Technical Memorandum

Significant Phosphorus Point Sources in the Catoctin Creek Watershed

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 2011). This technical memorandum identifies the significant point sources of phosphorus in the Catoctin Creek watershed. Detailed allocations are provided for those point sources included within the National Pollutant Discharge Elimination System (NPDES) Process Water Waste Load Allocation (WLA) and Regulated Stormwater WLA of the Catoctin Creek TMDL Contributions (See Executive Summary of the main report for further description of all watershed TMDL contributions and allocations). The WLA also includes an allocation to concentrated animal feeding operations (CAFOs), but the WLA for CAFOs is not presented here in more specific detail than in the main report. The State reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to protect aquatic life from nutrient related impacts.

The Catoctin Creek Watershed Phosphorus TMDLs are presented in terms of an average annual load established to be protective of aquatic health. WLAs have been calculated for NPDES regulated individual industrial, individual municipal, individual municipal separate storm sewer systems (MS4s), general industrial stormwater, and general MS4 permits in the Catoctin Creek watershed. The permits can be grouped into two categories, process water and stormwater.

The NPDES process water category includes those loads generated by the following continuous discharge sources: (1) major publically-owned wastewater treatment plants (WWTPs) (facilities with flow of 0.5 MGD or more) that are slated for Enhanced Nutrient Removal (ENR); (2) minor municipal WWTP (facilities discharging less than 0.5 MGD) and industrial facilities whose permits have total phosphorus (TP) limits; (3) minor municipal WWTPs with no phosphorus permit limits; and (4) industrial facilities which, based on the process involved, are expected to discharge nutrients. There are four industrial and eight municipal facilities capable of discharging phosphorus in the Catoctin Creek watershed. All are minor facilities not slated for ENR.

The WLAs for process water sources are based on the WLAs assigned to each facility under the Chesapeake Bay TMDL (EPA, 2010) and Maryland's Phase I and Phase II Watershed Implementation Plans (WIPs) (MDE 2010 and 2012, respectively). These WLAs are designed to meet the Phase II 2025 final implementation goal for the Bay TMDL. The WLAs are loading caps which are designed to accommodate future growth after full implementation of the Bay TMDL in 2025. The WLAs for major and minor municipal facilities with nutrient permit limits are calculated based on their phosphorus limits and design flow. The WLAs for the remainder of the minor municipal facilities are calculated based on their design flow or their projected 2020 flow, whichever is less, and expected maximum phosphorus concentrations of 3 mg/l. Four industrial facilities discharging process water in the Catoctin Creek watershed have the capacity

to discharge TP in their process water. Under the Chesapeake Bay TMDL, industrial facilities capable of discharging phosphorus in their process water were given WLAs based on the results of monitoring required by their permits and professional judgment. These WLAs were adopted for the Catoctin Creek Phosphorus TMDL. Based on the WLAs assigned to WWTPs and industrial facilities under the Chesapeake Bay TMDL, the Catoctin Creek Phosphorus TMDL does not require a reduction in phosphorus loads from process water sources.

Table 1 provides one possible scenario for the distribution of the average annual phosphorus point source loads attributed to the process water point sources in the Catoctin Creek watershed. An aggregate WLA is given for all minor municipal and industrial process water facilities. See Sections 2.2.2 and 4.6 of the main report for further details.

The stormwater category includes all NPDES regulated stormwater discharges. There are five NPDES Phase I and Phase II stormwater permits identified throughout the Catoctin Creek watershed. These include both general Phase I and II stormwater permits. These stormwater permits are regulated based on Best Management Practices (BMPs) and do not include nutrient limits. In the absence of nutrient limits, the baseline loads for these NPDES regulated stormwater discharges are calculated using phosphorus loading rates and acreages from developed land-uses within the watershed. These calculations are described in more detail below.

Individual WLAs have been calculated for each of the Phase I county MS4 permits and the SHA Phase I MS4 permit. An aggregate WLA has been calculated for the general municipal Phase II NPDES stormwater permits for the towns of Middletown and Myersville. Other NPDES regulated stormwater permits include state and federal regulated developed land, all industrial facilities permitted for stormwater discharges, and general construction permits.

The computational framework chosen for the Catoctin Creek watershed TMDL was the Chesapeake Bay Program Phase 5.3.2 (CBP P5.3.2) Watershed Model. Within this TMDL, the NPDES regulated stormwater baseline phosphorus loads generated within the Catoctin Creek watershed are calculated from edge-of-stream (EOS) loads within the watershed and represent a long-term average loading rate. EOS loads are calculated as a product of the developed land-use acreage and the average annual simulated phosphorus loading rates (lbs/ac/yr) from the 2009 Progress Scenario (US EPA 2010b). The 2009 Scenario represents current land-use, loading rates, and BMP implementation simulated using precipitation and other meteorological inputs from the period 1991-2000 to represent variable hydrological conditions. The 1991-2000 simulation period represents the baseline loading rates in the TMDL for Chesapeake Bay segments. Further details of the phosphorus load calculations from developed land can be found in Section 2.2.1 of the main report.

