



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

APR 08 2019

Mr. Matthew Rowe, Assistant Director
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard., Suite 540
Baltimore, Maryland 21230-1718

Dear Mr. Rowe:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the sediment total maximum daily load (TMDL) for the non-tidal Upper Chester River watershed. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Load of Sediment in the Non-Tidal Upper Chester River Watershed, Kent and Queen Anne's Counties, Maryland* (March 2019), to EPA for review and action on March 13, 2019. The TMDL was established to address impairments of water quality as identified on Maryland's Section 303(d) List.

The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and 303(d)(2) of the Clean Water Act. This approval includes all load and wasteload allocations established in the TMDL. Our review indicates that these allocations have been established at levels necessary that, when fully implemented, will lead to the attainment of the water quality standard addressed by this TMDL. A copy of EPA's rationale for approval is enclosed.

As you are aware, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of applicable TMDL wasteload allocations pursuant to 40 CFR §122.44(d)(1)(vii)(B). Please continue to submit all such permits to EPA for review per EPA's letter dated October 1, 1998.

If you have any questions regarding the TMDL, please contact Ms. Jillian Adair, Maryland TMDL Coordinator, at 215-814-5713 or adair.jillian@epa.gov.

Sincerely,

A handwritten signature in blue ink that reads "Catherine A. Libertz".

Catherine A. Libertz, Director
Water Protection Division

Enclosure

cc : Melissa Chatham, MDE-WSA



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Decision Rationale
Total Maximum Daily Load of Sediment
in the Non-Tidal Upper Chester River Watershed, Kent
and Queen Anne's Counties, Maryland

Catherine A. Libertz

Catherine A. Libertz, Director
Water Protection Division

Date: 4/8/19



Decision Rationale

Total Maximum Daily Load for the Non-Tidal Upper Chester River Watershed, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint sources and natural background, and a margin of safety (MOS), which takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$TMDL = \sum WLA_s + \sum LA_s + MOS$$

This document sets forth the U.S. Environmental Protection Agency, Region III's (EPA's) rationale for approving the TMDL for Sediment for the Non-Tidal Upper Chester River Watershed. The TMDL was developed to address impairments of water quality standards as identified on Maryland's Section 303(d) list of water quality-limited segments. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Load of Sediment in the Non-Tidal Upper Chester River Watershed, Kent and Queen Anne's Counties, Maryland*, (March 2019) (hereinafter referred to as the "TMDL report"), to EPA for final review and action on March 13, 2019. EPA's decision is based upon its administrative record, which includes the TMDL report and information in supporting files provided to EPA by MDE. EPA has reviewed and determined that the TMDL meets the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 CFR Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered and finds acceptable the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in Maryland's TMDL Report, *Total Maximum Daily Load of Sediment in the Non-Tidal Upper Chester River Watershed, Kent and Queen Anne's Counties, Maryland*, unless otherwise noted. In addition, the terms total suspended solids (TSS) and sediment may be used interchangeably, consistent with MDE's Biological Stressor Identification (BSID) as discussed below.

II. Section 303(d) Listing Information

MDE has established a sediment TMDL for the Non-Tidal Upper Chester River Watershed. The watershed is associated with two assessment units in Maryland’s Integrated Report: a non-tidal 8-digit watershed (02130510) and an estuary portion. The TMDL applies only to the non-tidal, 1st-4th order streams contained in the Maryland 8-digit Upper Chester River watershed (Assessment Unit MD-02130510). The tidal river estuary portion is separately identified as the Upper Chester River Tidal Fresh Chesapeake Bay segment (CHSTF). As set forth in footnote 1¹, a separate TMDL has been established to achieve applicable water quality standards in CHSTF and other Chesapeake Bay segments, and this TMDL is limited to impairments in the non-tidal MD-02130510 segment. For simplicity, further reference in this document to the Upper Chester River watershed refers only to the non-tidal Maryland 8-digit watershed (02130510). Table 1 presents the assessment unit and parameter from MDE’s 303(d) list of impaired waters that is addressed by this TMDL.

