UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

JAN 5 2005

Dr. Richard Eskin, Director
Technical and Regulatory Services Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 540
Baltimore, Maryland 21230-1718

Dear Dr. Rich Eskin:

The Environmental Protection Agency (EPA) Region III is pleased to approve the report, "Total Maximum Daily Loads [TMDL] of Nitrogen and Phosphorus for Mattawoman Creek in Charles County and Prince George's County, Maryland." The TMDL report was submitted to EPA for final review on January 21, 2004. The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Maryland's Section 303(d) list. Mattawoman Creek is a part of the Lower Potomac Tributary Strategy Basin and was first identified on Maryland's 1996 Section 303(d) list for nutrients and suspended sediments. Mattawoman Creek was additionally listed on Maryland's 2002 Section 303(d) list for biological impairments. The TMDLs described in this document were developed to address the localized nutrient impairments identified within the watershed. The other impairments in the Mattawoman Creek watershed will be addressed by Maryland in a separate document.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the nitrogen and phosphorus TMDLs for the Mattawoman Creek watershed satisfy each of these requirements.

Following the approval of this TMDL, Maryland shall incorporate the TMDL into the Water Quality Management Plan pursuant to 40 CFR § 130.7(d)(2). As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please don't hesitate to contact Ms. Susan Sciarratta at (215) 814-5733.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

Decision Rationale

Total Maximum Daily Load of Nitrogen and Phosphorus for Mattawoman Creek, Charles and Prince George's County, Maryland

I. Introduction

The Clean Water Act (CWA) requires a total maximum daily load (TMDL) to be developed for those water bodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document sets forth the United States Environmental Protection Agency's (EPA's) rationale for approving the TMDL for nitrogen and phosphorus in Mattawoman Creek Watershed. EPA is approving this TMDL because the TMDL provides reliable information as to the current load, the relationship of the current load to the applicable water quality standard, the reductions necessary for a total maximum daily load that will achieve the applicable water quality standard, a breakdown of wasteload and load allocations to the maximum extent supported by the available data, and other information that satisfies the requirements of 40 CFR Part 130.

The TMDL was established to address the impairment of water quality, caused by nitrogen and phosphorus identified in Maryland's 1996 Section 303(d) list for water quality-limited segments. The Maryland Department of the Environment (MDE) submitted the report, "Total Maximum Daily Load of Nitrogen and Phosphorus for Mattawoman Creek in Charles County and Prince George's County, Maryland," dated January 9, 2004 to EPA for final review on January 21, 2004. This TMDL addresses one segment, Mattawoman Creek, on Maryland's Section 303(d) list. The other identified impairments to the Mattawoman Creek; sediments and biological, will be addressed separately by MDE in future TMDLs.

EPA's rationale is based on the TMDL Report, information contained in the Appendices to the report, and the Comment Response Document. EPA's review determined that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual waste load allocations (WLAs) and load allocations (LAs).
3) The TMDLs consider the impacts of background pollutant contributions.
4) The TMDLs consider the critical environmental conditions.

5) The TMDLs consider seasonal environmental variations.
6) The TMDLs include a MOS.
7) There is reasonable assurance that the TMDLs can be met.
8) The TMDLs have been subject to public participation.

Table 1 and 2 summarize Summer Low Flow Allocations and Average Annual Flow Allocations respectively, for the TMDL for Mattawoman Creek as determined by MDE. The low flow TMDL is applied during the period May 1 through October 31. There are several point sources in the Mattawoman Creek Watershed. There are four wastewater treatment plants (Town of Indian Head WWTP, Lackey High School, Brandywine Receiver Site and the Lingafelt Residence) discharging nutrients into the watershed.

Table 1 - Mattawoman Creek Summer Low Flow Nutrient TMDL Summary

Parameter	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Future Allocation	Margin Of Safety (MOS)
Nitrogen	lbs/month	1544	1366	164	9	5
Phosphorus	lbs/month	411	404	5	1*	1**

* Representing 5% of the total loads from NPS
**Representing 3% of the total loads from NPS

Table 2 - Mattawoman Creek Average Annual Flow Nutrient TMDL Summary

Parameter	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation* (LA)	Future Allocation**	Margin of Safety*** (MOS)
Nitrogen	lbs/month	217,986	85,784	116,699	9689	5814
Phosphorus	lbs/month	18,167	11,786	5,304	673	404

* Excluding urban stormwater loads
**Representing 5% of the total loads from NPS
***Representing 3% of the total loads from NPS

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a "MOS" value. Conditions, available data, and the understanding of the natural processes can change more than what was anticipated by the MOS. The option is always available to refine the TMDLs for re-submittal to EPA for approval.

