Chesapeake Bay Stewardship Fund Final Programmatic Report Narrative

Part 1 Project Description

This project expanded on the success of the first two phases of the Chesapeake Bay Stormwater Training Partnership (CBSTP) to train carefully targeted populations to design, install and maintain urban stormwater and restoration practices across the seven Chesapeake Bay states. The third phase of CBSTP continued to accelerate the adoption of the most innovative and effective stormwater, green infrastructure and urban nutrient management practices to increase sediment and nutrient reductions from the urban sector in all seven Bay states.

"Phase 3" targeted new high-priority training populations involved in the delivery and implementation and verification of green infrastructure and restoration practices. These under-served training populations included: MS4 BMP implementers, UNM plan writers, contractors who design and install residential stewardship practices, BMP inspectors, industrial site compliance managers, and green infrastructure innovators. In addition, the project aimed to disseminate the tools and resources developed under the grant to the stormwater professionals that are members of the Chesapeake Stormwater Network.

Part 2 Summary of Accomplishments

We were able to effectively meet the objectives of Phase 3 of the Chesapeake Bay Stormwater Training Partnership as follows:

- Collectively provided a total of 25,357 training hours to a approximately 2,500 individuals across the Bay watershed
- Developed, produced and delivered 38 webcasts for a total of 19,307 training hours
- Trained 589 individuals to rapidly inspect existing, legacy urban BMPs to verify pollutant reduction credits and to quickly diagnose how to restore performance for BMPs that were failing
- Conducted 5 state-specific training events providing 2,020 training hours
- Grew membership of the Network to 9,044 stormwater professionals
- Initiated the development of an MS4 Contact Database and populated it with 1,176 contacts

Part 3 Project Activities & Outcomes

1. **Targeted Webcasts for Four Training Populations**.

   We far exceeded our initial goals of delivering 25 webcasts and providing more than 10,000 training house during the grant. During the course of "Phase 3", we delivered **38** webcasts which provided a total of 10,118 live training hours (the amount of training hours provided during the airing of the webcast) and 9,189 of training hours as a result of individuals downloading the webcast after the fact. This has resulted in a total of **19,307** training hours that have been provided to the Chesapeake Bay watershed community in the form of webcast training over the course of the grant. **Appendix 1** demonstrates the different webcasts that were offered during Phase 3. The webcasts were designed to train five different target populations:

Webcast Series 1 – MS4 Implementers and the Bay TMDL

To date, the Partnership has delivered 24 webcasts in the MS4 Implementers and the Bay TMDL series on the following topics:

Webcast Topics for MS4 Implementers Offered Under Phase 3 of the Chesapeake Bay Stormwater Partnership Grant	
Advanced Stormwater Design	Nutrient Accounting
• Bioretention & Dry Swales • Permeable Pavement • Infiltration • Soil Amendments • Constructed Wetlands • Rainwater Harvesting • Grass Channels, Filter Strips & Disconnections • Bioretention Maintenance	• Urban Stream Restoration • Erosion and Sediment Control • Urban Stormwater Retrofits • Industrial Stormwater and Pollution Prevention (3) • New and Redevelopment Projects • Urban BMP Verification • High Nutrient Discharges from Grey Infrastructure • Tidal Shoreline Management • Nutrient Sources • Nutrient Accounting to meet State-Specific Permits (3) • Street Sweeping & Storm Drain Cleaning • Modeling Pollutant Load Reductions for TMDL and Pollutant Reduction Plans

Webcast Series 2 – Urban Nutrient Management for Landscape Contractors

The Partnership developed 5 webcast on Urban Nutrient Management for Landscape Contractors and Local Government implementers. The topics are as follows:

1. Urban Nutrient Management Frequently Asked Questions
2. Managing Nutrients in Residential and Recreational Areas
3. Managing Nutrients on Golf Courses
4. Identifying and Targeting High Risk Turf Areas using GIS
5. The State of Urban Nutrient Management

Webcast Series 3 – Assessing, Designing and Installing Residential Stewardship Practices

The Partnership delivered two webcasts in the Assessing, Designing and Installing Residential Stewardship Practices series:

