

## Technical Memorandum

### *Significant Phosphorus and Sediment Point Sources in the Liberty Reservoir 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 2012a). This technical memorandum identifies the significant point sources of phosphorus and sediment in the Liberty Reservoir watershed. Detailed allocations are provided for those point sources included within the Liberty Reservoir Process Water Waste Load Allocations (WLAs) and National Pollutant Discharge Elimination System (NPDES) Regulated Stormwater WLAs. These are conceptual values that are designed to meet the TMDL thresholds. Phosphorus and sediment loads from concentrated animal feeding operations (CAFOs) are also assigned a WLA within the TMDL, but the WLA for CAFOs is not presented here in any more specific detail than it is 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 designated uses from nutrient or sediment related impacts.

The Liberty Reservoir Phosphorus and Sediment TMDLs are presented in terms of an average annual load established to be protective of the recreational, aquatic life, and public water supply designated uses of the reservoir. WLAs have been calculated for NPDES regulated individual industrial, individual municipal separate storm sewer systems (MS4s), general industrial stormwater, and general MS4 permits in the Liberty Reservoir watershed. The permits can be grouped into two categories, process water and stormwater.

The process water category includes those non-rainfall driven loads from facilities capable of discharging phosphorus and sediments. It specifically includes the following sources: (1) municipal waste water treatment plants (WWTPs); (2) industrial process water permits; and (3) mineral mines. There are no municipal WWTPs or mineral mines located in the watershed. There are eleven industrial process water permits in the Liberty Reservoir watershed that are capable of discharging phosphorus and/or sediments.

The Liberty Reservoir phosphorus and sediment WLAs for the process water point sources are based on the WLAs assigned to the same facilities within the Chesapeake Bay TMDL (US EPA 2010) and Maryland's Phase I and Phase II Watershed Implementation Plans (WIPs) (MDE 2010, 2012). These WLAs are loading caps that are designed to meet the Phase II 2025 final implementation goals for the Chesapeake Bay TMDL and accommodate future growth after full implementation of the TMDL in 2025. MDE has identified eleven industrial process water facilities that discharge phosphorus and sediments in the Liberty Reservoir watershed. Within the Chesapeake Bay TMDL, industrial facilities capable of discharging phosphorus and sediments in their process water were assigned a WLA based on the results of monitoring data collected as part of their permit requirements or best professional judgment. These WLAs were adopted for the Liberty Reservoir Phosphorus and Sediment TMDLs. See Sections 2.2.2 and 4.6 of the main report for further details. Tables 1 and 2 provide one possible scenario for the

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distribution of the average annual phosphorus and sediment point source WLAs, respectively, within the Liberty Reservoir watershed.

The stormwater category includes all NPDES regulated stormwater discharges. There are 25 NPDES Phase I and Phase II stormwater permits identified within the Liberty Reservoir watershed. These include both individual and general NPDES Phase I and II stormwater permits. The permits are regulated based on Best Management Practices (BMPs) and do not include TP or TSS limits. In the absence of TP and TSS limits, the baseline loads for these NPDES regulated stormwater discharges are calculated using the CBP P.3.2 2009 Progress Scenario nonpoint source loads from the urban land use 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 in the watershed and the SHA Phase I MS4 permit. An aggregate WLA has been calculated for the general municipal Phase II MS4 permits for the towns of Hampstead, Manchester, and Westminster. Finally, an aggregate WLA was also calculated for all other NPDES regulated stormwater permits, collectively termed “Other NPDES Regulated Stormwater”, which include general state and federal Phase II MS4 permits, all industrial facilities permitted for stormwater discharges, and general construction permits.