II. Summary

Mattawoman Creek (basin number 02-14-01-11) is a shallow, tidally-influenced embayment of th the Potomac Estuary, located approximately 38 miles downstream of Chain Bridge, Washington, D.C. The landuses in the watershed consist of forest and other herbaceous (59%), mixed agriculture (12%), urban (26%) and water/wetland (3%). There are four wastewater treatment plants (WWTP) contributing nutrient loads to the Mattawoman Creek: the Town of Indian Head WWTP, Lackey High School WWTP, Brandywine Receiving Station and the Lingafelt Residence. Additional information about Mattawoman Creek and the watershed is included in Section 2.0 of the TMDL Report. Figures 1 through 3 of the TMDL report show the location of Mattawoman Creek and landuses in the watershed.

Mattawoman Creek was first identified on the 1996 303(d) list submitted to EPA by the MDE. It was listed as being impaired by nutrients due to signs of eutrophication (expressed as high chlorophyll *a* levels), suspended sediments, and evidence of biological impacts. Problems associated with eutrophication are most likely to occur during the summer season. During the season, there is typically less stream flow available to flush the system, more sunlight to grow aquatic plants, and warmer temperatures, which are favorable conditions for biological processes of both plant growth and decay of dead plant matter. As a consequence of the generally level to moderate sloping topography and a soil texture consisting mostly of sandy soil in the drainage basin, minimum stream velocity are common in the low flow season and indicators of eutrophication are usually found in the boundary between the tidal and non-tidal portion of the creek.

The water quality impairments of Mattawoman Creek consist of a higher than acceptable level of chlorophyll *a*. The Surface Water Use Designation for Mattawoman Creek is Use I-*water contact recreation, fishing, and protection of aquatic life and wildlife.* Maryland's general water quality criteria prohibits pollution of waters of the state by any material in amounts sufficient to create nuisance or interfere with designated uses (COMAR 26.08.02.03B(2)). Additionally, COMAR 26.08.03.01B(3) recognizes that certain surface waters are eutrophic and all discharges to these surface waters shall be treated as necessary to reduce eutrophic effects. Excessive eutrophication, indicated by elevated levels of chlorophyll *a*, can produce nuisance level of algae and interfere with desired uses such as fishing and swimming. The numeric criteria for DO for Use I waters is that concentrations may not be less than 5.0 mg/l at any time (COMAR 26.08.02.03-3A (2)), unless resulting from natural conditions (COMAR 26.08.02.03A(2)). The achievement of 5.0 mg/l is expected in the well-mixed waters of the Mattawoman Creek system.

The CWA Section 303(d) and its implementing regulations require that TMDLs be developed for waterbodies identified as impaired by the state where technology-based and other required controls do not provide for attainment of the water quality standards. The TMDL submitted by MDE is designed to attain acceptable loadings of nitrogen and phosphorus into the Mattawoman Creek in order to attain the general water quality criteria and support the Use I

designation. Refer to Tables 1 and 2 above for a summary of allowable loads.

III. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all of the eight basic requirements for establishing a nutrient TMDL for Mattawoman Creek. EPA therefore approves this TMDL for nutrients in Mattawoman Creek. This approval is outlined below according to the eight regulatory requirements, with qualifications as appropriate.

1) *The TMDLs are designed to implement applicable water quality standards*

Water Quality Standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement. Maryland does have a general narrative standard that prohibits pollution of waters of the State by any material in amounts sufficient to create nuisance or interfere with designated uses (COMAR 26.08.02.03B(2)). Excessive eutrophication, indicated by elevated levels of chlorophyll *a*, can produce nuisance level of algae and interfere with desired uses such as fishing and swimming. The overall objective of the TMDL is to reduce peak chlorophyll *a* levels (a surrogate for algal blooms) to below 50 µg/l throughout the Mattawoman Creek system to support the Use I designation, and to maintain a minimum dissolve oxygen (DO) level of 5.0 mg/l throughout the Mattawoman Creek system.

