EPRU facility could have a serious impact on the model calculations if it uses chemicals and laundry detergents high in phosphorus.

Response: MDE acknowledged in the TMDL report Section 4.2, that two point sources of nutrients were located in the Southeast Creek watershed when the 1999 data was collected: the municipal wastewater treatment plants in Church Hill and the Eastern State Correctional Camp. MDE also states in the report that "However, MDE point source discharge data was used to estimate only the Church Hill point source load for the 1999 calibration. The second WWTP (Eastern State Correctional Camp) is far away from Southeast Creek (more than 4 km), and its discharge is 4 times less than Church Hill (See Section 2.1, General Setting and Source Assessment for further discussion). For modeling purposes it is considered as part of the upstream background load. Its contribution has been accounted for implicitly by observed concentrations at the water quality segment boundary (segment 20)."

25. The commentor questioned whether monitoring site #1, which is described in the document as located "1.49 km from the mouth of the Chester River", is the point where Island Creek and Southeast Creek merge.

Response: Monitoring site #1 (XHH9582) is located approximately 0.5 km upstream of the point where Island Creek and Southeast Creek merge.

26. The commentor questioned whether the chlorophyll *a* value of 64 μg/l measured in "one of the non-tidal branches (of Southeast Creek)" occurred in Island Creek or Kennersley.

Response: The chlorophyll a value of 64 μg/l was measured at station ILS0042 located in Island Creek.

27. The commentor questioned how MDE concluded that the Church Hill WWTP is responsible for the algal bloom and related problems in Southeast Creek, given that the concentrations of chlorophyll *a* measured near the plant were the second lowest measured in the mainstem.

Response: MDE did not conclude that the Church Hill WWTP is responsible for the algal bloom and related problems in Southeast Creek. Church Hill WWTP contributes nutrients to

the creek, but MDE has not made the statement that it is the only contributor to the Southeast Creek. Data from station XHH9396, located downstream of the Church Hill WWTP suggested that the plant is contributing to the high levels of chlorophyll *a* seen at that station. The model confirmed the suggestion, because reducing the phosphorus load from the plant influences the water quality of the river downstream.

28. The commentor noted that the guidelines cited in Section 3.0 of the document for determining chlorophyll *a* are 15 to 25 years old.

    Response: The reference for Thomann and Mueller guidelines show a 1987 publishing date. These scientific guidelines are not outdated, they are still current and they have served as the foundation of other very well documented and accepted projects and guidelines used by the department in the past. In addition to the Thommann and Mueller guidelines, MDE has used the 1997 EPA guidelines, which are only 5 years old, as stated in the Reference section of the TMDL report.

29. The commentor requested a clarification regarding what is meant by the phrase "observed 1999 water quality data" that appears in Section 4.2.

    Response: The department refers to "observed data" as analytical results for samples taken directly from the creek, as opposed to data output from the water quality models.

30. The commentor stated that the data used in the baseline calculations may be outdated and may not represent environmental changes that have occurred since the data was collected (e.g., reduction in phosphorus in laundry detergents, more development, etc.). The commentor added that the margin of safety also may not accurately reflect all the variables.

    Response: See the response to Comment 31.

    Regarding the margin of safety, as stated in the report, a margin of safety (MOS) is required as part of a TMDL in recognition of many uncertainties in the understanding and simulation of water quality in natural systems. The MOS is intended to account for such uncertainties in a manner that is conservative from the standpoint of environmental protection. The MOS is not intended to reflect all variables with extreme accuracy. Based on EPA guidance, the MOS can be achieved through two approaches (EPA, April 1991). One approach is to reserve a portion of the loading capacity as a separate term in the TMDL (i.e., TMDL = LA + WLA + MOS). The second approach is to incorporate the MOS as conservative assumptions used in the TMDL analysis.

31. The commentor stated that the report is based upon assumptions and estimates, with very little actual data (e.g., number of farmers using best management practices (BMPs) and confidence in their compliance as cited on page 13).