To determine the different NPDES stormwater WLAs MDE has further refined the CBP P5.3.2 developed land-use. The refined CBP P5.3.2 land-use contains the specific level of detail needed to determine individual and aggregate WLAs for the Frederick County Phase I jurisdictional MS4, the SHA MS4, the Phase II jurisdictional MS4s, and "Other NPDES regulated stormwater," which includes stormwater from federal state, and industrial facilities, mining and

extractive operations, and land under construction. The methods used by MDE to refine CBP P5.3.2 developed land-use are described within CBP P5.3.2 Land Use and MDE Urban Source Sector Delineation - Development Methodology (MDE 2009a).

In order to achieve the estimated phosphorus load reductions applied to urban land, which are necessary to meet the TMDL, current Frederick County Phase I MS4 permit requires the jurisdiction to retrofit 10% of existing impervious area where there is failing, minimal, or no stormwater management (estimated to be areas developed prior to 1985) every permit cycle (five years) (*i.e.*, the jurisdiction needs to install/institute stormwater management practices to treat runoff from these existing impervious areas) (MDE 2009a). Extending these permitting requirements to all urban stormwater sources (*i.e*., not solely those sources regulated via the Frederick County Phase I MS4 permit) 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 35% TP 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).

Table 2a provides a detailed list of all NPDES regulated stormwater discharges within the Antietam Creek watershed. Table 2b provides one possible scenario for the distribution of the average annual phosphorus point source loads attributed to NPDES regulated stormwater point sources in the Catoctin Creek watershed. (See Sections 4.5 - 4.6 of the main report for further details).

In January 2009, Maryland implemented new regulations governing CAFOs (COMAR 26.08.01, 26.08.03, and 26.08.04), which were approved by the EPA in January, 2010. Under these regulations, CAFOs are required to fulfill the conditions of a general permit. These conditions include instituting a Comprehensive Nutrient Management Plan (CNMP) which meets the Nine Minimum Standards to Protect Water Quality (MDE 2009b). The general permit also prohibits the discharge of pollutants, including nutrients, from CAFO production areas except as a result of event greater than the 25-year, 24-hour storm. Based on the TMDL methodology approach of applying an equal percent reduction to all controllable loads, the Catoctin Creek Phosphorus TMDL does not require a reduction in phosphorus loads from CAFOs. Table 3 provides the baseline load and WLA for CAFOs.

Table 1: Catoctin Creek Phosphorus TMDL Allocations for Process Water Point Sources

Location	NPDES #	Facility	WLA-Type		Baseline Load (lb/yr)	WLA (lb/yr)
Mainstem	MD0024406	MIDDLETOWN WWTP	Municipal	Aggregate	8,628	9,878
	MD0067521	THE JEFFERSON SCHOOL	Municipal			
Tributaries	MDG499792	EVERETT V. MOSER, INC.	Industrial			
	MDG344132	FARMERS COOPERATIVE ASSOC, INC.	Industrial			
	MD0070823	HOLLOW CREEK GOLF CLUB	Industrial			
	MDG766216	SKYCROFT BAPTIST CONFERENCE CENTER	Industrial			
	MD0022721	FOUNTAINDALE WWTP	Municipal			
	MD0023680	I-70 REST STOP WWTP	Municipal			
	MD0020737	JEFFERSON WWTP	Municipal			
	MD0067628	MIDDLETOWN EAST WWTP	Municipal			
	MD0020699	MYERSVILLE WWTP	Municipal			
	MD0055425	OLD SOUTH MOUNTAIN INN	Municipal			

Table 2a: NPDES Regulated Stormwater Permits in the Catoctin Creek Wateshed

NPDES Permit	Name	NPDES Group
MD0068357	FREDERICK COUNTY MS4	County Phase-I
MD0068276	STATE HIGHWAY ADMINISTRATION MS4	SHA Phase I
MDR055500	TOWN OF MIDDLETON MS4	Municipal Phase-II
MDR055500	TOWN OF MYERSVILLE MS4	Municipal Phase-II
	MDE GENERAL PERMIT TO CONSTRUCT	Other NPDES Regulated SW

Table 2b: Catoctin Creek Watershed Phosphorus TMDL Allocations for NPDES Regulated Stormwater Point Sources

NPDES Regulated Stormwater Point Source	NPDES Permit Number	Baseline Load (lbs/yr)	TMDL (lbs/year)	Reduction (%)
Frederick County Phase I	MD0068357	8,285	7,374	11%
SHA Phase I MS4	MD0068276	2,052	1,876	9%
Municipal Phase II MS4	MDR055500	3,042	2,775	9%
Other NPDES Regulated Stormwater		927	923	0%
Total		14,306	12,948	**9%**

Table 3: Catoctin Creek Watershed Phosphorus TMDL Allocations for NPDES Regulated Concentrated Animal Feeding Operations

NPDES Regulated Animal Feeding Operations	Baseline Load (lbs/yr)	TMDL (lbs/year)	Reduction (%)
	65	65	0%

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