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

Mr. D. Lee Currey, Director
Science Services Administration
Maryland Department of the Environment
1800 Washington Blvd., Suite 540
Baltimore, Maryland 21230-1718

NOV 15 2013

Dear Mr. Currey:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the report, *Total Maximum Daily Load (TMDL) of Sediment in the Upper Pocomoke River Watershed, Wicomico and Worcester Counties, Maryland.* The TMDL report was submitted by the Maryland Department of the Environment to EPA for final review on September 26, 2012 and received on October 2, 2012. 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. The MD 8-digit Upper Pocomoke River watershed (MD-02130203) has been identified in Maryland's Integrated Report as impaired by sediments – total suspended solids (TSS) (1996, Adkins Pond - sedimentation - 1998), nutrients – phosphorus (1996, Adkins Pond - 1998), and impacts to biological communities (2002) (MDE 2010a). All impairment listings are for the non-tidal streams in the watershed, except for the 1998 nutrient and sediment impairment listings for Adkins Pond, a small impoundment within the watershed. Sediment and phosphorus TMDLs for the Adkins Pond impoundment were approved by the EPA in 2002. A Phosphorus TMDL to address the nutrient impairment listing for the watershed was submitted concurrently with the Sediment TMDL. The TMDL established herein by MDE will address the 1996 sediments listing.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards; (2) include a total allowable loading and as appropriate, wasteload allocations 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); and (7) be subject to public participation. In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. The enclosure to this letter describes how the Sediment TMDL for the Upper Pocomoke watershed satisfies each of these requirements.

As you know, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL's wasteload allocation 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 do not hesitate to contact Ms. Helene Drago, TMDL Program Manager at 215-814-5796.

Sincerely,

Signed

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Melissa Chatham, MDE-SSA
Jay Sakai, MDE-WMA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
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Decision Rationale
Total Maximum Daily Load of Sediment
Upper Pocomoke River Watershed
Wicomico and Worcester Counties, Maryland

Signed

Jon M. Capacasa, Director
Water Protection Division

Date: 11/15/2013

Decision Rationale
Total Maximum Daily Load of
Sediment in the Upper Pocomoke River Watershed
Wicomico and Worcester Counties, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies 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 waterbody.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDL for sediment in the Upper Pocomoke River Watershed. The TMDL was established to address impairments of water quality, caused by sediment, as 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 Sediment in the Upper Pocomoke River Watershed, Wicomico and Worcester Counties, Maryland,* dated September 2012 to EPA for final review on September 26, 2012 and received on October 3, 2012. The TMDL in this report addresses the sediment impairment in the MD 8-Digit Upper Pocomoke River Watershed (MD-02130203) as identified on Maryland's Section 303(d) List.

EPA's rationale is based on the TMDL Report and information in the computer files provided to EPA by MDE. EPA's review determined that the TMDL meets the following seven regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, this TMDL considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

II. Summary

The TMDL specifically allocates the allowable sediment loading to the Upper Pocomoke River watershed. There are five permitted point sources which are included in the WLA. 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 National Pollutant Discharge Elimination System (NPDES) program. In addition, the fact that EPA is approving this TMDL does not mean that EPA has determined whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program. The sediment TMDL is presented as an average annual load in tons per year because it was calculated so as to not cause any sediment related impacts to aquatic health. The long term maximum daily sediment TMDL is presented in tons per day. The calculation of the long term maximum daily TMDLs is explained in Appendix B of the TMDL report. The average annual MD 8-Digit Upper Pocomoke River Watershed TMDL is summarized in Table 1. The TMDL is the sum of the LAs, NPDES Stormwater WLA, Process Water WLA, and MOS. The LAs include nonpoint source loads generated within and outside of the Upper Pocomoke River watershed. The long term maximum daily TMDL is presented in Table 2. Individual annual and daily WLAs for permitted point sources are provided in Table 3.

Table 1. MD 8-Digit Upper Pocomoke River Average Annual TMDL of Sediment/Total Suspended Solids (ton/yr)

TMDL (ton/yr)	=	$\mathbf{LA_{DE}}$[1]	+	$\mathbf{LA_{UP}}$	+	**NPDES Stormwater** $\mathbf{WLA_{UP}}$	+	**Process Water** $\mathbf{WLA_{UP}}$	+	**MOS**
2,617.8	=	310.4	+	2,296.8	+	1.7	+	8.9	+	Implicit
		Upstream Load Allocation[2,3]		MD 8-Digit Upper Pocomoke River Watershed TMDL Contribution						

Table 2. MD 8-Digit Upper Pocomoke River Maximum Daily Loads of Sediment/TSS (ton/day)

