

Appendix H

Considerations for Impaired Waters

H.1. Description of TMDLs and the MS4 General Permit

Impaired waters are those that do not meet applicable water quality standards. Impaired waters are identified on the West Virginia Section 303(d) list until a Total Maximum Daily Load (TMDL) is developed and approved by U.S. EPA. A Total Maximum Daily Load (TMDL) is a plan of action used to clean up streams that are not meeting water quality standards. The plan includes pollution source identification and strategy development for contaminant source reduction or elimination. TMDLs are often referred to as “pollution diets” for the applicable pollutants of concern. In West Virginia, the TMDL program is part of the Watershed Branch.

Part III, Section D of the MS4 General Permit pertains to MS4s that discharge to impaired waters. These include: (1) 303(d) listed waters (waters listed as impaired, but for which a TMDL has yet to be developed), and (2) waters that have an approved TMDL. The General Permit specifies that the local stormwater management program must address the BMPs used to control the pollutants for which the waterbody is impaired, meet any wasteload allocation in a TMDL, and conduct monitoring (including modeling) to demonstrate the effectiveness of BMPs. A key phrase in the General Permit is that the stormwater management program should demonstrate that “there will be no increase of the pollutants of concern” (Part III, D, 1.a).

For information on how stormwater programs can address watershed specific TMDL issues see the U.S. EPA guidance titled: *Evaluating the effectiveness of municipal stormwater programs* and *Understanding Impaired Waters and Total Maximum Daily Load (TMDL) Requirements for Municipal Stormwater Programs*. Both of these guidance documents can be found on EPA’s NPDES MS4 website: <http://cfpub.epa.gov/npdes/stormwater/munic.cfm>

Impaired waters and TMDLs may have significant implications for MS4s and local stormwater management programs. In the future, it may become incumbent on the local program to set up BMP tracking and accounting mechanisms in order to

document the implementation of BMPs in accordance with the requirements of the West Virginia MS4 Permit, and to further evaluate the compliance with any TMDL's.

Table H.1 provides a quick summary of when an MS4 may be required to address stormwater pollutant sources associated with impaired waters and TMDLs.

Table H.1. Summary of Conditions Under Which MS4s Must Address TMDLs for Stormwater Sources

- The MS4 discharges into a waterbody that is impaired or has a TMDL and/or drains to a Chesapeake Bay tributary.
- Urban stormwater (or urban sources) are listed as one of the sources of impairment that must be accounted for to implement the TMDL.
- A wasteload allocation (or in some cases load allocation) has been assigned to the MS4, a group of MS4s, or perhaps to all permitted stormwater sources (e.g., all NPDES permits to include industrial, construction, municipal). The MS4 may have to participate in regional efforts to take an overall WLA and parse out individual MS4 responsibilities.
- The specific MS4 permit has been updated (or will be updated) to include TMDL discharge requirements – these may be technology (BMP) driven or numeric.

H.2. Chesapeake Bay TMDL

The U.S. Environmental Protection Agency (EPA) has established the Chesapeake Bay TMDL, a comprehensive “pollution diet” that establishes Total Phosphorus, Total Nitrogen, and Sediment *Treatment Objectives* for the entire Bay watershed. Local *Watershed Implementation Plans* (WIPs) are being developed that address the “source sectors” of these pollutants: agriculture runoff, urban runoff, and wastewater treatment plant discharges, in the Bay watershed portions of West Virginia. The WIPs establish the criteria from which the *Performance Goals* for these objectives will be developed. More information on West Virginia’s WIPs, and requirements for urban stormwater management in the Bay watershed portion of the state can be found at:

<http://www.dep.wv.gov/WWE/watershed/wqmonitoring/Pages/ChesapeakeBay.aspx>

West Virginia's Phase I Chesapeake Bay Watershed Implementation Plan (West Virginia WIP Development Team, 2010) describes the connection between the Chesapeake Bay TMDL and the one-inch performance standard in the MS4 General Permit:

Because the pre-development land uses already contribute non-negligible loads, it is reasonable to assume that the implementation of the one inch capture performance standard will, over time, reduce baseline conditions in MS4 areas of responsibility. Furthermore, the relatively higher delivery factors and development rates in those areas will counter growth in the non-regulated areas of the West Virginia portion of the Chesapeake Bay watershed. WVDEP believes that the MS4 requirements coupled with other BMPs implemented in non-regulated areas will be sufficient to attain no net increase in 2010 NA delivered nitrogen and phosphorous loads from urban stormwater sources. (p. 38)

At this point in time, complying with the one-inch performance standard at new development and redevelopment sites will imply "no net increase" in associated pollutants in the context of the WIP.

Table H.2 provides the accepted nutrient and sediment annual load reduction capabilities of the BMPs provided in this manual. The *Total Reduction (TR)* column represents the total load reduction of the listed pollutants as the combined performance of Runoff Reduction (RR) and Pollutant Removal (PR). These values have been derived from compiled research and represent the latest available science on the ability of BMPs to manage annual volume and pollutant loads. (Hirschman et al. 2008).

The performance listed is contingent on the practice having been located, sized, and designed in accordance with the specifications provided in **Chapter 4**, and applied on new and redevelopment projects. The Total Reduction and Pollutant

Removal values listed in **Table H.2** are provided for informational purposes and may not be the same as the performance credits for nutrients and sediment assigned by the EPA Chesapeake Bay Program in its evaluation of BMPs for use in local WIPs.

