

**Comment Response Document
Regarding the Total Maximum Daily Loads of Nitrogen and Phosphorus
for the Northeast River, Cecil County, MD**

Introduction

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Total Maximum Daily Loads (TMDLs) of nitrogen and phosphorus for the Northeast River. The public comment period was open from November 5, 2003 through December 4, 2003. MDE received two 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
Matheu J. Carter, P.E.	Cecil County Department of Public Works	December 4, 2003	1 through 12
Robert Koroncai	Office of Watersheds, U.S. Environmental Protection Agency	November 25, 2003	13 through 15

Comments and Responses

1. The commentor states that basing the TMDLs on 2.0 MGD design flow for the Northeast River Advanced Wastewater Treatment Plant (WWTP) is shortsighted in Cecil County's more comprehensive goal of growth management and control of both point and nonpoint pollution sources which may require a 4.0 MGD discharge.

Response: *For the TMDL analysis, MDE used the approved Water and Sewer plan flow for the Northeast River Advanced WWTP, which is 2.0 MGD. Current discharge from the WWTP averages 0.5 MGD, and the Maryland Department of Planning estimated a 2020-projected flow of approximately 0.681 MGD. That still leaves more than 1 MGD for growth after 2020. MDE plans to revisit TMDLs in the future, if needed. Therefore any changes in land use, WWTP or any other significant change can be addressed at a future time.*

2. The commentor refers to the Executive Summary, which states, "the river is impaired by nutrients (nitrogen and phosphorus) which cause excessive algal blooms." Based on this reference the commentor questions what evidence there is of the impairment, given that high dissolved oxygen concentrations are consistently evident in MDE's sampling.

Response: *The evidence is the high chlorophyll a concentrations observed in the MDE 2001 sampling survey, and in Chesapeake Bay Program data that shows chlorophyll a*

concentrations as high as 120 µg/l in surveys dated from 1986 to present. The samples consistently show chlorophyll a concentrations higher than the concentration threshold of 50 µg/l. The high dissolved oxygen concentrations are due in part to photosynthesis of the algae growth caused by the eutrophication of the river.

3. The commentor refers to the Executive Summary, which states, “the water quality goal of these TMDLs is to reduce high chlorophyll *a* concentrations (a surrogate for algal blooms), and to maintain the dissolved oxygen criterion at a level whereby the designated uses for the Northeast River will be met.” Based on this reference, the commentor states that they concur with these goals, but states that there is no regulatory limit for chlorophyll *a* and that MDE’s sampling consistently shows dissolved oxygen (DO) levels above the required minimum of 5.0 mg/l. The commentor also states that they recognize that algal blooms may contribute DO during daylight hours and consume it during respiration at night, but that MDE has provided no evidence that the excellent DO in the river is due in any large part to algal photosynthesis.

Response: *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 waterbody. 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 is generally achievable and provides adequate protection of a water body's designated uses.*

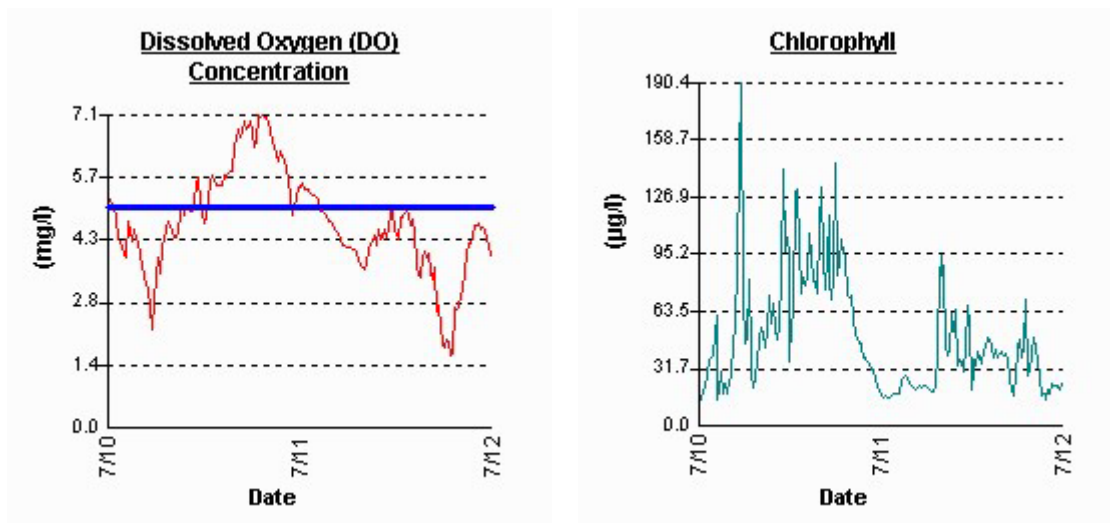
4. The commentor refers to Figure 6 which shows DO levels no lower than 7.0 mg/l and averages near 8.0 mg/l, above the required 5.0 mg/l. The commentor suggests that if MDE believes that the daytime samples are reflective of slightly elevated chlorophyll *a* (i.e., nighttime respiration/depletion of DO), then MDE should take nighttime samples to verify this theory before the TMDLs are finalized from a model based on speculation.