MDL (ton/day)	=	**LA**			+	**WLA**			+	**MOS**
		$\mathbf{LA_{DE}}$[1]	+	$\mathbf{LA_{UP}}$		**NPDES Stormwater** $\mathbf{WLA_{UP}}$	+	**Process Water** $\mathbf{WLA_{UP}}$		
7.23	=	0.85	+	6.30	+	0.005	+	0.076	+	Implicit
		Upstream Load Allocation[2,3]		MD 8-digit Upper Pocomoke River Watershed MDL Contribution						

Notes:
[1] LA_{DE} was set equivalent to its baseline load, since it was determined that reductions from upstream Delaware sources were not necessary in order to meet Maryland's water quality standards within the MD 8-digit Upper Pocomoke River watershed.
[2] Although for the purposes of this analysis, the upstream load is referred to as an LA, it could include loads from both point and nonpoint sources.
[3] A delivery factor of 1 was used for the Upstream LA.

Table 3. Wasteload Allocations for Point Sources in the MD 8-Digit Upper Pocomoke River Watershed

Facility	NPDES ID Number	WLA (ton/year)	MDL (ton/day)
Process Water Point Source [1]			
Pittsville WWTP	MD0060348	8.9	0.076
Willards WWTP	MD0051632		
Harkins Ready Mix	MDG499796		
NPDES Regulated Stormwater Permits [2]			
"Other NPDES Regulated Stormwater"		1.7	0.005

Note: [1] All of the process water point sources have design flows less than 1.0 MGD, and therefore, only an aggregate allocation is provided.

[2] See Table 4, below for the list of "Other NPDES Regulated Stormwater" permits.

Table 4. Other MDE NPDES Regulated Stormwater Permitted Point Sources in the MD 8-Digit Upper Pocomoke River Watershed

Permit Number	Facility	NPDES Group
N/A - 02SW1672	Forest Products, Inc.	Other NPDES Regulated SW
N/A	MDE General Permit to Construct	Other NPDES Regulated SW

The TMDL is a written plan established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically based strategy that considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. The option is always available to refine the TMDL for resubmittal to EPA for approval if environmental conditions, new data, or the understanding of the natural processes change more than what was anticipated by the MOS.

III. Background

The Pocomoke River originates in the Great Cypress Swamp located on the border between Delaware and Wicomico and Worcester Counties, Maryland. From its origin, the river flows approximately sixty miles through Maryland until it outlets to the Pocomoke Sound of the Chesapeake Bay (LESHC 1994). The specific MD 8-Digit Upper Pocomoke River watershed consists of the most upstream portion (i.e., the headwaters) of the Pocomoke River basin within Maryland. The outlet of the MD 8-digit Upper Pocomoke River watershed is located just north of the town of Snow Hill, and the watershed extends all the way to the border between Delaware and Maryland within Wicomico and Worcester Counties. All of the streams within the MD 8-Digit watershed are non-tidal. The watershed drains approximately 19 stream miles and 95,476 acres. The largest towns within the MD 8-Digit Upper Pocomoke River watershed are Willards and Pittsville.

There is one "high quality," or Tier II, stream segment (Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) aquatic life assessment scores > 4 (scale 1-5)) located within the watershed, Adkins Race, requiring the implementation of Maryland's anti-

degradation policy (COMAR 2012d; MDE 2011). Approximately 0.1% percent of the watershed area is covered by water (i.e., streams, ponds, etc). The total population in the MD 8-digit Upper Pocomoke River watershed is approximately 10,097 (US Census Bureau 2010).

The Upper Pocomoke River watershed land-use was evaluated separately for Maryland and Delaware. The land-use distribution in Maryland consists primarily of forest (63.5%) and crop land (28.9%), with smaller amounts of urban land (5.7%) and pasture (1.9%). In Delaware, the land-use distribution also consists mainly of forest (54.9%) and crop land (40.3%), with smaller amounts of urban land (3.7%), pasture (1.0%), and extractive activities (0.1%).

The MD 8-digit Upper Pocomoke River watershed (MD-02130203) has been identified in Maryland's Integrated Report as impaired by sediments – total suspended solids (TSS) (1996, Adkins Pond - sedimentation - 1998), nutrients – phosphorus (1996, Adkins Pond - 1998), and impacts to biological communities (2002) (MDE 2010a). All impairment listings are for the non-tidal streams in the watershed, except for the 1998 nutrient and sediment impairment listings for Adkins Pond, a small impoundment within the watershed. Sediment and phosphorus TMDLs for the Adkins Pond impoundment were approved by the EPA in 2002. Phosphorus TMDL to address the nutrient impairment listing for the watershed was submitted concurrently with the sediment TMDL. The TMDL established herein by MDE will address the 1996 sediments listing, for which a data solicitation was conducted, and all readily available data from the past five years have been considered. The designated use of the MD 8-digit Upper Pocomoke River mainstem and its tributaries is Use I (Water Contact Recreation and Protection of Aquatic Life) (COMAR 2012a,b,c).