The computational framework chosen for the Liberty Reservoir Phosphorus and Sediment TMDLs was 1) a refined version of the Chesapeake Bay Program Phase 5.3.2 (CBP P5.3.2) watershed model, which was used to estimate the phosphorus and sediment loads entering the reservoir during the 2001-2005 simulation period; 2) a CE-QUAL-W2 (W2) model of the Liberty Reservoir itself, which was used to simulate the impact that the phosphorus and sediment loads from the watershed model have on water quality in the reservoir; and 3) the CBP P5.3.2 watershed model 2009 Progress Scenario, which was used to estimate the current, or baseline, loads to the reservoir. The nonpoint source phosphorus and sediment loads generated within the Liberty Reservoir watershed are calculated as edge-of-stream (EOS) loads and represent a long-term average loading rate. Further details of the nonpoint source phosphorus and sediment load calculations can be found in Sections 2.2, 4.2, and 4.3 of the main TMDL report and the modeling report for this TMDL, *Modeling Framework for Simulating Hydrodynamics and Water Quality in Liberty Reservoir* (ICPRB 2012).

In order to calculate the individual and aggregate NPDES stormwater WLAs, MDE further refined the CBP P5.3.2 urban 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 Baltimore and Carroll counties Phase I jurisdictional MS4s, the SHA Phase I MS4, the Phase II jurisdictional MS4s, and “Other NPDES regulated stormwater,”. The methods used by MDE to refine the CBP P5.3.2 urban land-use are described within MDE’s documentation, *CBP P5.3.2 Land-Use and MDE Urban Source Sector Delineation - Development Methodology* (MDE 2011).

The baseline phosphorus and sediment loads were estimated for the NPDES regulated stormwater source sectors using MDE’s refinement of CBP P5.3.2 watershed model 2009 Progress Scenario land-use. The controllable loads (CBP P5.3.2 “E3” Scenario Load – CBP P5.3.2 2009 Progress Scenario Load) for each NPDES regulated stormwater source sector were

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calculated based on MDE's refinement of both the "E3" and 2009 Progress CBP P5.3.2 watershed model scenarios. The WLAs for each regulated stormwater source sector were then calculated based on applying an equal percent reduction to the controllable loads for each regulated stormwater source sector, along with other land-uses, as described in Section 4.6 of the main TMDL report. Reductions for all NPDES regulated stormwater source sectors were not allowed to exceed 75% of the controllable load, which MDE has defined as the maximum feasible reduction.

Table 3 identifies all of the applicable NPDES stormwater permits in the Liberty Reservoir watershed. Tables 4 and 5 provide one possible scenario for the distribution of the average annual phosphorus and sediment WLAs to the NPDES regulated stormwater source sectors in the Liberty Reservoir watershed, respectively (See Sections 4.2 - 4.6 of the main report for further details).

As per the Clean Water Act (CWA) all CAFOs are required to obtain NPDES permits for their discharges or potential discharges (CFR 2012b). In January, 2009, Maryland implemented new regulations governing CAFOs (COMAR 2012a,b), 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) that meets the Nine Minimum Standards to Protect Water Quality. The general permit also prohibits the discharge of pollutants, including nutrients, from CAFO production areas except as the result of an 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, subject to a maximum reduction for permitted sources of 75%, a 59% reduction in phosphorus loads and 50% reduction on sediment loads is required from CAFOs in the Liberty Reservoir TMDLs. Table 6 provides the baseline phosphorus load and WLA for CAFOs. Table 7 provides the baseline sediment load and WLA for CAFOs.

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**Table 1: Liberty Reservoir Phosphorus TMDL Process Water Point Source WLAs**

Facility Name <sup>1,2</sup>	NPDES #	Permit Type		WLA Type	Flow (MGD) <sup>3</sup>	Baseline Load (lbs/yr)	WLA (tons/yr)
CONGOLEUM CORPORATION	MD0001384	Industrial	Individual	Individual	0.12	88	160
BTR HAMPSTEAD, LLC	MD0001881	Industrial	Individual	Aggregate	N/A <sup>4</sup>	3,321	2,338
CITY OF WESTMINSTER KOONTZ WELL	MD0058556	Industrial	Individual	Aggregate			
S & G CONCRETE - FINKSBURG PLANT	MDG492472	Industrial	Individual	Aggregate			
CARROLL COUNTY FAMILY YMCA	MDG766057	Industrial	General	Aggregate			
THE BOSTON INN, INC.	MDG766199	Industrial	General	Aggregate			
FOUR SEASONS SPORTS COMPLEX	MDG766210	Industrial	General	Aggregate			
FREEDOM SWIM CLUB	MDG766371	Industrial	General	Aggregate			
GREEN VALLEY SWIM CLUB	MDG766379	Industrial	General	Aggregate			
MCDANIEL COLLEGE	MDG766048	Industrial	General	Aggregate			
GLYNDON TRACE CONDOMINIUMS	MDG766199	Industrial	General	Aggregate			
<b>Total</b>						<b>3,409</b>	<b>2,498</b>

