

## Technical Memorandum

### *Significant Phosphorus Point Sources in the Lower Monocacy River 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 2011). This technical memorandum identifies the significant point sources of phosphorus in the Lower Monocacy River 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 Lower Monocacy River 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 Lower Monocacy River 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 Lower Monocacy River 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 nineteen industrial and seventeen municipal facilities permitted to discharge phosphorus in the Lower Monocacy River watershed. Three major WWTPs are slated for ENR: Fort Detrick WWTP (MD0020877), Frederick City WWTP (MD0021610), and Ballenger Creek/McKinney WWTP (MD0021822).

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

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flow, whichever is less, and expected maximum phosphorus concentrations of 3 mg/l. Nineteen industrial facilities in the Lower Monocacy River 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 or professional judgment. These WLAs were adopted for the Lower Monocacy River Phosphorus TMDL.

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 Lower Monocacy River watershed. Individual WLAs are given for major facilities, and an aggregate WLA is given for all minor process water facilities in the watershed including both municipal and industrial 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 49 NPDES Phase I and Phase II stormwater permits identified throughout the Lower Monocacy River 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 Carroll County, Frederick County, and Montgomery County Phase I MS4 permits and the SHA Phase I MS4 permit. An aggregate WLA has been calculated for the general municipal Phase II NPDES stormwater permits, including the City of Frederick. Other NPDES permits include stormwater from federal, state, mining and extractive operations, and land under construction, which are aggregated into one WLA referred to as the “Other NPDES regulated stormwater” WLA.

The computational framework chosen for the Lower Monocacy River 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 Lower Monocacy River 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 and Montgomery County

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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 county Phase I MS4 permits require the jurisdictions 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 county 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 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 Lower Monocacy River 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 Lower Monocacy River watershed. (See Sections 4.2 - 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 Lower Monocacy River Phosphorus TMDL does not require a reduction in phosphorus loads from CAFOs. Table 3 provides the baseline load and WLA for CAFOs.

**Table 1: Lower Monocacy River Phosphorus TMDL Allocations for Process Water Point Sources**

Location	NPDES Permit Number	Facility Name	WLA Type		Design Flow (MGD)	Baseline Load (lbs/yr)	TMDL (lbs/yr)
Mainstem	MD0020877	FORT DETRICK WWTP	Municipal	Individual	2.0	2,085	1,827
	MD0021610	FREDERICK CITY WWTP	Municipal	Individual	8.0	20,225	7,309
	MD0021822	BALLENGER- MCKINNEY	Municipal	Individual	18.0	5,196	16,446
	MDG499704	ELLIE MAY LLC BUCKEYSTOWN MINE	Industrial				
MD 8-Digit	MD0002038	VULCAN	Industrial				
	MD0061093	OLD REICHS FORD MUNICIPAL LANDFILL	Industrial				
	MD0068853	STUP'S GARAGE/USED CARS, INC.	Industrial				
	MD0070319	JOHN C. GRIMBERG COMPANY, INC.	Industrial				
	MD0070700	HORSESHOE POINT LLC	Industrial				
	MDG344184	GRIFFITH ENERGY SERVICES, INC.	Industrial				
	MDG490621	LAFARGE - FREDERICK CONCRETE PLANT	Industrial				
	MDG490674	FREDERICK ASPHALT CO., L.C. AT ESSROC	Industrial				
	MDG490994	LEGORE QUARRY	Industrial				
	MDG491429	S.W. BARRICK & SONS, INC. - BARRICK QUARRY	Industrial				
	MDG492695	SUPERIOR PLUS, LLC	Industrial				
	MDG498001	AGGREGATE INDUSTRIES – WOODSBORO READY-MIX	Industrial				
	MDG498017	CJ MILLER, LLC	Industrial				
	MDG499732	JOHN EYLER PIT #2	Industrial				
	MDG499818	THOMAS, BENNETT & HUNTER, INC. - FREDERICK CONCRET	Industrial	Aggregate	N/A	6,218	5,890
	MDG499893	SOUTH STREET PLANT	Industrial				
	MDG499899	TAMKO BUILDING PRODUCTS, INC - GRINDING MILL	Industrial				
	MDG766968	VFW COUNTRY CLUB, INC.	Industrial				
	MD0020729	NEW MARKET WWTP	Municipal				
	MD0022870	SPRINGVIEW MOBILE HOME PARK	Municipal				
	MD0023060	CONCORD TRAILER PARK	Municipal				
	MD0023710	DAN-DEE MOTEL & COUNTRY INN	Municipal				
	MD0056481	KEMPTOWN SCHOOL WWTP	Municipal				
	MD0057100	NEW LIFE FOURSQUARE CHURCH AND SCHOOL	Municipal				
	MD0058661	WOODSBORO WWTP	Municipal				
	MD0059609	MONROVIA WWTP	Municipal				
	MD0065269	PLEASANT BRANCH WWTP	Municipal				
	MD0065439	MILL BOTTOM WWTP	Municipal				
	MD0060577	LIBERTYTOWN WWTP	Municipal				
	MD0067237	LEWISTOWN MILLS TREATMENT PLANT	Municipal				
	MD0067768	HYATTSTOWN WWTP	Municipal				
	MD0067989	LEWISTOWN MILLS WWTP NO.2	Municipal				
<b>TOTAL</b>						<b>33,724</b>	<b>31,473</b>

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**Table 2a: NPDES Regulated Stormwater Permits in the Lower Monocacy River Watershed**