Table 1: Waterbodies and Impairments Addressed by the TMDL

Assessment Unit	Waterbody Name	Parameter Addressed
MD-02130510	Upper Chester River	TOTAL SUSPENDED SOLIDS (TSS)

The Upper Chester River watershed is located within Queen Anne’s and Kent Counties in Maryland and the upper portion of the watershed, totaling to 41 out of 178 square miles, is located in Delaware. The watershed has a population of approximately 7,200. The total drainage area of the Upper Chester River watershed is approximately 86,500 acres, not including water/wetlands, and the land-use distribution consists primarily of agriculture (52 percent), forest (39 percent), and urban lands (5 percent). There are eight “high quality,” or Tier II, stream segments (aquatic life assessment scores > 4 [scale 1-5]) located within the watershed, which require the implementation of Maryland’s anti-degradation policy designed to prevent degradation of high-quality waters.

The Upper Chester River watershed was originally listed for biological impairment on the 2006 Integrated Report. The original listing was based on the biological assessment methodology, which uses aquatic health scores, consisting of the Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI). To further refine the biological listing, MDE conducted a Biological Stressor Identification (BSID) analysis for the Upper Chester River watershed. The BSID analysis applies a case-control, risk-based, weight-of-evidence approach to identify potential causes of biological impairment. The risk-based approach estimates the strength of association between various stressors and an impaired biological community. The

¹ There is a sediment TMDL for the CHSTF segment of the Chesapeake Bay as part of the Chesapeake Bay TMDLs established by EPA in December 2010. The sediment allocations and reductions set forth in the Chesapeake Bay TMDLs, while applicable within the Upper Chester River watershed, are intended to resolve impairments in the Chesapeake Bay tidal segments, including but not limited to CHSTF, and were not intended to and do not address any impairment within the non-tidal MD-02130510 segment. The sediment allocations and reductions in this TMDL are intended to address sediment impairments within the non-tidal MD-02130510 segment.

analysis then identifies individual stressors as probable or unlikely causes of the poor biological conditions within a given watershed, and subsequently reviews ecological plausibility. Finally, the analysis concludes whether or not these individual stressors or groups of stressors are contributing to the impairment.

MDE's BSID report states that the degradation of biological communities in the Upper Chester River watershed is strongly associated with agricultural impacts, poor epifaunal substrate, channelization, and high total nitrogen. Overall, stressors within the sediment parameter grouping were identified as having a statistically significant association with impaired biological communities at approximately 33 percent of the sites with BIBI and/or FIBI scores significantly less than 3.0 throughout the watershed. In the 2012 Integrated Report and as a result of the BSID analysis, the 2006 aquatic life use impairment (biological listing) for the non-tidal Upper Chester River watershed was refined and identified the watershed as impaired by TSS, which requires a TMDL, and channelization. The TMDL established herein by MDE addresses the TSS listing for the Upper Chester River watershed (MD-02130510) as identified in MDE's 2016 Integrated Report. For more information regarding the water quality characterization of the watershed, please refer to Section 2.3 of the TMDL report.

III. TMDL Overview

MDE has established a sediment TMDL for the Upper Chester River watershed, which is presented in Section 4.9 of the TMDL report. The sediment TMDL is expressed in Table 9 as an average annual load in tons of TSS per year. An average annual load is appropriate because the effects of sediment on aquatic life occur over an extended time. The daily loads are presented in tons of TSS per day in Table 10, the calculation of which is explained in Appendix B of the TMDL report. Detailed source allocations are further presented in the Point Source and Nonpoint Source Technical Memos, which accompany the main TMDL report.

The upstream loads from Delaware discharge to the portion of the watershed found in Maryland and were therefore included in this TMDL and prescribed reductions to meet downstream water quality standards in Maryland's non-tidal Upper Chester River watershed. There are no NPDES permitted discharges within Delaware's portion of the watershed. MDE prescribed a 22 percent reduction in loads from nonpoint sources in Delaware, which is presented in Table 8. EPA encourages Delaware to consider the sediment loads allocated to the upstream portion of this watershed located in Delaware when implementing best management practices in the watershed to address the sources identified.

Section 2.2 discusses the sediment source assessments in the Upper Chester River watershed. Regulated sources of sediment in the watershed include: one municipal wastewater facility, a general mining permit and the general permit for stormwater discharges from construction sites. Non-regulated sources in the watershed consist of run-off from land uses including: cropland, unregulated urban land, pasture, nursery, animal feeding operations, and forest.

Computational Procedures

To quantify the impact of sediment on the aquatic life of non-tidal stream systems, a reference watershed TMDL approach was used, which resulted in the establishment of a sediment loading threshold. This threshold was used to determine a watershed specific sediment TMDL endpoint, which represents the maximum allowable load the waterbody can receive without causing any sediment related impacts to aquatic health.