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 water quality standards. The sediment TMDL submitted by MDE is designed to allow for the attainment of the designated uses and to ensure that there will be no sediment impacts affecting aquatic health in the Maryland 8-digit Upper Pocomoke River watershed. Refer to Tables 1 and 2 above for a summary of allowable loads.

Currently in Maryland, there are no specific numeric criteria that quantify the impact of sediment on the aquatic life of nontidal stream systems. Therefore, to determine whether aquatic life is impacted by elevated sediment loads, MDE's Biological Stressor Identification (BSID) methodology was applied. The BSID identifies the most probable cause(s) for observed biological impairments throughout MD's 8-digit watersheds (1st though 4th order streams only) by ranking the likely stressors affecting a watershed using a suite of physical, chemical, and land-use data. The ranking of stressors was conducted via a risk-based, systematic, weight-of-evidence approach. The risk-based approach estimates the strength of association between various stressors and an impaired biological community. The BSID analysis then identifies individual stressors (pollutants) as probable or unlikely causes of the poor biological conditions within a given MD 8-digit watershed and subsequently concludes whether or not these individual stressors or groups of stressors are contributing to the impairment (MDE 2009). The BSID analysis for the MD 8-digit Upper Pocomoke River watershed concludes that biological communities are likely impaired due to sediment related stressors/impacts.

A total of 24 water quality monitoring stations were used to characterize the MD 8-Digit

Upper Pocomoke River watershed. Twenty-three biological/physical habitat monitoring stations from the MBSS program round one and round two data collection were used to describe the MD 8-Digit Upper Pocomoke River watershed in Maryland's 2010 Integrated Report. The BSID analysis used the nine biological/physical habitat monitoring stations from the MBSS program round two data collection. Additionally, one monitoring station from the Maryland CORE/TREND monitoring network was applied within the TMDL analysis.

The watershed model framework chosen for the MD 8-Digit Upper Pocomoke River watershed TMDL was the Chesapeake Bay Program Phase 5.3.2 (CBP P5.3.2) watershed model EOS loads. The spatial domain of the CBP P5.3.2 watershed model segmentation aggregates to the MD 8-digit watersheds, which is consistent with the impairment listing. The nonpoint source baseline sediment loads generated within the MD 8-Digit Upper Pocomoke River watershed, as well as the Delaware upstream baseline sediment loads, are based on the EOS loads from the CBP P5.3.2 watershed model 2010 Progress Scenario. CBP P5.3.2 Progress Scenario Edge-of-Stream (EOS) loads are calculated as the sum of individual land-use EOS loads within the watershed and represent a long-term average loading rate. Individual land-use EOS loads are calculated within the CBP P5.3.2 watershed model as a product of the land-use area, land-use target Edge-of-Field (EOF) loading rate, and loss from the EOF to the main channel. BMP data and reduction efficiencies are then subsequently applied to the EOS loads. The loss from the EOF to the main channel is the *sediment delivery factor* and is defined as the ratio of the sediment load reaching a basin outlet to the total erosion within the basin. A *sediment delivery factor* is estimated for each land-use type based on the proximity of the land-use to the main channel. Thus, as the distance to the main channel increases, more sediment is stored within the watershed (i.e., *sediment delivery factor* decreases).

The Upper Pocomoke River watershed was evaluated using two watershed TMDL Segments consisting of five CBP P5.3.2 watershed model segments. TMDL Segment 1 represents the sediment loads generated in the Delaware portion of the Upper Pocomoke River watershed. TMDL Segment 2 represents the sediment loads generated in the Maryland portion of the Upper Pocomoke River watershed (i.e., the MD 8-Digit Upper Pocomoke River watershed).

To quantify the impact of sediment on the aquatic life of non-tidal stream systems, a reference watershed TMDL approach was used and resulted in the establishment of a *sediment loading threshold* (Currey et al. 2006). The original methodology was established for watersheds within the Highland and Piedmont physiographic regions but has been adapted to the Coastal Plain physiographic region for this TMDL. Reference watersheds were determined based on Maryland's biocriteria methodology. The biocriteria methodology assesses biological impairment at the MD 8-digit watershed scale based on the percentage of MBSS monitoring stations, translated into watershed stream miles, that have BIBI and/or FIBI scores lower than the Minimum Allowable IBI Limit (MAL). The MAL is calculated based on the average annual allowable IBI value of 3.0 (on a scale of 1 to 5). It accounts for annual variability and helps to avoid classification errors (i.e., false positives) when assessing for biological impairments (Roth et al. 1998,2000; Stribling et al. 1998; MDE 2008).