Response: *Continuous monitoring data for dissolved oxygen and chlorophyll a, collected by the Maryland Department of Natural Resources, is presented and discussed below. The phenomenon of diurnal DO swings, which has been accounted for in the TMDL analysis, is well established. Collecting data to verify this phenomenon is not warranted. The graphs below, from data collected in the Patuxent River near the Chesapeake Biological Laboratory in 2002, show some typical relationships between dissolved oxygen (DO) and chlorophyll a, an indicator of algae presence. When looking at the chlorophyll data, it is best to follow the bottoms, or trend, of the jittery lines. The high peaks might be due to imperfections of the real-time monitoring sensors.*

Typical low dissolved oxygen is seen on July 10 as values drop from 12am (far left of the graph) to the early morning minimum (low dip below 2.8 mg/l). Dissolved oxygen increases as sunlight causes chlorophyll a to grow and generate oxygen during an algae bloom event as the day progresses. DO drops during the evening of July 10, again reaching a minimum during the early morning of July 11 (dipping below 4.3 mg/l). The cycle being described is

the typical swing in dissolved oxygen in relation to chlorophyll a over the course of 24 hours (the diurnal cycle).

The graph also appears to show a sag in the dissolved oxygen, later in the day on July 11, which is due to a different phenomenon. Note the chlorophyll a level has dropped. It is likely that the earlier bloom has sunk towards or to the bottom, and oxygen is being consumed due to two likely processes. First, some of the sinking algae is probably still living, and continues to consume oxygen as it respire; however, this living algae generates very little oxygen because sunlight does not penetrate the deeper water, which limits photosynthesis. Second, some of the sinking algae are probably dead. Bacterial decomposition of dead algae begins, which consumes oxygen.



- The commentor questions if the elevated levels of chlorophyll *a* are the sole evidence of over-enrichment of nutrients and therefore the impairment. The commentor further questions if chlorophyll *a* is not regulated, how can the impairment be declared when the DO evidence suggests no impairment?

Response: *There is a growing body of evidence suggesting that unhealthy ecological shifts are occurring due to over enrichment of nutrients. MDE uses chlorophyll a as an indicator. The Chesapeake Bay Program water quality standards states that “excessive amounts of nutrients indicate excessive amounts of chlorophyll a and the presence of blooms. Blooms usually consist of a single species of algae, typically one that is not desirable for consumption by fish and other predators. Also, unconsumed algae sink to the bottom and decay, a process that depletes deeper water of oxygen”. See also Response 3.*

- The commentor refers to Section 2.3, which states, “nutrient loadings from primarily nonpoint sources have resulted in higher than acceptable chlorophyll *a* concentrations”. The commentor states that yet the primary focus of the TMDL is to further limit point sources and

that the County's ability to address existing nonpoint source problems (specifically, areas of failing septic systems) will be erased by the TMDL, because it won't be able to provide sewer service to areas of failing septic systems, due to limitations on capacity at the Northeast River WWTP.

