Recommendations of the Expert Panel to Define Removal Rates for Urban Filter Strips and Stream Buffer Upgrade Practices

Photo credit Ryan Winston

Presented to the Urban Stormwater Workgroup
2/18/2014
Revised Report Presented to the Urban Stormwater Workgroup
4/15/2014

Panel Membership

Name	Affiliation
Joe Battiata	Center for Watershed Protection, Inc.
Sally Claggett	USFS, Chesapeake Bay Program Forestry Work Group Coordinator
Scott Crafton	Virginia Department of Environmental Quality
David Follansbee, PhD	New York Department of Environmental Conservation
David Gasper	New York Department of Environmental Conservation
Randy Greer	Delaware Department of Natural Resources and Environmental Control
Curtis Hardman	West Virginia Department of Environmental Protection
Tom Jordan, PhD	Smithsonian Environmental Research Center
Steve Stewart	Baltimore County , Environmental Protection and Sustainability
Al Todd	Alliance for the Chesapeake Bay
Ryan Winston	North Carolina State University
Jennifer Zielinski	Biohabitats, Inc.
Non-panelists: Neely L. Law (Coordinator, CWP & CBP Sediment Stream Coordinoar), Hannah Martin (CRC), Gary Shenk (CBPO), Matt Johnston (CBPO), Jeff Sweeney (CBPO)	

UFS Definition

- Runoff reduction and stormwater treatment BMP
- Designed to manage stormwater runoff draining from urban lands. Water quality benefits from urban filter strips are derived from both load reduction through infiltration and recharge as well as removal of pollutants through settling and filtration. UFS are stable areas with vegetated cover on flat to gently sloping land. Runoff entering the UFS must be in the form of sheetflow and at a non-erosive rate for the site-specific soil conditions. Refer to Sections 6.1 and 6.2 for detailed information on runoff reduction (RR) UFS and stormwater treatment UFS (ST).

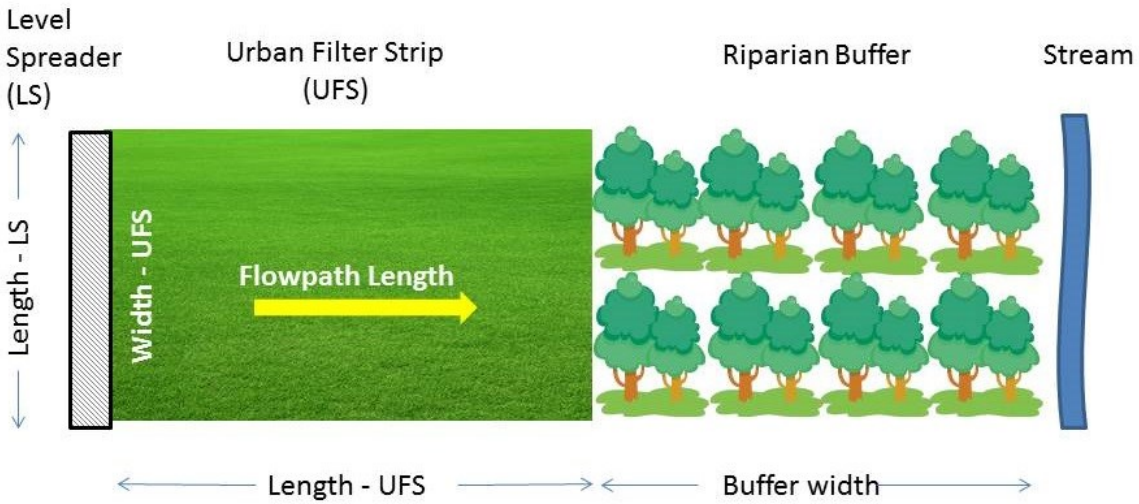


Figure 1. Dimensional elements of an urban filter strip.

Summary of Key Recommendations

- Runoff Reduction UFS

Table 9: Recommended pollutant removal rates for urban filter strips as a RR BMP.

	TN	TP	TS
0.5" Runoff depth captured	20%	54%	56%

- Stormwater Treatment UFS

Table 10. Recommended pollutant removal rate for UFS as a ST BMP.