Comparison of watershed sediment loads to loads from reference watersheds requires that the watersheds be similar in physical and hydrological characteristics. To satisfy this

requirement, in the original methodology, Currey et al. (2006) selected reference watersheds only from the Highland and Piedmont physiographic regions. This region is consistent with the non-coastal region that was identified in the 1998 development of FIBI and subsequently used in the development of BIBI (Roth et al. 1998; Stribling et al. 1998). For this analysis, however, the methodology was adapted, and reference watersheds (watersheds identified as supporting aquatic life on Maryland's 2010 Integrated Report) from the Coastal Plains physiographic region only were used. The same methodology as described in Currey et al. (2006) for the selection of the Highland and Piedmont reference watersheds was used to select the Coastal Plain reference watersheds. Furthermore, all subsequent methodologies used to establish the TMDL end point, based on these reference watersheds, are exactly the same as those described in Currey et al. (2006).

To further reduce the effect of the variability within the Coastal Plain physiographic 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 *forest normalized sediment load* for this TMDL is calculated as the current watershed sediment load divided by the *all forested sediment load.*

Five reference watersheds were selected from the Coastal Plain physiographic region. Reference watershed *forest normalized sediment loads* were calculated using CBP P5.3.2 watershed model 2010 Progress Scenario EOS loads. The median and 75th percentile of the reference watershed *forest normalized sediment loads* were calculated and found to be 5.6 and 6.0 respectively. The median value of 5.6 was established as the sediment loading threshold as an environmentally conservative approach to develop this TMDL.

The *forest normalized sediment load* for the Upper Pocomoke River watershed (estimated as 5.9 and 5.0 for the Maryland and Delaware portions of the watershed, respectively) was calculated using CBP P5.3.2 2010 Progress Scenario EOS loads, to best represent current conditions. A comparison of the Upper Pocomoke River watershed *forest normalized sediment loads* to the *forest normalized reference sediment load* (also referred to as the *sediment loading threshold*) demonstrates that the Maryland portion of 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 Delaware portion of the watershed does not exceed the sediment loading threshold. Therefore, a TMDL will be required for the Maryland portion of the watershed only. 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 Pocomoke River *all forested sediment load.* The resulting load is considered the maximum allowable load the watershed can sustain and support aquatic life.

The MD 8-Digit Upper Pocomoke River Average Annual TMDL of Sediment/ TSS is 2,617.8 ton/yr (a 4.4% reduction from the baseline load). This TMDL consists of:

- Allocations attributed to loads generated outside the assessment unit, referred to as Upstream Load Allocations
    - A Delaware Upstream Load Allocation (LA_{DE}) of 310.4 ton/yr
- Allocations attributed to loads generated within the assessment unit

- A MD 8-Digit Upper Pocomoke River Watershed TMDL Contribution of 2,307.4 ton/yr.

The MD 8-Digit Upper Pocomoke River TMDL Contribution is further subdivided into point and nonpoint source allocations and is comprised of a Load Allocation (LA_{UP}) of 2,296.8 ton/yr, an NPDES Stormwater Waste Load Allocation (NPDES Stormwater WLA_{UP}) of 1.7 ton/yr, and a Process Water Waste Load Allocation (Process Water WLA_{UP}) of 8.9 ton/yr.

IV. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all seven of the basic requirements for establishing a sediment TMDL for the Upper Pocomoke River watershed. EPA, therefore, approves this sediment TMDL for the Upper Pocomoke River watershed. This approval is outlined below according to the seven regulatory requirements.

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. The designated use of the MD 8-digit Upper Pocomoke River mainstem and its tributaries is Use I (Water Contact Recreation and Protection of Aquatic Life) (COMAR 2012a,b,c).

The water quality impairment of the MD 8-Digit Upper Pocomoke River watershed addressed by this TMDL is caused by an elevated sediment load beyond a level that the watershed can sustain, thereby causing sediment related impacts that cannot support aquatic life. Assessment of aquatic life is based on benthic and fish Index of Biotic Integrity (IBI) scores, as demonstrated via the BSID analysis for the watershed. The BSID analysis has determined that the biological impairment in the MD 8-Digit Upper Pocomoke River watershed is due in part to sediment-related stressors. Specifically, the analysis confirmed that individual stressors within the sediment parameter grouping were contributing to the biological impairment in the watershed.

Reductions in sediment loads are expected to result from decreased watershed erosion, which will then lead to improved benthic and fish habitat conditions. Specifically, sediment load reductions are expected to result in an increase in the number of benthic sensitive species present, an increase in the available and suitable habitat for a benthic community, a possible decrease in fine sediment (fines), and improved stream habitat diversity, all of which will result in improved water quality.

The TMDL, however, will not completely resolve the impairment to biological communities within the watershed. Since the BSID watershed analysis identifies phosphorus, low DO, sulfates, in-stream habitat conditions (most importantly, stream channelization), and the lack of riparian buffer as other possible stressors impacting the biological conditions, this impairment remains to be fully addressed through the Integrated Report listing and TMDL development processes. This impairment to aquatic life will only be fully addressed when all impairing substances identified as impacting biological communities in the watershed are

reduced to levels that will meet water quality standards, as established in future TMDLs for those substances (MDE 2009,2012a).