    Response: The purpose of the TMDL analysis is to determine the assimilative capacity of the waterbody to nutrients, which depends primarily on the physical characteristics of the waterbody itself (volume, flushing rate, temperature, etc.). The TMDL is independent of the estimated current load, that is, the TMDL will not change if the estimate of the current load is

refined. Estimating the current load, and thus the reduction needed to meet the TMDL, is not a statutory requirement of the TMDL analysis. Maryland provides the initial estimate of the current load, and the necessary nonpoint source reduction needed to achieve the TMDL, as a good faith effort towards future implementation. Improving the estimate of "current" loads, and tracking the best management practices in the watershed, will be one of the on-going challenges associated with implementing the TMDL. MDE has committed to supporting this effort in consultation with interested stakeholders.

32. The commentor requested that rainfall and temperatures for the period of July through September 1999, as well as for several years before and after, be checked for comparison.

    Response: Rainfall data was not used directly in the analysis; however, historic rainfall data was reviewed during the study. The temperature data used in the analysis represents appropriate values that represent critical conditions. Historic temperature data were reviewed. See the response to Comment 16.

33. The commentor noted that the graphs in the section discussing modeling scenarios do not extend to the Church Hill WWTP.

    Response: The graphs actually do include the Church Hill WWTP; however, because the water quality model segments, which show the location of the WWTP are numbered, and the graphs have mile markings, it is not easy to discern this. We will make an effort to improve the presentation to avoid this type of confusion in the future.

34. The commentor stated that the document cites the highest chlorophyll *a* concentrations located approximately 4.5 km from the mouth. The commentor noted that this location is in close proximity to Kennersley Marina, rather than to the Church Hill WWTP (which Table 1 of the document indicates is located 8.14 km from the mouth). The commentor added that the lowest chlorophyll *a* are located nearer to the Church Hill WWTP.

    Response: The station with the highest chlorophyll *a* value is located downstream of the WWTP. This is reasonable because it takes time for algae to grow as the water moves downstream from the WWTP. The analysis indicates that the treatment plant has an effect on downstream chlorophyll *a* concentrations. That is, the model demonstrates that changes in discharges from the WWTP result in changes in water quality.

35. The commentor stated that the DO concentrations measured near the Church Hill WWTP do not indicate an impairment, as the levels measured there are of the highest at the sampling stations (7.5 mg/l). The commentor added that, by contrast, the “worst area” appeared to be near Kennersley Marina.

    Response: See response to Comment 34.

36. The commentor stated that the modeling scenarios do not give any proof that the Church Hill WWTP is the source of the phosphorus problem, or any reason why the plant’s NPDES permit should include phosphorus limits.

Response: The modeling scenarios did show that the water quality of the Southeast Creek is sensitive to phosphorus discharged from the Church Hill WWTP. The Department would not request upgrades of the plant unless it is absolutely necessary, as shown by the analysis, to restore the state's water quality in its rivers.

37. The commentor expressed concern that the probable failure of nonpoint sources to implement phosphorus management plans until 2004/2005 may result in further limitations to Church Hill WWTP's NPDES permit under the guise of "achievement of the water quality standard", because MDE has more "control" over point sources.

    Response: The MDE is sensitive to the concerns raised by the commentor, which also have been raised in national forums on TMDL policy matters. Because point sources have historically borne much of the responsibility for nutrient reductions in the past, significant attention and financial resources are being focused on nonpoint sources. The general expectation nationally is that nonpoint sources need to do their fair share in protecting our water resources. Given Maryland's long Chesapeake Bay heritage, our robust citizen-based water resource management institutions, and new financial resources being made available to the agricultural sector, we expect that nonpoint sources of nutrients will share in the responsibility to meet the goals of the TMDL.