2) *The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.*

Total Allowable Load

EPA regulations at 40 CFR 130.2(i) state that the total allowable load shall be the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background concentrations. The TMDL for nutrients for Mattawoman Creek is consistent with 40 CFR 130.2(i) because the total load provided by MDE equals the sum of the WLAs for point sources and the land-based LAs for nonpoint sources. Pursuant to 40 CFR 130.6 and 130.7(d)(2), this TMDL and supporting documentation should be incorporated into Maryland's current water quality management plan. See Tables 1 and 2 above for a summary of allowable loads.

Waste Load Allocations

The Mattawoman Creek basin contains four point sources, the Town of Indian Head WWTP, Lackey High School, Brandywine Receiver Site, and Lingafelt Residence. Allocations have been made to these point sources based on their maximum permitted discharge flows. Annual WLAs are also given to three jurisdictions with separate municipal stormwater discharges

in the Mattawoman Watershed to address nutrient loads from urban sources during storm events. The Technical Memorandum entitled *"Nutrient Point Sources in the Mattawoman Creek Watershed"* gives more detail to the allocations of the nutrients attributed to the point sources in the Mattawoman Creek during the Mattawoman Creek Eutrophication Model simulation for low flow and average annual flow conditions.

Load Allocations

The nonpoint source loads that were used in the model analysis account for both "natural" and human-induced components. The low flow nonpoint source loads were based on in-stream monitoring data. Insufficient data are available to distribute the low flow nonpoint source load among different landuse categories.

The average annual nonpoint source loads were determined using landuse loading coefficients. The landuse data was based on 2000 Maryland Department of Planning Data. The total load was calculated by summing all the individual landuse areas and multiplying by the corresponding land use loading coefficients. Loads from urban development in this watershed are allocated to municipal stormwater in WLAs. The Technical Memorandum entitled "Significant Nutrient nonpoint sources in the Mattawoman Creek Watershed" gives more detail on the significant nonpoint sources of nitrogen and phosphorus in the Mattawoman Creek Watershed and their distribution between different landuses.

According to Federal regulations at 40 CFR 130.2(g), load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished.

Allocations Scenarios

Low Flow Allocations

For this scenario, the TMDL requires a 40% reduction in nonpoint source loads of nitrogen and phosphorus. These low flow nonpoint source loads, based on observed concentrations, account for both "natural" and human-induced components and cannot be separated into specific source categories. Allocations to the point sources were based on their maximum permitted discharge flows. To address future developments in the watershed, 5% of the nonpoint source loading used in the Mattawoman Creek Eutrophication Model (MCEM) was assigned to the urban waste load allocation. The nitrogen and phosphorus allocations for low flow conditions are presented in Table 1 above.

Average Annual Flow Allocations

For this scenario, the TMDL requires a 40% reduction overall in from nonpoint source (for nitrogen reduction: 54% from urban stormwater, 54% for agriculture and 20% from air deposition; for phosphorus reduction: 47% from urban stormwater, 49% from agriculture and 20% from air deposition). The point source loading from wastewater treatment plants will be allocated at the current level, since it has been determined that the nutrient values set for these loadings will be adequate for average annual flow TMDL. There are four wastewater treatment plants discharging nutrients into the watershed. Allocations have been made to these point sources based on their maximum permitted discharge flows. To address future developments in the watershed, 5% of the nonpoint source loading used in the MCEM is being assigned to the urban waste load allocation. The nitrogen and phosphorus allocations for average annual flow conditions are presented in Table 2 above.