Based on the analysis of benthic monitoring results at the CORE/TREND station, it has been determined that the mainstem of the MD 8-Digit Upper Pocomoke River watershed is supportive of aquatic life and is therefore not impaired by sediment. The TMDL will be restricted to the 1st through 4th order tributaries within the MD 8-Digit watershed and will exclude the Upper Pocomoke River mainstem.

The objective of the sediment TMDL established herein is to reduce sediment loads, and subsequent effects on aquatic life in the 1st through 4th order streams in the MD 8-Digit Upper Pocomoke River watershed, to levels that support the Use I designation for the watershed. EPA believes these are reasonable and appropriate water quality goals.

2) The TMDLs include a total allowable load as well as individual wasteload 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 of Sediment for the Upper Pocomoke River watershed is consistent with 40 CFR §130.2(i) because the total loads provided by MDE equal the sum of the individual WLAs for point sources and the land based LAs for nonpoint sources.

The allowable load for the MD 8-Digit Upper Pocomoke River Watershed is calculated as the product of the *sediment loading threshold* (determined from watersheds with a healthy biological community) and the Upper Pocomoke River *all forested sediment load.* The resulting load is considered the maximum allowable load the watershed can sustain and support aquatic life. The Sediment TMDL for the Upper Pocomoke River watershed was calculated to be 2,617.8 ton/yr. This load is considered the maximum allowable load the watershed can sustain and support aquatic life. The Sediment TMDL and allocations are presented as mass loading rates of tons per year for the average annual load and tons per day for the maximum daily load. Expressing TMDLs as annual average and maximum daily mass loading rates is consistent with Federal regulations at 40 CFR §130.2(i), which states that *TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.* The annual average and maximum daily Phosphorus loads are presented in Tables 1 and 2, respectively.

It has been determined that sediments are only impairing aquatic life in the 1st through 4th order tributary streams within the MD 8-Digit Upper Pocomoke River watershed. It has been determined that sediment is not impairing the aquatic life in the watershed's mainstem. Since the Delaware portion of the watershed drains to the Upper Pocomoke River mainstem in Maryland, the TMDL is being developed solely for the 1st through 4th order tributaries in the MD 8-Digit watershed, and no reductions are being applied to the Delaware portion of the Upper Pocomoke River watershed. Therefore, the Delaware portion of the watershed is only provided with an informational allocation equivalent to its baseline load.

The MD 8-Digit Upper Pocomoke River Baseline Load and TMDL are presented in Table 4.

Table 5. MD 8-Digit Upper Pocomoke River Baseline Load and TMDL

Baseline Load (ton/yr)	**TMDL** (ton/yr)	**Reduction** (%)
2,737.7	2,617.8	4.4

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), LAs 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. The TMDL summary in Table 1 contains the LA for the Upper Pocomoke River watershed.

As indicated above, the computational framework chosen for the MD 8-Digit Upper Pocomoke River Sediment TMDL was the CBP P5.3.2 watershed model 2010 Progress Scenario EOS sediment loads. Individual land-use EOS loads are calculated within the CBP P5.3.2 watershed model as a product of the land use area, land use target EOF loading rate, and loss from the EOF to the main channel (i.e., sediment delivery factor). For the 2010 Progress Scenario, Best Management Practice (BMP) data and reduction efficiencies are then subsequently applied to the EOS loads (US EPA 2010).

In order to attain the TMDL loading cap calculated for the watershed, constant reductions were applied to the predominant controllable sources (i.e., significant contributors of sediment to the stream system), independent of jurisdiction. If only these predominant sources are controlled, the TMDL can be achieved in the most effective, efficient, and equitable manner. Predominant sources typically include urban land, high till crops, low till crops, hay, and pasture, but additional sources could be controlled as well, in order to ensure that the TMDL is attained. High till crops, low till crops, hay, and urban land were identified as the predominant controllable sources in the MD 8-Digit Upper Pocomoke River watershed. Thus, constant reductions were applied to these sources. Forest is the only non-controllable source, as it represents the most natural condition in the watershed.

Although loads from urban land are defined as a predominant controllable source of sediment, within the MD 8-Digit Upper Pocomoke River watershed a portion of the sediment load from urban land is considered to be regulated under National Pollutant Discharge Elimination System (NPDES) Phase I and II stormwater permits. Therefore, this portion of the urban sediment is considered a point source that must be included in the WLA portion of a TMDL (US EPA 2002). The remainder of the urban sediment load is assigned to the LA.