38. The commentor stated that the Maryland Agricultural Cost Share (MACS) Program and the Low Income Loans for Agriculture Conservation (LILAC) cited in the "Assurance of Implementation" section are loan programs and do not insure implementation of the TMDL.

    Response: Please see the response to Comment 37 above.

39. The commentor stated that the citation of biological nutrient reduction (BNR) requirements for WWTPs under the tributary strategies does not include any mention of available funding sources for point sources to implement BNR.

    Response: The BNR program continues to provide funding for treatment plant upgrades. In the present case, the point sources are fairly small and do not necessitate a strict level of treatment that would justify the cost of implementing BNR technology.

40. The commentor stated that an expectation for nonpoint source loads to be reduced during low flow conditions may be premature, because not all nonpoint sources have BMPs in place. The commentor questioned whether MDE has sufficient staff to monitor and enforce compliance with the BMPs that may be filed now and in the future. The commentor further questioned whether BMPs will be monitored for compliance as closely as point sources.

    Response: The MDE shares the responsibility for implementation oversight with the Maryland Department of Agriculture. In addition to State agency staffing, we are fortunate in Maryland to have citizen advocates who help perform informal oversight, and help to inform members of the General Assembly about these matters. It is recognized that reduction of NPS loads during low flow conditions will lag behind the implementation of

BMPs because of the time it takes for ground water slowly to work its way through the system. See responses to Comment 11 and Comment 31.

41. The commentor noted that data for environmental conditions for solar radiation and photoperiod was from a water model study performed on the Potomac River in 1982, and questioned whether more current data is available.

    Response: The study done for the Potomac River in 1982 is the most readily available data for solar radiation and photoperiod. The department believes that the data of this study is suitable to be used in the development of the Southeast Creek TMDL, because both watersheds are located in the same geographical area, and these types of conditions would not change significantly since the data were collected.

42. The commentor questioned whether estimated temperatures were used when the Church Hill WWTP's monthly reports include daily temperatures.

    Response: MDE used actual "observed temperature data" in the development of the Low Flow TMDL. Temperatures were estimated using historical data for the Annual Average TMDL. Also, the model uses water column temperature, not air temperature or temperature of the point source discharge.

43. The commentor questioned why a TMDL for phosphorus is being proposed for the Church Hill WWTP if, as the document states, "the point source has flows below 0.08 million gallons per day…and it has only a small effect on the water quality of the river".

    Response: An effluent of 80,000 gallons per day is significant to the Southeast Creek water quality because of the small size of this receiving waterbody. The assimilative capacity of the Creek is very small and a flow of that magnitude with the concentrations as shown in the plant's database, translate into a phosphorus load that can have a detrimental effect in the water quality of the river.

44. The commentor stated that statements within the report (e.g., MDE "advises further monitoring as part of future implementation efforts to establish a more accurate baseline of nonpoint source loading values", "it should be noted that the Chesapeake Bay Program loading estimates are possibly over-stating current loads", and "it must be noted that these loads are based upon broad-scaled estimates") clearly indicate that more accurate information is needed.

    Response: The CBP watershed model and resulting land use loading rates have been extensively peer reviewed. They represent the best readily available data for the estimation of average annual nonpoint source loads. These types of land use loading rates have been used in other TMDLs approved by U.S. EPA. Please also see the response to Comment 31.

45. The commentor questioned whether any algal problems have occurred in Southeast Creek since the 1999 algal bloom.

Response: There have been algal blooms in the Southeast Creek after 1999. Specifically, there have been high chlorophyll *a* concentrations reported at the headwaters of the creek, downstream of the Church Hill treatment plant, during the summer of 2000, 2001 and 2002. These have been reported by the Department's field office personnel.

46. The commentor requested a clarification regarding the number of farms abutting the Southeast Creek watershed and monitoring sites that have recorded BMPs. The commentor further questioned how frequently the BMPs are monitored and whether the water adjacent to these farms is tested.

Response: Please see response to Comment 11.