Permit Number	Facility Name	NPDES Group
MD0068331	CARRROLL COUNTY MS4	County Phase-I
MD0068306	MONTGOMERY COUNTY MS4	County Phase-I
MD0068357	FREDERICK COUNTY MS4	County Phase-I
MD0068276	STATE HIGHWAY ADMINISTRATION MS4	SHA Phase-I
MDR055500	FREDERICK CITY MS4	Municipal Phase-II
02SW0124	FORT DETRICK - AREA A	Other NDPEs Reg SW
02SW0212	ALLIED WASTE SERVICES OF FREDERICK	Other NDPEs Reg SW
02SW0285	MORNINGSTAR FOODS, INC.	Other NDPEs Reg SW
02SW0336	M-NCPPC - LITTLE BENNETT MAINTENANCE YARD	Other NDPEs Reg SW
02SW0518	ACCUBID EXCAVATION, INC.	Other NDPEs Reg SW
02SW0547	PRECISION AUTOBODY, INC.	Other NDPEs Reg SW
02SW0674	FREDERICK ASPHALT CO., L.C. AT ESSROC	Other NDPEs Reg SW
02SW0696	RICHARD B. RUDY, INC.	Other NDPEs Reg SW
02SW0699	FREDERICK CITY WWTP	Other NDPEs Reg SW
02SW0726	D.M. BOWMAN, INC. - FREDERICK	Other NDPEs Reg SW
02SW0850	UNITED PARCEL SERVICE - FREDERICK	Other NDPEs Reg SW
02SW0987	ENTENMANN'S, INC.	Other NDPEs Reg SW
02SW1066	RICHARD F. KLINE, INC. - FREDERICK	Other NDPEs Reg SW
02SW1067	MCCORMICK PAINT WORKS COMPANY - FREDERICK	Other NDPEs Reg SW
02SW1099	HAHN TRANSPORTATION INC.	Other NDPEs Reg SW
02SW1100	FREDERICK MUNICIPAL AIRPORT	Other NDPEs Reg SW
02SW1162	RELIABLE JUNK COMPANY INC.	Other NDPEs Reg SW
02SW1163	FREDERICK AUTO PARTS, INC.	Other NDPEs Reg SW
02SW1199	BP SOLAR INTERNATIONAL, LLC	Other NDPEs Reg SW
02SW1226	FORT DETRICK - AREA B	Other NDPEs Reg SW
02SW1343	SHA - FREDERICK SHOP	Other NDPEs Reg SW
02SW1349	RINKER MATERIALS HYDRO CONDUIT - FREDERICK	Other NDPEs Reg SW
02SW1564	YORK BUILDING PRODUCTS - FREDERICK	Other NDPEs Reg SW
02SW1571	MTA - TRAIN STORAGE YARD	Other NDPEs Reg SW
02SW1654	PLEASANTS CONSTRUCTION INC.	Other NDPEs Reg SW
02SW1707	WASTE MANAGEMENT OF MARYLAND - FREDERICK COUNTY	Other NDPEs Reg SW
02SW1767	INVITROGEN CORPORATION	Other NDPEs Reg SW
02SW1773	DAIRY MAID DAIRY, INC.	Other NDPEs Reg SW
02SW1775	SCHWERMAN TRUCKING COMPANY - FREDERICK TERMINAL	Other NDPEs Reg SW
02SW1780	GRIMES PROPERTIES, LLC	Other NDPEs Reg SW
02SW1799	ALTEC INDUSTRIES, INC.	Other NDPEs Reg SW
02SW1851	COUNTRY SIDE USED AUTO PARTS	Other NDPEs Reg SW
02SW1866	ROLLING FRITO-LAY SALES - FREDERICK DC	Other NDPEs Reg SW
02SW1878	BALLENGER CREEK WWTP	Other NDPEs Reg SW
02SW1887	FREDERICK COUNTY PUBLIC SCHOOLS - HAYWARD BUS LOT	Other NDPEs Reg SW
02SW1888	FREDERICK COUNTY TRANSIT	Other NDPEs Reg SW
02SW1890	FREDERICK COUNTY HIGHWAYS - FREDERICK HQ	Other NDPEs Reg SW

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Permit Number	Facility Name	NPDES Group
02SW1891	FREDERICK COUNTY HIGHWAYS - JOHNSVILLE	Other NPDES Reg SW
02SW1893	FREDERICK COUNTY HIGHWAYS - URBANA	Other NPDES Reg SW
02SW1942	FREDERICK COUNTY LAW ENFORCEMENT COMPLEX	Other NPDES Reg SW
02SW1950	TAMKO BUILDING PRODUCTS, INC.	Other NPDES Reg SW
02SW1975	MEDIMMUNE, INC.	Other NPDES Reg SW
02SW1994	SFA DEFENSE PRODUCTS DIVISION	Other NPDES Reg SW
	MDE GENERAL PERMIT TO CONSTRUCT	Other NPDES Reg SW

**Table 2b: Lower Monocacy River 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 (%)
Carroll County Phase I	MD0068331	1,155	806	30%
Frederick County Phase I	MD0068357	31,570	22,766	28%
Montgomery County Phase I	MD0068306	1,872	1,305	30%
SHA Phase I MS4	MD0068276	5,650	4,222	25%
Municipal Phase II MS4	MDR055500	13,859	10,124	27%
Other NPDES Regulated Stormwater		14,849	13,703	8%
<b>Total</b>		<b>68,956</b>	<b>52,926</b>	<b>23%</b>

Note: Individual load contributions may not add to total load due to rounding.

**Table 3: Lower Monocacy River Watershed Phosphorus TMDL Allocations for NPDES Regulated Concentrated Animal Feeding Operations**

NPDES Regulated Animal Feeding Operations	Baseline Load (lbs/yr)	TMDL (lbs/year)	Reduction (%)
	170	170	0%

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