- Notes:**<sup>1</sup> Two municipal Water Treatment Plants (WTPs) (Cranberry WTP, NPDES # MD0067644; and Freedom District WTP, NPDES# MD0067652) have been identified within the watershed, but are not included within the analysis, since they withdraw water from the watershed stream system. Therefore, any TP and TSS loads discharged from the plants are representative of a pass through condition.
- <sup>2</sup> Two hydrostatic testing permits (Maryland Military Facility – Camp Fretterd, NPDES# MDG675043; and Pearlstone Family Camp, NPDES# MDG675029) have also been identified within the watershed but are not included within the analysis, since they both discharge to groundwater rather than surface water, and therefore there are no potential TP or TSS loadings from the permits.
- <sup>3</sup> MGD: Millions of Gallons per Day.
- <sup>4</sup> N/A: Not Applicable.

**Table 2: Liberty Reservoir Sediment TMDL Process Water Point Source WLAs**

Facility Name <sup>1,2</sup>	NPDES #	Permit Type		WLA Type	Flow (MGD)	Baseline Load (tons/yr)	WLA (tons/yr)
CONGOLEUM CORPORATION	MD0001384	Industrial	Individual	Individual	0.12	1	4
BTR HAMPSTEAD, LLC	MD0001881	Industrial	Individual	Aggregate	N/A	14	57
CITY OF WESTMINSTER KOONTZ WELL	MD0058556	Industrial	Individual	Aggregate			
S & G CONCRETE - FINKSBURG PLANT	MDG492472	Industrial	Individual	Aggregate			
CARROLL COUNTY FAMILY YMCA	MDG766057	Industrial	General	Aggregate			
THE BOSTON INN, INC.	MDG766199	Industrial	General	Aggregate			
FOUR SEASONS SPORTS COMPLEX	MDG766210	Industrial	General	Aggregate			
FREEDOM SWIM CLUB	MDG766371	Industrial	General	Aggregate			
GREEN VALLEY SWIM CLUB	MDG766379	Industrial	General	Aggregate			
MCDANIEL COLLEGE	MDG766048	Industrial	General	Aggregate			
GLYNDON TRACE CONDOMINIUMS	MDG766199	Industrial	General	Aggregate			
<b>Total</b>						<b>15</b>	<b>61</b>

**Notes:**<sup>1</sup> Two municipal WTPs (Cranberry WTP, NPDES # MD0067644; and Freedom District WTP, NPDES# MD0067652) have been identified within the watershed, but are not included within the analysis, since they withdraw water from the watershed stream system. Therefore, any TP and TSS loads discharged from the plants are representative of a pass through condition.

<sup>2</sup> Two hydrostatic testing permits (Maryland Military Facility – Camp Fretterd, NPDES# MDG675043; and Pearlstone Family Camp, NPDES# MDG675029) have also been identified within the watershed but are not included within the analysis, since their loadings are considered to be *de minimis* in terms of the overall watershed TP and TSS loadings.