	TN	TP	TS
0.5" Runoff depth captured	n/a	n/a	22%

Comments

- MD State Highway Administration
- VA DEQ
- PA DEP
- The comments received did not change the recommendations
- Clarification on the development and application of the recommended credits for urban filter strips

Executive Summary

- Disclaimer added + text in report

  "*The recommendations included in this report do not address or revise the current urban forest buffer BMP nitrogen, phosphorus or sediment removal efficiencies or definition defined by the Chesapeake Bay Program.*"

Section 2.2 Qualifying Conditions

Stand-alone practice to treat relatively small impervious areas for new development, redevelopment or retrofit.

- Sheetflow must enter the UFS and be maintained across the entire flow length
- A 0.4 design ratio of filter strip length: impervious flow length is recommended for runoff reduction urban filter strips (Section 6.1) and 0.2 design ratio for stormwater treatment urban filter strips (Section 6.2). This applies to UFS that meet the maximum impervious flow length design criteria without use of an engineered level spreader or other flow dispersion device to dissipated concentrated flow (see Appendix C).
- Soils must be classified as Hydrologic Soil Group A, B, or C. Soil amendments are required for D soils or compacted (disturbed) soils to make their permeability equivalent to A, B, or C soils.
- Vegetated cover must be in good condition with minimal bare spots
- Minimize use of fertilizer, application rate is based on a site specific soil test.
- Not an applicable practice for hotspots or where there is a high groundwater table

Qualifying Conditions

Additional conditions apply where concentrated flow conditions:

- Must enter a low flow diversion or forebay and into a combination channel and level spreader (or other approved configuration) prior to discharging into the filter strip.
- Level spreader length (or other flow dispersion device) is based on 10ft for every 1 cfs (of the concentrated flow) with a maximum 100 ft length.
- The maximum allowable drainage area to meet the above condition will vary depending on the percentage of imperviousness in the contributing drainage area and the volume of runoff requiring treatment by a particular jurisdiction.

- Manicured lawns, athletic fields and other managed turf or pervious areas cannot be used as UFS; other BMPs considered such as Urban Nutrient Management
- Consult state stormwater agency for state-specific design and hydraulic specifications

Section 6.1 Protocols to Define Nutrient and Sediment Removal Rates

Table 7. Example methods to estimate runoff volume reduced by urban filter strips in each of the Bay jurisdictions.

DC	DE	MD	NY	PA	VA	WV
For compacted cover, reduce volume conveyed to grass area by 2.0 cu. ft. per 100 sq. ft. of pervious area.	Based on soils and vegetation ranging from 10% to 40%	Up to 1 inch credit provided based upon ratio of Disconnection (filter strip) and contributing (impervious cover) flow lengths varies between 0.2 and 1	100% runoff reduction volume (RRv) credit	100% runoff reduction volume credit	50% runoff volume reduction for treated area	Reduce volume conveyed to conservation area by 0.06 cu. ft per sq. ft. of conservation area. (6 cu.ft per 100 sq ft)

Table 8: Runoff depth estimated using hypothetic design example for an urban filter strip.

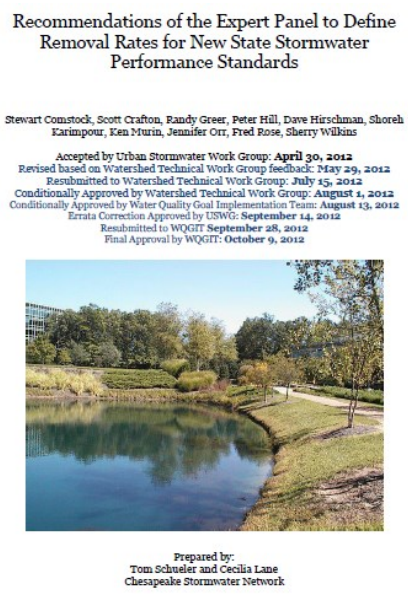
	DC	DE	MD[1]	PA	NY	VA	WV
volume reduction (cu ft)[2]	288	450	171 - 855	1,653	855	428	378
Runoff depth captured (in) using New State Stormwater Performance Method	0.32	0.50	0.19 – 0.95	1.8	0.95	0.48	0.42
Runoff reduction (%)	28	20	8-38	100	99	50	44

[1] The values for MD represent the range in P_e available for urban filter strips and range from 0.2 , 0.4, 0.6 to 1.0.