The sediment loading threshold was based on a detailed analysis of sediment loads from watersheds that are identified as supporting aquatic life (i.e., reference watersheds) based on Maryland's biological assessment methodology. In addition to supporting aquatic life, reference watersheds and the TMDL watershed must also be similar in physical and hydrological characteristics; therefore, reference watersheds were chosen within the Coastal Plain physiographic eco-region to align with the Upper Chester River watershed. Six reference watersheds were identified for use in the TMDL.

To further reduce the effect of variability within the eco-region (i.e., soils, slope, etc.), the watershed sediment loads were then normalized by a constant background condition, the all forested watershed condition. This new normalized term, defined as the forest normalized sediment load, represents how many times greater the current watershed sediment load is than the all forested sediment load. The all forested sediment load is a modeled simulation of what the sediment load would be if the watershed were in its natural all forested state, instead of its current mixed land use. The forest normalized sediment load is calculated as the current watershed sediment load divided by the all forested sediment load. Total watershed sediment loads and all forested sediment loads were estimated using the Chesapeake Bay Program Phase 5.3.2 watershed model, which is described in Sections 2.2 and 4.2 of the TMDL report.

Reference watershed forest normalized sediment loads were calculated and the median (50th percentile) and 75th percentile (also referred to as the sediment loading threshold) were calculated and found to be 5.9 and 8.8, respectively. The median value of 5.9 was used as an environmentally conservative approach for establishing the sediment loading threshold for the TMDL. A comparison of the Upper Chester River watershed forest normalized sediment load (7.4) to the forest normalized reference sediment load demonstrates that the watershed exceeds the sediment loading threshold, indicating that it is receiving loads above the maximum allowable load that it can sustain and still meet water quality standards. The allowable load for the impaired watershed is calculated as the product of the sediment loading threshold (determined from watersheds with a healthy biological community) and the Upper Chester River all forested sediment load. The resulting load is considered the maximum allowable load the watershed can sustain and support aquatic life.

EPA has determined that the TMDL is consistent with statutory and regulatory requirements and EPA's policy and guidance. EPA's rationale for approving the TMDL is set forth according to the regulatory requirements listed below.

IV. Discussion of Regulatory Requirements

1) TMDLs are designed to meet the applicable water quality standards.

EPA regulations at 40 CFR 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS. Water quality standards are state regulations that define the water quality goals of a waterbody. Water quality standards are comprised of three components: (1) designated uses, (2) criteria (numeric or narrative) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality.

The Upper Chester River watershed's nontidal tributaries are designated as *Use Class I-water contact recreation, and protection of nontidal warmwater aquatic life*. This TMDL focuses primarily on the protection of the aquatic life designated use because the Integrated Report listing was based on a biological assessment of the watershed. However, the required reductions are expected to protect all designated uses of the watershed, including water contact recreation. The impairment of the Upper Chester River watershed is caused in part by an elevated sediment load beyond a level that the watershed can sustain, which causes sediment related impacts that cannot support aquatic life. Currently in Maryland, there are no specific numeric criteria that quantify the impact of sediment on the aquatic life of non-tidal stream systems; consequently, a reference watershed approach was used to establish the TMDL. The sediment TMDL established herein reduces sediment loads, and subsequent effects on aquatic life in the 1st through 4th order streams in the Upper Chester River watershed, to levels that support the designated uses for the watershed. Based on the foregoing, EPA finds the TMDL is designed to meet the applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 CFR §130.2(i) define TMDL as the sum of the WLAs for point sources and LAs for nonpoint sources and natural background. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to Federal regulations at 40 CFR §130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. As described in Section 4.6 and the Point Source Technical Memo, WLAs were assigned to one municipal wastewater facility, a general mining permit, and the general permit for stormwater discharges from construction sites, although none were prescribed reductions². Table 8 of the TMDL Report provides the WLA for the Upper Chester River watershed split by wastewater and regulated stormwater while detailed individual and aggregate WLAs are presented in the Point Source Technical Memo. Daily loads are presented in Table 10 and the Point Source Technical Memo and were calculated using methods outlined in Appendix B.

² The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or MDE that there are no additional sources in the watershed that are subject to the NPDES program.

