

## Technical Memorandum

### *Significant Sediment Point Sources in the Patuxent River Upper Watershed*

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The U.S. Environmental Protection Agency (EPA) requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of each impairing pollutant (CFR 2009). This technical memorandum identifies the significant point sources of sediment in the Patuxent River Upper watershed. Detailed allocations are provided for those point sources included within the Process Water Waste Load Allocation (WLA) and National Pollutant Discharge Elimination System (NPDES) Regulated Stormwater WLA of the Patuxent River Upper Watershed Sediment TMDL. These allocations are designed to meet the TMDL thresholds. The State reserves the right to allocate the TMDLs among different sources in any manner that protects aquatic life from sediment related impacts.

The Patuxent River Upper Watershed Sediment TMDL is presented in terms of an average annual load established to ensure the support of aquatic life.

WLAs have been calculated for NPDES regulated individual municipal, individual municipal separate storm sewer systems (MS4s), general mineral mining, general industrial stormwater, and general MS4 permits in the Patuxent River Upper 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. There are six process water permits in the Patuxent River Upper watershed. They include five individual municipal permits, and one general mineral mining permit. The WLAs for these six process water permits are calculated based on their TSS limits (average monthly or weekly concentration values) and corresponding flow information (See Sections 2.2.2, 4.6, and Appendix B of the main report for further details). The process water permits are 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). The minor facilities are calculated as an aggregate WLA.

The stormwater category includes all NPDES regulated stormwater discharges. There are 22 NPDES Phase I and Phase II stormwater permits identified throughout the Patuxent River Upper watershed. These include the Anne Arundel County Phase I jurisdictional MS4 permit, the Howard County Phase I jurisdictional MS4 permit, the Prince George's County Phase I jurisdictional MS4 permit, the Phase I State Highway Administration (SHA) MS4 permit, two general Phase II jurisdictional MS4 permits, and other general Phase I and II stormwater permits. These stormwater 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 within the watershed. The associated WLAs are calculated by applying reductions to the urban land use. These calculations are described in more detail below.

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Individual WLAs have been calculated for the Anne Arundel County Phase I jurisdictional MS4 permit, the Howard County Phase I jurisdictional MS4 permit, the Prince George's County Phase I jurisdictional MS4 permit, and the Phase I SHA MS4 permit. Aggregate WLAs have been calculated for: 1) the Phase II jurisdictional MS4 permits and 2) the other general Phase I and II NPDES stormwater permits. Other NPDES regulated Phase I and Phase II stormwater permits include non-jurisdictional general MS4s, all industrial facilities permitted for stormwater discharges, and general construction permits. This aggregate WLA is referred to as the "Other NPDES regulated stormwater" WLA.

The computational framework chosen for the Patuxent River Upper watershed TMDL was the Chesapeake Bay Program Phase 5.2 (CBP P5.2) watershed model. Within this TMDL, the NPDES regulated stormwater baseline sediment loads are represented by the urban land use nonpoint source loads. These loads are calculated as the sum of the urban land use *edge-of-stream* (EOS) loads and represent a long-term average loading rate. Urban land use EOS loads are calculated as a product of the land use area, land use target loading rate, and loss from the *edge-of-field* (EOF) to the main channel (US EPA 2009). Further details regarding general nonpoint source sediment load calculations can be found in Section 2.2.1 of the main report.

In order to attain the TMDL loading cap calculated for the watershed, reductions were applied equally to the predominant controllable sediment sources, which were identified as urban land, high till crops, low till crops, and hay. Since all urban land use in the Patuxent River Upper watershed is considered to be representative of all regulated stormwater sources (i.e., all urban stormwater is regulated via a permit), the NPDES stormwater WLA is equivalent to the urban land use loads resultant from applying reductions to all of the predominant land uses.

Relative to the estimated sediment load reductions applied to urban land, which are necessary to achieve the TMDL, MDE currently requires that Phase I MS4s retrofit 10% of their existing impervious area where there is failing, minimal, or no stormwater management (estimated to be areas developed prior to 1985) within a permit cycle (five years) (i.e., Phase I MS4s need to install/institute stormwater management practices to treat runoff from these existing impervious areas) (MDE 2009b). Theoretically, extending these permitting requirements to all urban stormwater sources (i.e., not solely those sources regulated via Phase I MS4 permits) would require that all impervious areas developed prior to 1985 be retrofit at this pace. Additionally, MDE estimates that future stormwater retrofits will have, on average, a 65% TSS reduction efficiency (Claytor and Schueler 1997; Baldwin et al. 2007; Baish and Caliri 2009). By default, these retrofits will also provide treatment of any adjacent urban pervious runoff within the applicable drainage area (See Sections 4.5 and 4.6 of the main report for further details).