Note: *The Runoff Reduction credit provided in this manual is for purposes of “site-scale” new and redevelopment project compliance with the locally adopted WVMS4 Permit. Total Reduction and/or Pollutant Removal credit values are provided for informational purposes when considering a project’s effect on a receiving stream with a TMDL load or waste load allocation. As such, compliance with the Chesapeake Bay TMDL and local WIPs is evaluated by the Chesapeake Bay Watershed Model through aggregation of BMPs at the watershed or sub-watershed scale, and are not evaluated using the same compliance tools.*

It is expected that stormwater treatment research will continue and new BMPs will be developed, as well as modifications to the design and runoff reduction credit of the existing BMPs provided in this manual. WVDEP will continue to evaluate the research and will also adopt a process for evaluating and implementing changes related to BMP design and performance. See Section 3.2.4 of **Chapter 3**.

It should also be noted that the EPA Chesapeake Bay Program will also be reviewing and potentially updating BMP design and performance standards for purposes of evaluating the effectiveness of the local WIPs. Given the variety of state stormwater programs in the Chesapeake Bay, it is expected that there may be differences in the state and/or local program criteria and that of EPA’s Chesapeake Bay Model. WVDEP will continue to work with EPA through the permit cycles and where possible (or necessary) will consider permit or program guidance updates.

Table H.2. Comparative Load Reduction Capability of BMPs											
Best Management Practice		RR ¹ (%)	TP PR ² (%)	TP TR ³ (%)	TN PR ² (%)	TN TR ³ (%)	TSS PR ² (%)	TSS TR ³ (%)	Bacteria TR ³ (%)	Metals TR ³ (%)	PAH's TR ³ (%)
Sheet Flow to Vegetated Filter Strips ⁴	A/B Soils	50	0	50	0	50	50	75	20 ⁵		
	C/D Soils	25	0	25	0	25	50	63	20 ⁵		
	C/D Soils w/ compost amended soils (CA)	50	0	50	0	50	50	75	20 ⁵		
Sheet flow to Conservation Area ⁴	A/B Soils	75	0	75	0	75	75	94	35 ⁵		
	C/D Soils	50	0	50	0	50	50	75	20 ⁵		
Simple Disconnection ⁴	A/B Soils	50	0	50	0	50	50	75	NA		
	C/D Soils	25	0	25	0	25	50	63	NA		
	C/D Soils w/ CA	50	0	50	0	50	50	75	NA		
Simple Disconnection (alternative Practices)	Micro Infiltration	Refer to Infiltration									
	Residential Raingarden	Refer to Bioretention Level 1 and Level 2									
	Rainwater Harvesting	Refer to Rainwater Harvesting									
	Urban Planter	40	25	55	40	64	50	70	40		
Bioretention	Level 1	60	25	55	40	64	50	70	40		62
	Level 2	100 ⁶ (80)	50	90	60	92	75	95	70		62
Permeable Pavement	Level 1	45	25	59	25	59	65	81	NA		
	Level 2	100 ⁶ (75)	25	81	25	81	65	91	NA		
Grass Swale	A/B Soils	20	15	32	20	36	50	60	0	70 ⁷	62
	C/D Soils	10	15	24	20	28	30	37			
	C/D w/ CA	20	15	32	20	36	50	60			
Infiltration		100 ⁶ (90)	25	93	15	92	50	95	40		
Regenerative Conveyance Channel ⁸	A/B Soils	100 ⁶ (80)	50	90	60	92	75	95	70		62
	C/D/Soils	60	25	55	40	64	50	70	40		
Rainwater Harvesting		90 ⁹	0	0 ⁹	0	0 ⁹	0	0 ⁹			
Vegetative Roof		100 ⁶ (45)	0	45	0	45	50	70	NA		
Filtration Practices	Level 1	0	60	60	30	30	60	60	35 ¹⁰	69 ⁷	84
	Level 2	0	65	65	45	45	85	85	70 ¹¹	69 ⁷	84
Stormwater Wetlands	Level 1	0	50	50	25	25	50	50	80 ⁷	42 ⁷	85
	Level 2	0	75	75	55	55	80	80	80	42 ⁷	85
Dry Ext Det	Level 1	0	15	15	10	10	50	50	30 ¹⁰		
	Level 2	15	15	28	10	24	70	75	60 ¹⁰		

Wet Pond	Level 1	0	50	50	30	30	50	50	70 ⁷	62 ⁷	
	Level 2	0	75	50	40	40	80	80	70	62 ⁷	

¹Annual volume reduction based on managing the runoff from the 1” rain event (Hirschman et al., 2008)
² Pollutant removal by reducing the pollutant concentration (EMC) as it flows through the BMP.
³Total Pollutant Load Reduction as a function of combined **Runoff Reduction** (RR) and **Pollutant Removal** (PR).
⁴ **Runoff Reduction** (RR) and **Total Reduction** (TR) values (%) are based on a ft³ credit per ft² of BMP surface area (Refer to **Section 3.4** for details).
⁵ Limited monitoring data. Estimates should be considered provisional
⁶ Performance Credit for compliance with WV MS4 Permit; Actual Runoff Reduction values used for TR credit provided in parentheses.
⁷ Median value from the CWP National Pollutant Removal Database
⁸ New practice – performance credits comparable to bioretention/amended media filter. Credit is 100% of provided storage in step pools.
⁹Runoff Reduction credit is variable up to 90% - based upon storage and water usage budget.
¹⁰Median value from the International BMP Performance Database
¹¹Q3 value from the International BMP Performance Database

References

Hirschman, D., Collins, K., and T. Schueler. 2008. *Technical Memorandum: The Runoff Reduction Method*. Center for Watershed Protection and Chesapeake Stormwater Network. Ellicott City, MD.

West Virginia WIP Development Team. 2010. *West Virginia’s Chesapeake Bay TMDL Watershed Implementation Plan*. <http://www.wvca.us/bay/documents.cfm>