Table 6 provides one possible scenario for the distribution of the annual nonpoint source sediment loads amongst the different nonpoint source sectors in the MD 8-Digit Upper Pocomoke River watershed. The source categories in Table 6 represents aggregates of multiple sources (e.g., crop is an aggregate of high till, low till, and hay).

Table 6. MD 8-Digit Upper Pocomoke River Sediment TMDL Allocation by Nonpoint Source Category

Nonpoint Source Category	Baseline Load (ton/yr)	LA (ton/yr)	Reduction (%)
Forest	291.3	291.3	0.0
Pasture	9.3	9.3	0.0
Crop	1,729.6	1,632.1	5.6
Extractive	6.4	6.4	0.0
Urban[1]	380.0	357.7	5.9
Total[2]	2,416.6	2,296.8	5.0

Notes: [1] Nonpoint source baseline loading and LA represent the non-regulated urban sediment load (i.e., loading associated with urban areas in the watershed not regulated by an NPDES stormwater permit).

[2] The individual and total baseline loads and LAs are for the Maryland portion of the Upper Pocomoke River watershed only and do not include the Upstream Delaware baseline Load/LA.

Wasteload Allocations

WLAs have been calculated for NPDES regulated individual municipal permits, general mineral mining permits, general industrial stormwater permits, and the general permit for stormwater discharges from construction sites in the MD 8-Digit Upper Pocomoke River watershed. The permits can be grouped into two categories, process water and stormwater.

The process water category includes those loads generated by continuous discharge sources whose permits have total suspended solids (TSS) limits (i.e., contributors to the watershed sediment load). Other permits that do not meet these conditions are considered *de minimis* in terms of the total watershed sediment load. There are two municipal Wastewater Treatment Plants (WWTPs) and one mineral mine within the MD 8-Digit Upper Pocomoke River watershed that contribute to the overall sediment load. There are no individual industrial process water permits.

The WLAs for these three process water permits are calculated based on their TSS limits and corresponding flow. The process water permits can be further divided into minor and major facilities, based on whether their design flow is greater or less than 1.0 Millions of Gallons per Day (MGD). However, within this watershed, all of the process water point sources have design flows less than 1.0 MGD, and therefore, only an aggregate allocation is provided.

The stormwater category includes all NPDES regulated stormwater discharges. There are two NPDES stormwater permits identified within the MD 8-Digit Upper Pocomoke River

watershed. One is an industrial facility that is permitted for stormwater discharge and the other is Maryland Department of the Environment's (MDE) General Permit to Construct. The permits are regulated based on Best Management Practices (BMPs) and do not include TSS limits. In the absence of TSS limits, the baseline loads for these NPDES regulated stormwater discharges are calculated using the nonpoint source loads from the urban land-use associated with these permits within the watershed.

Since there are no individual or general Phase I or II municipal separate storm sewer system (MS4) permitted jurisdictions or state/federal entities within the watershed, the only applicable NPDES regulated stormwater permits within the basin are MDE's General Permit to Construct and one facility with an industrial stormwater permit. Thus, an aggregate WLA only has been calculated for these NPDES stormwater permits. MDE collectively refers to the types of NPDES regulated stormwater permits identified within the watershed as "Other" NPDES regulated stormwater permits, and the aggregate WLA assigned to the permits is termed the "Other NPDES Regulated Stormwater" WLA.

In order to calculate the NPDES stormwater WLA, MDE further refined the CBP P5.3.2 urban land-use. For any given watershed, the refined CBP P5.3.2 land-use contains the specific level of detail needed to determine individual and aggregate WLAs for county Phase I jurisdictional MS4s, the State Highway Administration (SHA) Phase I MS4, Phase II jurisdictional MS4s, and "Other NPDES Regulated Stormwater" entities.

In order to attain the TMDL loading cap calculated for the watershed, constant reductions were applied to the predominant controllable sources (i.e., significant contributors of sediment to the stream system), independent of jurisdiction. Urban land was identified as one of the predominant controllable sources in the watershed. Only a portion of the urban land-use within the watershed is associated with the applicable NPDES stormwater permits, and therefore only this portion of the urban sediment load is assigned to the WLA. The remainder of the urban sediment load is assigned to the LA. Table 7, below, presents the Upper Pocomoke stormwater baseline load and WLA. No reductions were applied to permitted process load sources, since such controls would produce no discernible water quality benefit when nonpoint sources and regulated stormwater sources comprise greater than 99% of the total watershed sediment load.