In order to determine the individual and aggregate WLAs for the Anne Arundel County Phase I jurisdictional MS4, the Howard County Phase I jurisdictional MS4, the Prince George's County Phase I jurisdictional MS4, the Phase I SHA MS4, the Phase II jurisdictional MS4s, and "Other NPDES regulated stormwater", Maryland Department of Planning (MDP) urban land use was applied to further refine the CBP P5.2 urban land use. This methodology associates MDP urban land use classifications with the different types of NPDES regulated stormwater Phase I and II permits (MDE 2009a).

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In addition to the WLA value, a Maximum Daily Load (MDL) is also presented in this document for major process water facilities, the aggregation of minor process water facilities, and individual, as well as aggregate, NPDES stormwater sources. The calculation of the MDL is explained in Appendix C of *Total Maximum Daily Load of Sediment in the Patuxent River Upper Watershed, Anne Arundel, Howard and Prince George's Counties, Maryland*.

Tables 1 and 3 provide one possible scenario for the distribution of the average annual point source loads attributed to the process water and NPDES regulated stormwater point sources, respectively, in the Patuxent River Upper watershed. The reductions from the urban sector required to meet this TMDL would entail that at a 65% TSS reduction efficiency, approximately 26% of the urban area (impervious and pervious) within the watershed that was developed prior to 1985 would need to be retrofitted.

**Table 1: Patuxent River Upper TMDL Allocations for Process Water Point Sources**

<b>Process Water Point Source</b>	<b>NPDES Permit Number</b>	<b>Baseline Load (ton/year)</b>	<b>WLA (ton/year)</b>	<b>MDL (ton/day)</b>	<b>Reduction (%)</b>
ANNE ARUNDEL COUNTY - MARYLAND CITY WATER RECLAMATION FACILITY	MD0062596	114.0	114.0	0.97	0.0
BOWIE CITY OF - WASTEWATER TREATMENT PLANT	MD0021628	150.5	150.5	1.28	0.0
WSSC - PARKWAY WASTEWATER TREATMENT PLANT	MD0021725	342.0	342.0	2.91	0.0
Minor Facilities <sup>1</sup>	See Table 2	1.0	1.0	0.008	0.0
<b>Total</b>		<b>607.5</b>	<b>607.5</b>	<b>5.2</b>	<b>0.0</b>

**Note:** <sup>1</sup> Minor facilities are those with less than 1.0 MGD design flow. These facilities are not given individual allocations. Rather, an aggregate allocation is provided for all of the minor facilities.

**Table 2: Facilities included in Minor Process Water Point Source WLA**

<b>Process Water Point Source</b>	<b>NPDES Permit Number</b>
NATIONAL WILDLIFE VISITOR CENTER	MD0065358
U.S. AIR FORCE - DAVIDSONVILLE TRANSMITTER SITE	MD0025631
CHANEY ENTERPRISES - CROFTON CONCRETE PLANT	MDG499716

**Table 3: Patuxent River Upper TMDL Allocations for NPDES Regulated Stormwater Point Sources**

<b>NPDES Regulated Stormwater Point Source</b>	<b>NPDES Permit Number</b>	<b>Baseline Load (ton/year)</b>	<b>WLA (ton/year)</b>	<b>MDL (ton/day)</b>	<b>Reduction (%)</b>
Anne Arundel County Phase I MS4	MD0068306	1,029.7	912.4	35.6	11.4
Howard County Phase I MS4	MD0068322	654.4	579.8	22.6	11.4
Prince George's County Phase I MS4	MD0068284	1,680.7	1,489.2	58.1	11.4
Phase II Jurisdictional MS4s	MDR055500	3,473.3	3,077.4	120.0	11.4
SHA Phase I MS4	MD0068276	714.8	633.3	24.7	11.4
“Other NPDES Regulated Stormwater” <sup>1</sup>	N/A	1,549.1	1,372.5	53.5	11.4
<b>Total</b>		<b>9,102.0</b>	<b>8,064.6</b>	<b>314.5</b>	<b>11.4</b>

**Note:** <sup>1</sup> The “Other NPDES Regulated Stormwater” Baseline Load and WLA include sediment loadings from Urban Barren land use, which represents the permitted construction site baseline sediment load and WLA within the watershed. No reductions were applied to Urban Barren land use because such controls would produce no discernable water quality benefit, when the remaining point and nonpoint sources within the watershed comprise 96.7% of the Patuxent River Upper Baseline Load Contribution.

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## REFERENCES

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