Federal regulations at 40 CFR 122.44(d)(1)(vii)(B) requires that, for an National Pollutant Discharge Elimination System (NPDES) permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. EPA has authority to object to the issuance of an NPDES permit that is inconsistent with wasteload allocations established for that point source. To ensure consistency with this TMDL, if an NPDES permit is issued for a point source that discharges one or more of the pollutants of concern in the Mattawoman Creek watershed, any deviation from the wasteload allocation and future allocation established in the TMDL Report, and described herein for a point source must be documented in the permit Fact Sheet and made available for public review along with the proposed draft permit and the Notice of Tentative Decision. The documentation should: 1) demonstrate that the loading change is consistent with the goals of the TMDL and will implement the applicable water quality standards, 2) demonstrate that the changes embrace the assumptions and methodology of this TMDL, and, 3) describe that portion of the total allowable loading determined in the State's approved TMDL report that remains for any other point sources (and future growth where included in the original TMDL) not yet issued a permit under the TMDL. It is also expected that Maryland will provide this Fact Sheet for review and comment to each point source included in the TMDL analysis as well as any local and state agency with jurisdiction over landuses for which LA changes may be impacted. It is also expected that MDE will require periodic monitoring of the point source(s) for nitrogen and phosphorus, through the NPDES permit process, in order to monitor and determine compliance with the TMDL wasteload and future allocations.

In addition, EPA regulations and program guidance provides for effluent trading. Federal regulations at 40 CFR 130.2(i) states: "if Best Management Practices or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations may be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs." The state may trade between point sources and nonpoint sources identified in this TMDL as long as three general conditions are met: 1) the total allowable load to the waterbody is not exceeded; 2) the trading of loads from one source to another continues to properly implement the applicable water quality standards and embraces the assumptions and methodology of this

TMDL; and, 3) the trading results in enforceable controls for each source. Final control plans and loads should be identified in a publicly available planning document, such as the state's water quality management plan (see 40 CFR 130.6 and 130.7(d)(2)). These final plans must be consistent with the goals of the approved TMDL.

Based on the foregoing, EPA has determined that the TMDL is consistent with the regulations and requirements of 40 CFR Section 130. Pursuant to 40 CFR 130.6 and 130.7(d)(2), this TMDL and the supporting documentation should be incorporated into Maryland's current water quality management plan.

3) The TMDLs consider the impacts of background pollutant contributions.

The nutrient limits for point sources, reflected in the TMDL analysis, are designed to protect local water quality. It is likely, however, that future Chesapeake Bay Agreement nutrient reduction goals will entail more ambitious point source nutrient limits to protect water quality of the bay. Nonpoint sources were estimated on the basis of observed in-stream data (low flow condition) and 10 years of regional nutrient loading data provided by EPA Chesapeake Bay Program (average annual flow condition). The nonpoint source loads used in the model account for both "natural" and human induced components.

4) The TMDLs consider critical environmental conditions.

EPA regulations at 40 CFR 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. The intent of the regulations is to ensure that 1) the TMDLs are protective of human health, and 2) the water quality of the waterbodies is protected during the times when they are most vulnerable.

The nutrient TMDL analyses presented consist of an assessment of low flow loading conditions and a projected loading for average annual flow condition. The low flow TMDL analysis investigates the critical conditions under which symptoms of eutrophication are typically most acute, that is, in late summer when flows are low, leading to poor flushing of the system, and when sunlight and temperatures are most conducive to excessive algal growth.

In addition, the concentrations of nitrogen and phosphorus are modeled in their speciated forms. The dissolved forms of nutrients are more readily available for biological processes such as algae growth, which affect chlorophyll *a* levels and DO concentrations. The ratios of total nutrients to dissolved nutrients used in the model scenarios represent normalized values that have been measured in the field. These ratios are not expected to vary within a particular flow regime. Thus, a total nutrient value obtained from these model scenarios, under a particular flow regime, is expected to be protective of the water quality criteria in Mattawoman Creek.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in flow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flow normally occurs during the colder period of winter and in early spring due to snowmelt and spring rain, while seasonally low flow typically occurs during the warmer summer and early fall drought periods.[1]

The TMDL appropriately considers seasonal variations by estimating loading rates at low flow periods (May 1 - October 31) and at average flow periods. This approach captures both dry weather loading rates and the wet-weather loading rates and other seasonal variations.