Response: *As explained above in Response 1, for the TMDL analysis, MDE used the approved Water and Sewer plan flow for the Northeast River Advanced WWTP, which is significantly higher than current discharges from the WWTP, allowing the County to address the concerns stated in the comment. It was also explained in Response 1 that MDE plans to revisit TMDLs in the future, if needed; therefore any changes can be address at a future time.*

7. The commentator states that the implications of the TMDL limits the growth management of Cecil County and that desired goals rather than regulated limits should be balanced with other management goals.

Response: *See Response to Comment 1 regarding how the TMDL analysis has accommodated future growth. In regard to balancing water quality with other management goals, the federal Clean Water Act (CWA) is fairly clear on this matter. The first step in setting water quality standards is the process of establishing designated uses for waterbodies of the State. Examples of designated uses include coldwater habitat that support naturally reproducing trout, and the use of shellfish harvesting in some of our tidal waters. It is only during the public process of setting designated uses that other management goals may be taken into consideration and balanced relative to social expectations for water quality. The next step in setting the water quality standards for a particular water body is to set observable water quality criteria that are deemed necessary to meet the designated uses for that water body. An example of a criterion is the minimum level of dissolved oxygen that is needed to support the designated use of naturally reproducing trout waters. As noted above, once the designated uses are established, the criteria must be set and achieved, regardless of impacts on other management goals.*

This said, the CWA specifies a public process for changing designated uses to accommodate other management goals or social preferences that conflict with existing water quality criteria. The process involves conducting a use attainability analysis (UAA). UAA studies are very rigorous analyses, subject to significant scrutiny. Aside from technical refinements, such as accounting for improved understanding of natural conditions that limit the feasibility of meeting current water quality criteria, UAAs represent the consideration of basic social values to balance water quality goals and other goals.

8. The commentator states that Section 4.2, 7th paragraph, incorrectly states that the Northeast River Advanced Wastewater Treatment Plant (WWTP) is located in the Town of North East when it is located just south of the Town of Charlestown.

Response: *Thanks. The correction will be made.*

9. The commentator states that chlorophyll a is listed occasionally in mg/l, where it may actually be in µg/l as in Figure 11.

Response: *Thanks. The units will be corrected in the report.*

10. The commentator suggests that the Morning Cheer WWTP should at a minimum have nutrient limits imposed at its current 8.25 lbs/day maximum, allowing Morning Cheer to double its discharge flow by only treating to 9 mg/l total nitrogen (TN).

Response: *As explained above, the limits to the WWTPs allocated by these TMDLs can be revised in the future when future growth in the area can be addressed. At the present time, the current plant's design flow allows for higher concentration limits.*

11. The commentator refers to Section 5.0, where it is stated, "the Susquehanna River and the Chesapeake Bay could be a significant nutrient source, implying that a lower proportion of the load is from nonpoint sources in the Northeast River basin. In such case, load reductions from the Susquehanna, as part of the Chesapeake Bay Agreement, could have a significant positive effect on the Northeast River water quality. Regardless of the uncertainty, nonpoint source reductions associated with the programs outlined above should be pursued aggressively to address the extensive enrichment of the Bay and Northeast River and to offset the increasing population pressure." The commentator, based on this reference, states that it implies that point and nonpoint sources on the Northeast River basin will be required to limit nutrients regardless of the likelihood that some less restrictive TMDL may indeed be appropriate once more is known about the effectiveness of required actions in the Susquehanna River basin. The commentator also requests an opportunity to review the modeling of the Northeast River in the future to lessen the point source limitations if efforts of the Chesapeake Bay Agreement are enforced.

Response: *The commentator raises a legitimate limitation of the analysis, which is noted in the TMDL documentation. The State must balance its need to make regulatory decisions and conduct TMDL analyses with the fact that information and analytical tools are imperfect and continuously improving. As more data and analytical tools become available, the TMDL analysis may be revised to account for the point raised by the commentator. The Department invites the commentator to take the opportunity to discuss the modeling of the Northeast River at a mutually convenient time in the future.*

12. The commentator states that MDE should withhold finalization of the TMDL until the nutrient impairment can be substantiated with the low flow condition, and nighttime DO monitoring. The commentator further states that a TMDL that is restrictive of growth management tools in Cecil County will result in unmanaged growth elsewhere in the County.

