

Technical Memorandum

Significant Biochemical Oxygen Demand, Nitrogen, and Phosphorus Point Sources in the Anacostia River Watershed

The U.S. Environmental Protection Agency requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of the impairing pollutant or pollutants. The TMDL analysis for the Anacostia watershed addresses the biochemical oxygen demand (BOD), total nitrogen (TN), and total phosphorus (TP) loads on an annual average basis. This technical memorandum identifies, in detail, the significant surface water discharges of BOD, TN, and TP used as input when computing the TMDLs. The State of Maryland (MD) and the District of Columbia (DC) expressly reserve the right to allocate the loads among different sources in any manner that is reasonably calculated to achieve water quality standards (WQSS).

Waste load allocations (WLAs) have been made to National Pollutant Discharge Elimination System (NPDES)-regulated municipal and industrial wastewater treatment plants, municipal separate storm sewer system (MS4) discharges, and CSOs in the Anacostia watershed. Loads from urban land uses are broken down by MS4 jurisdiction.

In Maryland, there are two municipal wastewater treatment plants (WWTPs) contributing BOD, TN, and TP loads to the Anacostia river: the Beltsville Agricultural Research Center (BARC) East Side and Beltsville U.S. Department of Agriculture (USDA) West Side WWTPs. BOD loads were calculated based on the permitted flow and monthly average concentrations. The permits contain values for two seasons for BOD, which were incorporated into the calculations based on the permit-defined seasons. TN and TP loads were calculated based on permitted flow and concentrations. There are no permit-defined seasons for TN and TP. In addition to these two municipal WWTPs, there is one industrial point source in MD contributing to BOD loads to the Anacostia River: NASA Goddard Center. BOD loads were calculated from the maximum reported flow, 2005 through 2007, and the monthly average permitted BOD values. There are no permit limits on nutrients.

In DC, there are three permitted industrial facilities contributing to BOD loads to the tidal Anacostia: Super Concrete, PEPCO, and CTIDC. BOD WLAs were calculated for Super Concrete and CTIDC based on maximum reported flow and an assumed maximum concentration of 30 mg/l. The BOD WLA for PEPCO is based on the maximum daily average permitted concentration of 30 mg/l, the maximum permitted flow of 0.5 MGD, and an annual discharge frequency of four times a year. Stormwater loads from these facilities are included in the "Other DC Stormwater" WLA. WLAs are also given for combined sewer overflows (CSOs) in DC, based on DC's Long Term Control Plan.

WLAs are also given to DC and to two jurisdictions in MD with municipal stormwater discharges in the Anacostia watershed to address BOD, TN, and TP loads from urban sources during storm events. DC, Prince George's County and Montgomery County are all covered under NPDES Phase I MS4 permits. EPA's guidance document, "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES

Permit Requirements Based on Those WLAs" (November 2002), advises that all individual and general NPDES Phase I and Phase II permits be treated as point sources subject to WLA assignment in the TMDL. The document acknowledges that quantification of rainfall-driven nonpoint source loads is uncertain, stating that available data and information usually are not detailed enough to determine WLAs on an outfall-specific basis; therefore, the EPA guidance allows the stormwater WLA to be expressed as an aggregate allotment. Available information for the Anacostia River watershed allows the stormwater WLA for this analysis to be defined in separate aggregate allocations for DC, Montgomery County, and Prince George's County MS4s by major tributary.

WLAs have been made to these stormwater discharges based on the Hydrologic Simulation Program – FORTRAN (HSPF) model of the watershed from 1995 to 1997. TP loads allocated to MS4s also include phosphorus loads from streambank erosion. As explained in the main document, the HSPF model was used to simulate the fate and transport of BOD, TN, and TP in the non-tidal drainage areas of the Anacostia's main tributaries, the Northwest Branch, the Northeast Branch, Lower Beaverdam Creek, and Watts Branch. The HSPF model was calibrated against the loads from the ESTIMATOR Model. The HSPF model results provided daily flow and constituent load inputs for the TAM/WASP model for Lower Beaverdam Creek, Watts Branch, and tidal drainage areas. The ESTIMATOR model was used to compute daily BOD, TN, and TP loads for the Northwest Branch and the Northeast Branch. HSPF was used as well to provide a breakdown of the constituent loads by source, i.e., from the various land uses (agriculture, forest, or urban) or, in the case of TP, from streambank erosion.

Federal lands and facilities, federal and state highways, parks, and other land not under the jurisdiction of Montgomery or Prince George's Counties are not included in the counties' MS4 WLAs; rather, they are addressed separately by county and tributary in aggregate "Other MD Stormwater (SW)" WLAs. The total stormwater load was allocated between the counties' MS4s and these other entities on the basis of land use. The land use information was based on Maryland Department of Planning, Montgomery County DEP and the Maryland National Capital Park and Planning Commission – Prince George's County (M-NCPPC-PG) data, as described in section 2.1.2 of the main report. Similarly, in DC, BOD, TN, and TP loads for federal and industrial facilities have been separated from the DC MS4 WLAs and are addressed separately in aggregate "Other DC Stormwater (SW)" WLAs. These SW WLAs were calculated on the basis of area estimated for the facilities.

The potential BOD, TN, and TP allocations for point sources, reflected in the TMDL analysis, are designed to protect aquatic life in both MD and DC tidal waters of the Anacostia River, meet MD and DC Chla WQSs in their respective portions of the watershed, meet the numeric criteria for water clarity in the tidal waters, and meet all DO criteria for MD's and DC's designated uses in the tidal Anacostia.