Table 7. MD 8-Digit Upper Pocomoke River Sediment TMDL NPDES Regulated Stormwater WLAs

NPDES Regulated Stormwater Sector	**NPDES #**	**Baseline Load** (lbs/yr)	**WLA** (lbs/year)	**Reduction** (%)
"Other NPDES Regulated Stormwater"	N/A	1.8	1.7	5.5
Total		1.8	1.7	5.5

Federal regulations at 40 CFR §122.44(d)(1)(vii)(B) require that, for an 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. There is no express or implied statutory requirement that effluent limitations in NPDES permits necessarily be expressed in daily terms. The CWA definition of "effluent limitation" is quite broad (effluent limitation is "any restriction on quantities, rates, and concentrations of

chemical, physical, biological, and other constituents which are discharged from point sources ...)." See CWA 502(11). Unlike the CWA's definition of TMDL, the CWA definition of "effluent limitation" does not contain a "daily" temporal restriction. NPDES permit regulations do not require that effluent limits in permits be expressed as maximum daily limits or even as numeric limitations in all circumstances, and such discretion exists regardless of the time increment chosen to express the TMDL. For further guidance, refer to Benjamin H. Grumbles memo (November 15, 2006) titled *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015 (April 25, 2006) and implications for NPDES Permits.*

EPA has authority to object to the issuance of an NPDES permit that is inconsistent with 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. Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Part 130.

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

The TMDLs consider the impact of background pollutants by considering the sediment load from natural sources such as forested land. The CBP P5.2 model also considers background pollutant contributions by incorporating all land uses.

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. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[1]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable worst-case scenario condition.

The biological monitoring data used to determine the reference watersheds reflect the impacts of stressors (i.e., sediment impacts to stream biota) over the course of time and therefore depict an average stream condition (i.e., captures all high and low flow events). Since the TMDL endpoint is based on the median of forest normalized loads from watersheds assessed as having good biological conditions (i.e., passing Maryland's biocriteria), by the nature of the biological data described above, it must inherently include the critical conditions of the reference watersheds. Therefore, since the TMDL reduces the watershed sediment load to a level compatible with that of the reference watersheds, critical conditions are inherently addressed.

[1] EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

5) The TMDLs consider seasonal environmental variations.

Seasonality is captured in two components. First, it is implicitly included through the use of the biological monitoring data as biological monitoring data reflect the impacts of stressors over time, as described above. Second, the MBSS dataset included benthic sampling in the spring (March 1 - April 30) and fish sampling in the summer (June 1 - September 30). Benthic sampling in the spring allows for the most accurate assessment of the benthic population, and therefore provides an excellent means of assessing the anthropogenic effects of sediment impacts on the benthic community. Fish sampling is conducted in the summer when low flow conditions significantly limit the physical habitat of the fish community, and it is therefore most reflective of the effects of anthropogenic stressors as well.

6) The TMDLs include a Margin of Safety.

The requirement for a 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 an implicit MOS for this TMDL. It is proposed that the estimated variability around the reference watershed group used in this analysis already accounts for such uncertainty. Analysis of the reference group *forest normalized sediment loads* indicates that approximately 75% of the reference watersheds have a value of less than 6.0. Also, 50% of the reference watersheds have a value less than 5.6. Based on this analysis the *forest normalized reference sediment load* (also referred to as the *sediment loading threshold*) was set at the median value of 5.6 (Currey et al. 2006). This is considered an environmentally conservative estimate, since 50% of the reference watersheds have a load above this value (5.6), which when compared to the 75% value (6.0), results in an implicit MOS of approximately 18%.

7) The TMDLs have been subject to public participation.

MDE provided an opportunity for public review and comment on the sediment TMDL for the MD 8-Digit Upper Pocomoke River watershed. The public review and comment period was open from August 23, 2012 through September 21, 2012. MDE received no written comments.

A letter was sent to the U.S. Fish and Wildlife Service (US FWS) pursuant to Section 7(c) of the Endangered Species Act, requesting the Service's concurrence with EPA's findings that approval of this TMDL does not adversely affect any listed endangered and threatened species, and their critical habitats.

US FWS's response to EPA's letter stated that except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area and therefore, no biological assessment or further Section 7 consultation with US FWS was required.

V. Discussion of Reasonable Assurance

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs 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 WLA 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.

The MD 8-Digit Upper Pocomoke River Sediment TMDL is expected to be implemented as part of a staged process recently developed by Maryland. This staged process is designed to achieve both the sediment reductions needed within the MD 8-Digit Upper Pocomoke River watershed and to meet sediment target loads consistent with the Chesapeake Bay TMDL, established by EPA in 2010 (US EPA 2010a) and scheduled for full implementation by 2025. The Bay TMDL requires reductions of nitrogen, phosphorus, and sediment loads throughout the Bay watershed to meet water quality standards that protect the designated uses in the Bay and its tidal tributaries. Bay TMDL implementation planning has been primarily focused on nutrient (nitrogen and phosphorus) reductions; however, reductions in sediment loadings and the attainment of the applicable sediment allocations specified within the Bay TMDL are expected to occur as a result of implementation measures to control nutrients. Therefore, even though the Bay TMDL implementation framework has focused on meeting the nutrient allocations, it still ensures the achievement of the required sediment allocations and reductions.