Response: *The State is sensitive to how its decisions could influence patterns of development. Response 1 and Response 7 address how future waste water treatment capacity has been considered in the TMDL analysis.*

Information included in Response 3 and Response 4 justify the use of chlorophyll a as an endpoint in the TMDL analysis. Furthermore, because the nutrient impairment is based on

this same endpoint for chlorophyll a, withholding finalization of the TMDL document on this basis is not warranted.

13. The commentor understands, based on previous communications with MDE staff, that there are municipal separate storm sewer systems (MS4s) located in the Northeast River watershed and is subject to permit coverage under the NPDES program. The commentor also understands that the lack of detailed data for Cecil County makes it difficult to estimate loads that are subject to MS 4 permitting. However, the commentor states that the TMDL must set aside a wasteload allocation for these and any other sources that would be subject to NPDES permits and therefore treated as point sources, even if a crude estimation method is required.

Response: *An analysis to estimate loads subject to MS4 permitting was already done and included in the TMDL report. A copy of the new version was sent to Susan Sciarratta for her review on December 1st. The analysis followed the same methodology used by MDE on the 2003 Mattawoman Creek TMDL. The methodology has been reviewed and accepted by EPA staff.*

14. The commentor requests that MDE comment on the low flow and high flow calibration plots for BOD5 (see Figures A11 and A19) in terms of the difference between the observed data and calibration curves, and the overall effect, if any to the modeled results.

This comment was addressed in the document from 10/09/2003: "Northeast River EPA Preliminary Comments". The response was as follows:

Response: *The primary focus of this modeling effort was to assess the effects of nutrients on the mainstem of the Northeast River. 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 always to follow the trend of the observed data and to be within a reasonable data range. The modeler makes a best professional judgment whether to accept the calibration with some variations, or to keep calibrating for an unreasonable amount of time.*

15. The commentor requests that MDE double-check the reductions implied by Table 1 of the Technical Memorandum against the baseline loading estimates and land use percentages provided in Section 2.1 of the TMDL report. The commentor gives the following example: the atmospheric deposition and forest TMDL loads appear higher than the loads that are calculated from the baseline numbers.

Response: *This comment was also in the "Northeast River EPA Preliminary Comments" and as suggested MDE double-checked the percentages stated in Table 1 of the technical memorandum and compared them to the baseline scenario.*

The percentages are correct since they represent the relative percentage of each load by land use and not percent reductions as suggested in the comment.

The baseline relative percentages as shown in Section 2.1 of the report are as follows (including point source loads):

Baseline TN Loads

Source	lb/year	% of total
Point Sources	34,206	13.2%
Forest/Herbaceous	16,658	6.4%
Urban	81,247	31.4%
Mixed Agriculture	125,518	48.6%
Atm Dep to Water	790	0.3%
Totals	258,419	100.0%

Baseline TP Loads

Source	lb/year	% of total
Point Sources	1,700	13.8%
Forest/Herbaceous	149	1.2%
Urban	3,048	24.8%
Mixed Agriculture	7,381	60.0%
Atm Dep to Water	27	0.2%
Totals	12,305	100.0%

The TMDLs relative percentages shown in Table 1 of Technical Memorandum including urban stormwater loads (does not include point source loads) are:

Land Use/Atmospheric Deposition Categories	Nitrogen		Phosphorus	
	Percentage	Loads (lb/yr)	Percentage	Loads (lb/yr)
Mixed Agricultural	53.42%	57,301	70.69%	3,587
Urban	30.31%	32,515	25.84%	1,311
Forest and Other Herbaceous	15.53%	16,658	2.94%	149
Atmospheric Deposition	0.74%	790	0.53%	27
Total	100.00%	107,264	100.00%	5,074

Note how the percentages change for Forest and Atmospheric Deposition that are not included in the load reduction, because they are relative to the total load for each particular scenario. Notice that the Forest and Atmospheric Deposition loads remain the same.

Also, please note, that in the new version of the report, this table is different and it doesn't include the urban loads. The urban loads are now shown in the point sources table. The nonpoint source (NPS) loads also changed because the margin of safety/future allocation (MOS/FA) for the average annual flow TMDL is now 5% of the total NPS loads instead of 3% as it was before. The change was made to be consistent with the methodology used in the Mattawoman Creek TMDL (MDE, 2003), to include the MS4 loads analysis.