Table 1 below provides the average annual allocations of the BOD, TN, and TP loads attributed to MD point sources in the Anacostia watershed: municipal WWTPs and industrial discharges, and NPDES regulated MS4s and other stormwater discharges. Table 2 below provides the average annual allocations of the BOD, TN, and TP loads attributed to DC point sources in the

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Anacostia watershed: industrial facilities, NPDES regulated MS4 and other stormwater discharges, and CSOs.

The main report explains how the TAM/WASP modeling framework has been used to determine the allocation of average annual loads that meets all seasonal WQSs, and Appendix C explains in more detail how the average annual loads meet seasonal DO criteria. Tables 3, 4, and 5 provide monthly average BOD, TN, and TP loads, respectively, to facilitate calculation of seasonal loads for wastewater treatment plants with continuous discharges with seasonal permit limits. The tables also provide loads for these facilities for seasonal periods associated with the existing designated uses in the Anacostia.

Table 1
Loads Attributed to MD Point Sources

<i>MD Point Source Name</i>	<i>Permit Number</i>	<i>BOD (lbs/year)</i>	<i>TN (lbs/year)</i>	<i>TP (lbs/year)</i>
BARC East Side WWTP	MD0020842	44,348	7,554	567
Beltsville USDA West WWTP	MD0020851	14,705	2,437	183
NASA Goddard Center	MD0067482	7,311		
Montgomery County MS4 – NWB	MD0068349	126,176	26,394	2,279
Other Mont. Co. SW – NWB		39,643	6,700	788
Montgomery County MS4 – NEB	MD0068349	62,707	12,565	1,668
Other Mont. Co. SW – NEB		25,460	3,682	322
Prince George's County MS4 – NWB	MD0068284	55,234	9,065	1,388
Other PG Co. SW-NWB		9,784	1,193	204
Prince George's County MS4 – NEB	MD0068284	226,639	25,116	3,461
Other PG Co. SW-NEB		101,158	10,311	893
Prince George's County MS4 – LBC	MD0068284	109,434	11,598	1,485
Other MD SW-LBC		18,946	1,625	140
Prince George's Co. MS4 – Watts Br	MD0068284	12,765	1,490	199
Other MD SW-Watts		1,147	97	8
Total MD Non-tidal PS Loads		855,457	119,827	13,584
Prince George's County MS4 – Tidal	MD0068284	62,613	4,173	433
Other MD SW-Tidal		13,963	1,172	88
Total MD PS Loads		932,033	125,172	14,105

NWB = Northwest Branch; NEB = Northeast Branch; LBC = Lower Beaverdam Creek; Watts Br = Watts Branch

Table 2
Loads Attributed to DC Point Sources

<i>DC Point Source Name</i>	<i>Permit Number</i>	<i>BOD (lbs/year)</i>	<i>TN (lbs/year)</i>	<i>TP (lbs/year)</i>
Aggregate Super Concrete Industries	DC0000175	1,188		
CTIDC	DC0000191	1,005		
PEPCO	DC0000094	501		
Total DC Industrial PS Loads		2,694		
DC MS4 - NWB	DC0000221	14,421	1,955	162
Other DC SW NWB		692	31	3
DC MS4 – LBC	DC0000221	403	45	6
DC MS4 - Watts Br	DC0000221	14,252	1,731	248
DC MS4 – Tidal Upper	DC0000221	181,841	10,493	966
Other DC SW Tidal Upper		9,358	423	46
DC MS4 – Tidal Lower	DC0000221	98,435	5,172	509
Other DC SW Tidal Lower		15,720	710	78
Total DC MS4/SW Loads		335,121	20,560	2,018
DC CSO Loads – Tidal Upper	DC0021199	52,472	5,061	1,047
DC CSO Loads – Tidal Lower	DC0021199	56,801	5,479	1,134
Total CSO Loads		109,274	10,540	2,181
Total DC PS Loads		447,089	31,100	4,199

Table 3
Average Monthly BOD Loads for Municipal and Industrial Facilities
(lbs/mo)

Month	BARC-East	BARC-West
January	4,812	1,552
Feb	4,346	1,402
March	4,812	1,552
April	2,639	1,001
May	2,727	1,035
June	2,639	1,001
July	2,727	1,035
August	2,727	1,035
September	2,639	1,001
October	4,812	1,035
November	4,657	1,502
December	4,812	1,552
Annual	44,348	14,705
February – May	14,524	4,991
June – January	29,824	9,714
April –October	20,909	7,144
July –September	8,092	3,071

Table 4
Average Monthly TN Loads for Municipal and Industrial Facilities
(lbs/mo)

Month	BARC-East	BARC-West
January	642	207
Feb	580	187
March	642	207
April	621	200
May	642	207
June	621	200
July	642	207
August	642	207
September	621	200
October	642	207
November	621	200
December	642	207
Annual	7,554	2,437
February – May	2,484	801
June – January	5,071	1,636
April –October	4,429	1,429
July –September	1,904	614

Table 5
Average Monthly TP Loads for Municipal and Industrial Facilities
(lbs/mo)

Month	BARC-East	BARC-West
January	48	16
Feb	43	14
March	48	16
April	47	15
May	48	16
June	47	15
July	48	16
August	48	16
September	47	15
October	48	16
November	47	15
December	48	16
Annual	567	183
February – May	186	60
June – January	380	123
April –October	332	107
July –September	143	46