Based on the foregoing, EPA finds that both annual and daily WLAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

MDE is authorized to administer the National Pollutant Discharge Elimination System (NPDES) Program, which, among other duties, includes issuing NPDES permits to existing or future point sources subject to the NPDES program. The effluent limitations in any new or revised NPDES permits must be consistent with “the assumptions and requirements of any available [WLA]” in an approved TMDL pursuant to 40 CFR §122.44 (d)(1)(vii)(B). EPA has authority to object to the issuance of an NPDES permit that is inconsistent with the assumptions and requirements of WLAs established for that point source. It is expected that MDE will require periodic monitoring of the point source(s), through the NPDES permit process, in order to monitor and determine compliance with the TMDL’s WLAs.

A TMDL represents the sum of WLAs for point sources, LAs for nonpoint sources and natural background conditions. In some circumstances, the available data and information may be insufficient to assign each source an individual WLA. In those circumstances, it is appropriate to express allocations from NPDES-regulated discharges as a single categorical aggregate wasteload allocation. See Memorandum from Robert H. Wayland and James A. Hanlon to EPA Water Division Directors, *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on those WLAs* (Nov. 22, 2002). Such aggregate WLAs constitute “available WLA[s] for the discharge[s] prepared by the State and approved by EPA” for purposes of 40 C.F.R. § 122.44(d)(1)(vii)(B).”

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), a LA is the portion of a receiving water’s loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. 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. As described in Section 4.6 and the Nonpoint Source Technical Memo, LAs were assigned to: forest, harvested forest, animal feeding operations, pasture, cropland, nursery, and unregulated urban land, although only the latter four sources were prescribed reductions (i.e. pasture, cropland, nursery, and unregulated urban land).³

Table 8 of the TMDL Report provides the LA for the Upper Chester River watershed with detailed LAs split by land-use in the Nonpoint Source Technical Memo. Daily loads were presented in Table 10 and were calculated using methods outlined in Appendix B. Based on the

³ EPA’s approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA’s review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

foregoing, EPA finds that both annual and daily LAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

3) TMDLs consider natural background sources.

According to Federal regulations at 40 CFR §130.2(g & i), natural background sources of pollutants are part of the LA and, wherever possible natural and nonpoint source loads should be distinguished. The TMDL considers the impact of background pollutants by considering the sediment load from natural sources such as forested land and including that load in the LA. The Chesapeake Bay Program Phase 5.3.2 watershed model also considers background pollutant contributions by incorporating all land uses. Based on the foregoing, EPA finds the TMDL accounts for natural background sources consistent with the regulations at 40 CFR §130.2(g & i).

4) TMDLs consider critical 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. Notably, the impact of excessive sediment on aquatic life generally occurs over time and is the result of long-term conditions; therefore, the use of a long-term modeling approach captures critical conditions. Critical conditions are further discussed in Section 4.4 of the TMDL report. Based on the foregoing, EPA finds that the TMDL accounts for critical conditions consistent with the regulations at 40 CFR §130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variation was captured through the continuous simulation model, which runs over a number of years, as well as through the biological monitoring strategy. Seasonal variations are further discussed in Section 4.4 of the TMDL report. Based on the foregoing, EPA finds the TMDL has been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 CFR §130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity. MDE has adopted an implicit MOS for this TMDL as the sediment loading threshold was chosen in a conservative manner. The MOS is further discussed in Section 4.8 of the TMDL report. Based on the foregoing, EPA finds that MDE has incorporated a MOS into the TMDL consistent with the regulations at 40 CFR §130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 CFR §130.7(c)(1)(ii) require TMDLs to be subject to public review and the State to implement a process for involving the public in development of TMDLs. MDE provided an opportunity for public review and comment on the TMDL from November 1, 2018 through December 3, 2018. MDE received one set of written comments from EPA and

provided a comment response document that adequately addressed those comments. Based on the foregoing, EPA finds that the TMDL has been subject to MDE's public participation process.

In addition, in reaching our conclusions on approving the sediment TMDL for the Upper Chester River watershed, EPA appropriately considered information on the endangered and threatened species and their critical habitat in Maryland's waters identified by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

V. Discussion of Reasonable Assurance

The CWA section 303(d) requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained.

Where a TMDL is developed for waters impaired by both point and nonpoint sources, in EPA's best professional judgment, determinations of reasonable assurance that the TMDL's LAs will be achieved could include whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) are likely to be implemented. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate greater loadings to point sources.

Reasonable assurance is discussed in Section 5 of the TMDL Report. Based on the foregoing, EPA finds acceptable the reasonable assurances set forth in the TMDL Report.