**Table 3: Liberty Reservoir NPDES Stormwater Permits**

NPDES Permit # <sup>1</sup>	Facility Name	NPDES Regulated Stormwater WLA Sector <sup>2</sup>
N/A - 02SW1965	BALTIMORE COUNTY BUREAU OF HIGHWAYS - SHOP 3	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1219	BFI WASTE SERVICES, LLC - FINKSBURG	OTHER NPDES REGULATED STORMWATER
N/A - 02SW3001	BULLOCK'S MEATS, INC.	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1824	C AND C MULCH PROCESSING, LLC	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1755	CARROLL COUNTY REGIONAL AIRPORT	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1452	CONDON'S AUTO PARTS, INC.	OTHER NPDES REGULATED STORMWATER
N/A - 02SW2006	GENERAL DYNAMICS ROBOTIC SYSTEMS	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0664	HODGES LANDFILL	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0954	JONES AUTO & SALVAGE	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1144	M & M TRUCK & EQUIPMENT CO., INC.	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0660	NORTHERN MUNICIPAL LANDFILL	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1345	SHA - WESTMINSTER SHOP	OTHER NPDES REGULATED STORMWATER
N/A - 02SW1908	SMITH BROTHERS AUTO PARTS	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0078	THOMAS, BENNETT & HUNTER, INC. - SHOP FACILITY	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0794	TOBACCO TECHNOLOGY, INC.	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0115	CJ MILLER, LLC	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0719	MARYLAND PAVING - FINKSBURG	OTHER NPDES REGULATED STORMWATER
N/A - 02SW0029	MARANDA INDUSTRIES	OTHER NPDES REGULATED STORMWATER
MDR05550	CITY OF HAMPSTEAD MS4	MUNICIPAL PHASE II MS4
MDR05550	CITY OF MANCHESTER MS4	MUNICIPAL PHASE II MS4
MDR05550	CITY OF WESTMINSTER MS4	MUNICIPAL PHASE II MS4
MD0068314	BALTIMORE COUNTY MS4	BALTIMORE COUNTY PHASE I MS4
MD0068331	CARROLL COUNTY MS4	CARROLL COUNTY PHASE I MS4
MD0055501	STATE HIGHWAY ADMINISTRATION MS4 (PHASE I)	SHA PHASE I MS4
N/A	MDE GENERAL PERMIT TO CONSTRUCT	OTHER NPDES REGULATED STORMWATER

**Notes:**<sup>1</sup> N/A: Permit does not have an NPDES number. For the industrial stormwater permits, the permit number listed is the MDE permit application number.

<sup>2</sup> Although not listed in this table, some individual permits from Table 2 and 3 incorporate stormwater requirements and are accounted for within the "Other NPDES Regulated Stormwater WLA", as well additional Phase II permitted MS4s, such as military bases, hospitals, etc.

**Table 4: Liberty Reservoir Phosphorus TMDL NPDES Regulated Stormwater WLAs**

<b>NPDES Regulated Stormwater Sector</b>	<b>NPDES #</b>	<b>Baseline Load (lbs/yr)</b>	<b>WLA (lbs/year)</b>	<b>Reduction (%)</b>
Baltimore County Phase I MS4	MD0068314	1,037	524	49
Carroll County Phase I MS4	MD0068331	12,300	6,102	50
SHA Phase I MS4	MD0055501	1,231	677	45
Municipal Phase II MS4s	MDR05550	1,672	893	47
“Other NPDES Regulated Stormwater”	N/A	3,848	2,981	23
<b>Total</b>		<b>20,088</b>	<b>11,177</b>	<b>44</b>

**Table 5: Liberty Reservoir Sediment TMDL NPDES Regulated Stormwater WLAs**

<b>NPDES Regulated Stormwater Sector</b>	<b>NPDES #</b>	<b>Baseline Load (tons/yr)</b>	<b>WLA (tons/yr)</b>	<b>Reduction (%)</b>
Baltimore County Phase I MS4	MD0068314	475	294	38
Carroll County Phase I MS4	MD0068331	4,033	2,530	37
SHA Phase I MS4	MD0055501	500	275	45
Municipal Phase II MS4s	MDR05550	611	350	43
“Other NPDES Regulated Stormwater”	N/A	2,402	2,035	15
<b>Total</b>		<b>8,021</b>	<b>5,484</b>	<b>32</b>

**Table 6: Liberty Reservoir Phosphorus TMDL NPDES Regulated CAFO WLA**

<b>Baseline Load (lbs/yr)</b>	<b>WLA (lbs/year)</b>	<b>Reduction (%)</b>
1,060	430	59

**Table 7: Liberty Reservoir Sediment TMDL NPDES Regulated CAFO WLA**

<b>Baseline Load (tons/yr)</b>	<b>WLA (tons/year)</b>	<b>Reduction (%)</b>
11	5	50

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