[2] The volume reduction is based on the hypothetical design example provided in Appendix D with an impervious area of 10,800 ft^2

Reporting, Tracking & Verification

- Guidance provided in New State Stormwater Performance Standards and Retrofit Projects expert panel report recommendations
- USWG BMP Verification Guidance (1/23/2014)

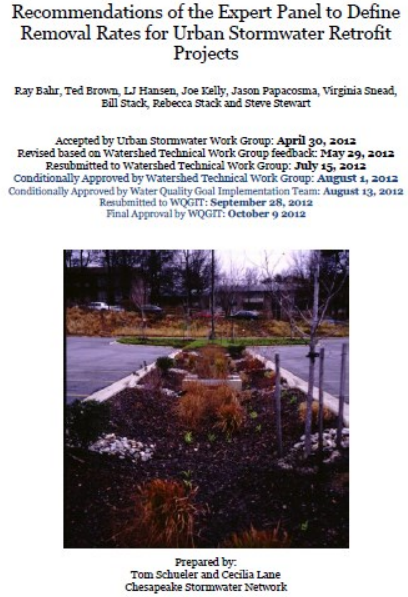


Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards

Stewart Comstock, Scott Crafton, Randy Greer, Peter Hill, Dave Hirschman, Shoreh Karimpour, Ken Murin, Jennifer Orr, Fred Rose, Sherry Wilkins

Accepted by Urban Stormwater Work Group: **April 30, 2012**
Revised based on Watershed Technical Work Group feedback: **May 29, 2012**
Resubmitted to Watershed Technical Work Group: **July 15, 2012**
Conditionally Approved by Watershed Technical Work Group: **August 1, 2012**
Conditionally Approved by Water Quality Goal Implementation Team: **August 13, 2012**
Errata Correction Approved by USWG: **September 14, 2012**
Resubmitted to WQGIT **September 28, 2012**
Final Approval by WQGIT: **October 9, 2012**

Prepared by:
Tom Schueler and Cecilia Lane
Chesapeake Stormwater Network

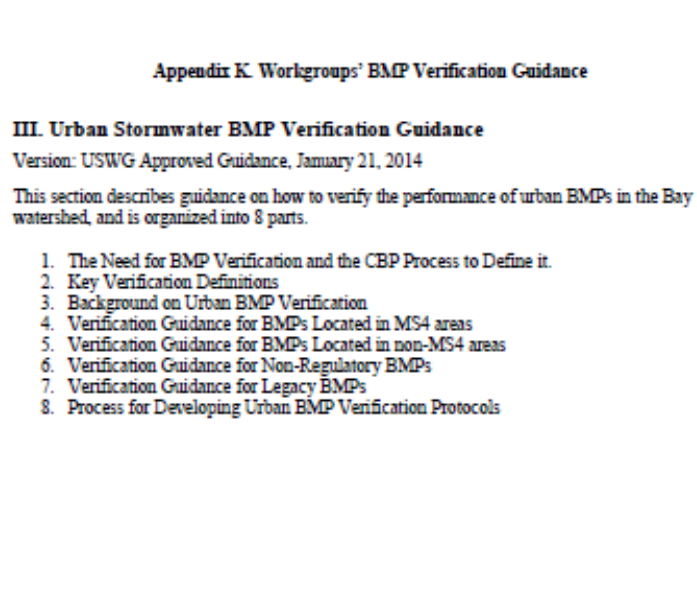


Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects

Ray Bahr, Ted Brown, LJ Hansen, Joe Kelly, Jason Papacosma, Virginia Snead, Bill Stack, Rebecca Stack and Steve Stewart

