

Technical Memorandum

Significant Nutrient Point Sources in the Port Tobacco Watershed

EPA requires that TMDL allocations account for all significant sources. This technical memorandum identifies, in detail, the significant surface water discharges of nutrients and biological oxygen demand (BOD) substances to the system in question. The two nutrients, total nitrogen (TN) and total phosphorus (TP), are addressed by the TMDLs for Port Tobacco River. Modeling input information is provided for simulating all potentially significant point sources as discrete discharges. These are conceptual values that are within the TMDL thresholds for each nutrient. They represent viable individual allocations to each point source. Maryland expressly reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to achieve water quality standards.

TMDLs are being established in the Port Tobacco watershed for both low flow and annual average conditions. Tables 1A and Table 1B provide modeling information for low flow TMDLs for TN and TP respectively. These are supplemented by Table 1C, which provides additional modeling information attributed to each point source for the low flow TMDL calculation.

Table 1A
Loads Attributed to Significant Point Sources for Low Flow Nitrogen TMDL^a

Source Name	Permit Number	TN Load <i>lb/month</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
La Plata	MD0020524	1,355	0.9023	6.0 ^b
Charles Community College	MD0052311	124	0.0275	18.0
Mt. Carmel	MD0053228	77	0.0170	18.0
Thunderbird Apartments	MD0050334	42	0.0093	18.0
Subtotal		1,597	--	--
Future Allocations		1,164	--	--
Grand Total		2,761	--	--

- a. This case corresponds to model scenario 3.
- b. It can be expected that BNR will operate more efficiently during summer months (ie. June, July, August). The average total nitrogen during summer months over several years for nine sewage treatment plants (Ballenger Creek, Bowie, Broadneck, Chesapeake Beach, Easton, Maryland City, MCI, Patuxent, and Perryville) operating with various types of BNR was calculated from their respective DMRs. The values ranged from 1.89 to 6.16 mg/l. The type of BNR to be implemented at the La Plata STP is Modified Ludzack-Ettinger (MLE). There are no STPs in Maryland that have been running this technology long enough to estimate the efficiency, from readily available data. However, there are two plants that are running a very similar technology. The Ballenger Creek STP is running a Modified Bardenpho, and the MCI STP is running with Bardenpho. The average summer total nitrogen values for these two plants are 5.83 mg/l and 2.58 mg/l respectively. With this information, the summer average BNR value used for La Plata was estimated at 6 mg/l, which is considered to be conservative compared to the other STPs.

Table 1B
Loads Attributed to Significant Point Sources for Low Flow Phosphorus TMDL^a

Source Name	Permit Number	TP Load <i>lb/month</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
La Plata	MD0020524	68	0.9023	0.3
Charles Community College	MD0052311	7	0.0275	1.0
Mt. Carmel	MD0053228	9	0.0170	2.0
Thunderbird Apartments	MD0050334	5	0.0093	2.0
Subtotal		88	--	--
Future Allocations		66	--	--
Grand Total		154	--	--

a. This case corresponds to model scenario 3.

Table 1C
Additional Assumptions for Low Flow the TMDL^a

		La Plata	Charles CC	Mt. Carmel	Thunderbird
BOD₅	<i>mg/l</i>	22.5	20.0	22.5	25.0
DO	<i>mg/l</i>	5.0	5.0	5.0	5.0
NH₃	<i>kg/d</i>	2.01	0.82	0.25	0.30
ON	<i>kg/d</i>	19.31	0.32	0.15	0.06
NO₂₃	<i>kg/d</i>	12.79	2.96	1.03	1.82
PO₄	<i>kg/d</i>	0.88	0.21	0.14	0.20
OP	<i>kg/d</i>	0.83	0.02	0.02	0.04
Flow	<i>m³/s</i>	0.0657	0.0026	0.0009	0.0014
Total Nitrogen	<i>kg/d</i>	34.12	4.09	1.43	2.18
Total Phosphorus	<i>kg/d</i>	1.71	0.23	0.16	0.24
Overall Total Nitrogen	<i>kg/d</i>		41.83		
Overall Total Phosphorus	<i>kg/d</i>		2.34		

a. This case corresponds to model scenario 3.