The sediment reductions for the Bay TMDL are independent of those needed to implement any TMDLs developed to address sediment-related impairments in Maryland's non-tidal watersheds, although their reduction goals and strategies do overlap. For example, the implementation planning framework, developed by the Bay watershed jurisdictions in partnership with EPA, provides a staged approach to achieving Bay TMDL sediment reduction goals that is also applicable to the implementation of any sediment TMDLs developed for local non-tidal watersheds. In short, sediment reductions required to meet the Chesapeake Bay TMDL will also support the restoration and protection of local water quality.

Maryland's Phase I Watershed Implementation Plan (WIP) for the Chesapeake Bay TMDL, finalized in December 2010, identifies sediment reduction targets by source sector for the Pocomoke River Tidal Fresh segment-shed, which includes the MD 8-Digit Upper Pocomoke River watershed and a number of other MD 8-Digit watersheds. EPA revised the nutrient and sediment load allocations for the Bay TMDL in August 2011, based on the results of the updated CBP P5.3.2 watershed model. Maryland has been working with key local partners, including county and municipal staff, soil conservation managers, and a variety of stakeholder organizations and business interests, to help them develop local implementation plans at the county scale. These local plans have been incorporated into the basin-scale implementation plans in the Phase II WIP.

Maryland's Phase II WIP and the State's schedule of two-year milestones provide implementation strategies and a time line for achieving sediment reductions across the State to meet Chesapeake Bay interim target loads by 2017, equivalent to 60% of the final target goals set for 2025 to fully implement the Chesapeake Bay TMDL in Maryland. A Phase III Plan will

be developed in 2017 to address the additional reductions needed from 2018 through 2025 to meet the final targets. Prior to Phase III, the TMDL allocations may again be revised to reflect better data, a greater understanding of the natural systems, and to make use of enhanced analytical tools (such as updated watershed and water quality models). This iterative process provides an adaptive approach for achieving the Chesapeake Bay TMDL goals, as well as a framework and time line for the staged implementation of the MD 8-Digit Upper Pocomoke River watershed sediment TMDL.

Once the Bay TMDL sediment target loads for the Pocomoke River Tidal Fresh segment-shed have been met, MDE will revisit the status of sediment impacts on aquatic life in the non-tidal waters of the MD 8-Digit Upper Pocomoke River watershed, based on monitoring data that will be collected in the watershed following EPA approval of the TMDL. The primary datatset that will be used to reevaluate the status of sediment impacts on aquatic life will be MBSS biological monitoring data, which is applied within the BSID analysis for the watershed to determine whether or not sediments are impacting aquatic life. The same parameters used to identify sediment related impacts to aquatic life within the BSID will be reassessed. The results of this reassessment will determine whether additional sediment reductions are needed in the watershed, or whether the sediment TMDL goals for the MD 8-Digit Upper Pocomoke River watershed have in fact been met.

In addition, MDE plans to use a series of legislative actions and funding programs to support TMDL implementation. Some of these include:

- In response to the WIP and the increased burden on local governments to achieve nutrient and sediment reduction goals, Maryland has continued to increase funding in the Chesapeake and Atlantic Coastal Bays Trust Fund. Funding was also increased to support implementation of natural filters on public lands, and funding for Soil Conservation Districts from 16 to 39 positions. In addition, funding for the cover crop program is at $12 million – a record level.

- Any new development in the watershed will be subject to Maryland's Stormwater Management Act of 2007 and will be required to use environmental site design (ESD) to the maximum extent practicable.

- Additional potential funding sources for implementation include Maryland's Agricultural Cost Share Program (MACS) which provides grants to farmers to help protect natural resources, and the Environmental Quality and Incentives Program, which focuses on implementing conservation practices and BMPs on land involved with livestock and production.

- Relative to practices that are expected to reduce sediment loads, for the 2012-2013 milestone period, Maryland is working to require a cover crop following fall applications of organic nutrient sources. For future milestones, best management practices will be required for streams with adjacent livestock (2014).

- Some other examples of programs that can provide funding for local governments and agricultural sources include the Federal Nonpoint Source Management Program (§ 319 of

the Clean Water Act), Buffer Incentive Program (BIP), State Water Quality Revolving Loan Fund, Bay Restoration Fund, Chesapeake Bay Trust Fund. Details of these programs and additional funding sources can be found at http://www.dnr.state.md.us/bay/services/summaries.html.

For more details about these and other legislative actions and funding programs, refer to Section 5.0 of the TMDL report.

G: Upper Pocomoke River/sediments **CONCURRENCES**

SYMBOL	3WP30	3WP30	3WP30					
SURNAME	GARCIA	DRAGO	MACKNIGHT					
DATE	10/31/13	11/4/13	11/4/13					

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