Accepted by Urban Stormwater Work Group: **April 30, 2012**
Revised based on Watershed Technical Work Group feedback: **May 29, 2012**
Resubmitted to Watershed Technical Work Group: **July 15, 2012**
Conditionally Approved by Watershed Technical Work Group: **August 1, 2012**
Conditionally Approved by Water Quality Goal Implementation Team: **August 13, 2012**
Resubmitted to WQGIT: **September 28, 2012**
Final Approval by WQGIT: **October 9 2012**

Prepared by:
Tom Schueler and Cecilia Lane
Chesapeake Stormwater Network



Appendix K. Workgroups' BMP Verification Guidance

III. Urban Stormwater BMP Verification Guidance

Version: USWG Approved Guidance, January 21, 2014

This section describes guidance on how to verify the performance of urban BMPs in the Bay watershed, and is organized into 8 parts.

1. The Need for BMP Verification and the CBP Process to Define it.
2. Key Verification Definitions
3. Background on Urban BMP Verification
4. Verification Guidance for BMPs Located in MS4 areas
5. Verification Guidance for BMPs Located in non-MS4 areas
6. Verification Guidance for Non-Regulatory BMPs
7. Verification Guidance for Legacy BMPs
8. Process for Developing Urban BMP Verification Protocols

Section 7. Accountability Mechanisms

The verification of individual BMPs is a critical element to ensure that BMPs continue to reduce pollutants as designed following implementation and for the expected life of that BMP. The guidance for verification is based on SPSEP (2012) and SRP (2012) for new development, redevelopment and retrofit with additional information specific to design elements that may affect UFS performance. In general, non-MS4 communities have options of reporting and verifying individual BMPs as outlined in the Urban Stormwater Workgroup verification guidance (January 21, 2014) and described below. However, it should be noted that a BMP may be downgraded if a local government or federal facility fails to perform verification inspections (USWG 2014).

- Local jurisdictions or “other data providers”
- Soil test recommended
- Local reporting to the State: Deleted reference to VA specific requirements
- Added 3 reporting options for non-MS4s taken from USWG BMP Verification Guidance (1/24/2014)

Special Procedures for Urban BMPs Installed in Non-MS4s

Three options are included in the USWG BMP Verification Guidance (dated January 21,2014) and stated below:

- *Option 1: Local or state agency follows the verification inspection process outlined in Part 4 and gets the same credit as a MS4 community.*

- *Option 2: Local or third party performs verification inspections on a sub-sample of their BMP inventory at least once during the prescribed credit duration of the BMP. Non-MS4 communities may elect to reduce the scope of their visual inspections by sub-sampling a representative fraction of their local BMPs and applying the results to their entire population of BMPs that are credited in the CBWM. The sub-sampling method must be designed to have at least and 80% confidence level that the BMPs are reported accurately. There are several well accepted approaches to determining the sample size. These include using a census for a small population of BMPs, imitating a sample size of similar studies, using published tables, and/or applying formulas to calculate a sample size.*

- *Option 3: State or third party conducts a sub-sample to verify BMPs reported within one non-MS4 community, and applies the results to reported BMP data to other comparable and adjacent non-Ms4s in their portion of the watershed.*

Section 7.1 Un-Intended Consequences and Double-Counting

- Given the qualifying conditions for fertilizer management for UFS, pollutant load reductions for Urban Nutrient Management (UNM) may not be applied to the area of an UFS, however, any pervious areas draining to the UFS may be eligible for UNM. A UFS may be credited as pretreatment to an urban forest buffer where the purpose of the UFS is to create the sheetflow conditions that are required for urban forest buffers. In this circumstance, the area of the UFS may not be included as buffer area but must meet the qualifying conditions outlined in Section 2.2 to be eligible for credit.

3. Monitoring studies to further evaluate the impact of concentrated flow through forested buffers. As part of this review, it is important to evaluate the function throughout the buffer. The areas with no flow might significantly reduce the load while concentrated flow areas may have slightly higher concentrated loading. Studies that review event mean concentration through various types of vegetated buffer may be helpful.

Thank you.

Comments & Questions