b. 2.2 kg = 1 lb

The loadings, concentrations, and flows represented in the above tables are for illustrative purposes only. Actual effluent limits and related permit conditions will be established at the time of permit issuance or renewal and will be based upon conditions present at that time, as reflected in populations projections, infrastructure needs as defined in County Comprehensive Water and Sewer Plans, and appropriate concentrations and loadings needed to address impairments of the water quality limited segments identified by this TMDL and the applicable 303(d) list. The total

of load reductions from all sources will, however, remain the same as the subtotals and grand totals reflected on the charts. Point source loadings, flows, and concentrations placed in permits will be based upon the information listed above as well as that provided during the permit adjudication process.

Tables 2A and Table 2B provide modeling information for average annual TMDLs for TN and TP respectively. These are supplemented by Table 2C, which provides additional modeling information attributed to each point source for the average annual TMDL calculation.

Table 2A
Loads Attributed to Significant Point Sources for Average Annual Nitrogen TMDL^a

Source Name	Permit Number	TN Load <i>lb/year</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
La Plata	MD0020524	21,970	0.9023	8.0
Charles Community College	MD0052311	1,510	0.0275	18.0
Mt. Carmel	MD0053228	930	0.0170	18.0
Thunderbird Apartments	MD0050334	510	0.0093	18.0
Subtotal		24,920	--	--
Future Allocations		17,800	--	--
Grand Total		42,720	--	--

a. This case corresponds to model scenario 4.

Table 2B
Loads Attributed to Significant Point Sources for Average Annual Phosphorus TMDL^a

Source Name	Permit Number	TP Load <i>lb/year</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
La Plata	MD0020524	820	0.9023	0.3
Charles Community College	MD0052311	80	0.0275	1.0
Mt. Carmel	MD0053228	100	0.0170	2.0
Thunderbird Apartments	MD0050334	60	0.0093	2.0
Subtotal		1,060	--	--
Future Allocations		810	--	--
Grand Total		1,870	--	--

a. This case corresponds to model scenario 4.

Table 2C
Additional Assumptions for Average Annual TMDL^a

		La Plata	Charles CC	Mt. Carmel	Thunderbird
BOD₅	<i>mg/l</i>	22.5	20.0	22.5	25.0
DO	<i>mg/l</i>	5.0	5.0	5.0	5.0
NH₃	<i>kg/d</i>	2.68	0.82	0.25	0.30
ON	<i>kg/d</i>	25.75	0.32	0.15	0.06
NO₂₃	<i>kg/d</i>	17.06	2.96	1.03	1.82
PO₄	<i>kg/d</i>	0.88	0.21	0.14	0.20
OP	<i>kg/d</i>	0.83	0.02	0.02	0.04
Flow	<i>m³/s</i>	0.0657	0.0026	0.0009	0.0014
Total Nitrogen	<i>kg/d</i>	34.12	4.09	1.43	2.18
Total Phosphorus	<i>kg/d</i>	1.71	0.23	0.16	0.24
Overall Total Nitrogen	<i>kg/d</i>		53.20		
Overall Total Phosphorus	<i>kg/d</i>		2.34		

- a. This case corresponds to model scenario 4.
- b. 1 kg = 2.2 lbs

The loadings, concentrations, and flows represented in the above tables are for illustrative purposes only. Actual effluent limits and related permit conditions will be established at the time of permit issuance or renewal and will be based upon conditions present at that time, as reflected in populations projections, infrastructure needs as defined in County Comprehensive Water and Sewer Plans, and appropriate concentrations and loadings needed to address impairments of the water quality limited segments identified by this TMDL and the applicable 303(d) list. The total of load reductions from all sources will, however, remain the same as the subtotals and grand totals reflected on the charts. Point source loadings, flows, and concentrations placed in permits will be based upon the information listed above as well as that provided during the permit adjudication process.