6) The TMDL includes a margin of safety

The requirement for a margin of safety (MOS) is intended to add a level of conservatism to the modeling process in order to account for uncertainty. Based on EPA guidance, the MOS can be achieved through two approaches. One approach is to reserve a portion of the loading capacity as a separate term, and the other approach is to incorporate the MOS as part of the design conditions. MDE has adopted MOS for this TMDL by using both a more conservative approach in the modeling process as well as a reserved portion from loading capacity. For instance, the design flows utilized in baseline and scenario simulations in MCEM (0.5MGD) are higher than average monthly flows coming from point sources (only 0.36 MGD from Town of Indian Head WWTP). In addition to this conservative approach, additional safety factors are also built into the TMDL development process. In the absence of other factors, a generally acceptable range of peak chlorophyll *a* concentrations is between 50 and 100 µg/l. For this TMDL, MDE has elected to reserve 3% of nonpoint source loads to address the uncertainties faced during the modeling process. MDE also added an additional MOS in the average annual TMDL given the projected maximum chlorophyll *a* at a value of 48 µg/l.

7) There is reasonable assurance that the TMDL can be met.

EPA requires that there be a reasonable assurance that the TMDL can be implemented. WLAs (as provided by the future allocation), as applicable, will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the state and approved by EPA. Furthermore, EPA has the authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

In addition, Maryland has several well-established programs that will be drawn upon, including Maryland's Tributary Strategies for Nutrient Reductions developed in accordance with the Chesapeake Bay Agreement. Also, Maryland's Water Quality Improvement Act of 1999

[1] USEPA, 1997. Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1, Section 2.3.3 USEPA 823-B-97-002.

requires that nutrient management plans be implemented for all agricultural lands throughout Maryland. Finally, Maryland has adopted a watershed cycling strategy, which will assure that routine future monitoring and TMDL evaluations are conducted.

In addition to the above measures, reductions in atmospheric contributions are expected to be accomplished over time through existing and proposed Clean Air Act regulatory controls that will require reduction in airborne nutrient loading on a nationwide basis by reducing atmospheric emissions. Additionally, the following actions taken by EPA and the State of Maryland are also underway to assure the reduction of air deposition:

- To date, EPA has promulgated approximately 100 New Source Performance Standards under Section 111 of the Clean Air Act (CAA), of which about ten directly control nitrogen oxide (NOx) emissions;
- Because NOx is a precursor to ozone, Maryland and other states must apply similar requirements to major stationary sources of NOx emissions, including application of reasonably available control technology;
- The CAA Acid Rain Program specifies a two-part strategy to reduce NOx emissions from coal-fired electric power plants. EPA estimates that this program has resulted in 40% reductions in NOx emission rates from large utility boilers, and additional controls are expected over the next several years:
- In 1994, Maryland and other states signed a Memorandum of Understanding to achieve regional emission reductions of NOx (a.k.a. "OTC NOx Budget Program"). The agreement calls for the adoption of regulations to reduce NOx emissions in 1999 and further reduce emissions in 2003;
- In 1998, EPA issued the "NOx SIP Call" which assigns a cap on summertime NOx emissions to be achieved by 2007;
- In 1999, EPA announced new limits for tailpipe emissions of NOx. These standards would require a 77% emissions reduction in cars over the next ten years;
- The proposed Clear Skies Act of 2003, aimed at power plants, estimates to reduce NOx emissions from Maryland sources by 70% by 2020, and 77% reductions in total NOx emissions in Maryland from 2000 levels. The estimated NOx deposition to the Chesapeake Bay watershed would be reduced up to 20%;
- Maryland and the other Chesapeake Bay states have agreed to incorporate nitrogen reductions resulting from the Clear Skies legislation as part of the overall plan to reduce nutrient loadings to the Bay.

The EPA expects to see reduced emissions as a number of regulations are implemented to control sulfur dioxide and nitrous oxides emissions. These controls for atmospheric emissions are expected to be implemented in phases.

8) The TMDL has been subject to public participation.

MDE provided an opportunity for public review of and comment on the Nutrient TMDL for Mattawoman Creek. The public review and comment period was open from November 14, 2003 to December 13, 2003. MDE received written comments from the EPA, the Charles County Department of Planning and Growth Management, the Navy/DoD Regional Environmental Coordination Office, the Chesapeake Bay Foundation, and from a private citizen.