1. Make Your Lawn More Bay-Friendly This Spring!
2. Neighborhood Engagement in Restoration…Easy as 1-2-3!
3. Becoming RiverWise! An Introduction to Becoming a RiverWise Community
4. Building Local Technical Capacity Networks for Small Scale Stormwater BMPs

Webcast Series 4 – Highlighting Green Infrastructure

The Partnership delivered 5 webcasts in the Highlighting Green Infrastructure series on the following topics:

1. Creating or Enhancing Your Local Residential BMP Program
2. Innovations in Retrofit Delivery
3. The Best Urban BMP in the Bay Award
4. Discharge Detectives: Finding Sources of High Nutrient Discharges in the Storm Drain System
5. Monitoring Results and Lessons Learned from BUBBA Award Winning Restoration Projects

In 2014 CSN implemented a way to track downloads of archived webcasts as a proxy for estimating how many times a webcast is watched after the fact. This metric is very interesting and helpful to us as not only does it show us what some of our better webcasts have been but also it shows us what topic areas people are still struggling with. The above webcasts listed in **Appendix 1** have been listened to for a combined total of **6,126** times since their original air date. The take-away from this is that webcasts are a good outreach tool for getting the information out to the people who need it long after the fact. An important thing to remember is that it takes active promotion of past webcasts to ensure that they are utilized.

2. **Training of BMP Installation, Maintenance and Verification Inspectors**. CSN and Partners trained **589** individuals providing a total of **2,892** training hours on how to rapidly inspect existing, legacy urban BMPs to verify pollutant reduction credits and to quickly diagnose how to restore performance for BMPs that are failing or were designed based on outdated performance standards. More information on each of the workshops can be found in **Appendix 2**. In addition, CSN and partners have accomplished the following:

    - Developed inspection modules for the Virginia Department of Environmental Quality's statewide stormwater inspector training course and completed a state-wide rollout of the materials at a 'train the trainers' workshop in Richmond, VA in July, 2014.
    - Conducted 8 BMP Inspection, Maintenance and Retrofitting workshops in these places in Howard County, MD, Anne Arundel County, MD, Dover Delaware, Frederick County, MD, Charles County, MD, Shepherdstown, WV, Prince George's County, MD and Aberdeen Proving Ground resulting in a total of 1,743 training hours.
    - Partnered with multiple different organizations (U.S. EPA, Chesapeake Bay Program Office, and Department of Defense) to provide training on Urban BMP verification in the form of webcasts, talks and workshops. As part of this effort we were able to provide 746 training hours on Urban BMP Verification.

Figure 1. Training of BMP Installation, Maintenance and Verification Inspectors under Phase 3 of the Chesapeake Bay Stormwater Training Partnership Grant.

In addition, more general training occurred during over the course of the project grant on various stormwater topics (training hours provided in parenthesis):

- Urban Nutrient Accounting for the Chesapeake Bay (**30**)
- 2015 Bay-wide Partner's Stormwater Retreat (**1,738**)
- Residential BMP Implementation in Virginia (**152**)
- Come to the Bay: Stormwater Management for the Virginia Turfgrass Council (**78**)

Finally, the Partnership also developed the technical resource "Identification of High Risk Lawns Guidance for Chesapeake Bay Communities" to help local government implementers, private sector consultants and others to focus their urban nutrient management outreach efforts. A copy of this document can be found in **Appendix 3**.

3. Industrial Sites and Public Works Yards.

Under this task the Partnership conducted two site visits to industrial areas in the Baltimore metropolitan area to help refine our tools and resources for implementing pollution prevention and retrofit practices on industrial sites. In addition, the Partnership was able to offer to provide the following training on industrial site stormwater management during the course of the grant (training hours provided in parenthesis):

1. Industrial Stormwater and Basics of Pollution Prevention and Retrofits (**530**)
2. Basics of Maryland Industrial Permit (**632**)
3. Chesapeake Bay Restoration Requirements for Meeting the MDE Industrial Permit (**566**)
4. Industrial Permits and BMPs (**50**)

4. State-Specific Training for Stormwater Designers and Plan Reviewers.

The Partnership conducted **four** state-specific training events for design engineers and plan reviewers in the state of Pennsylvania and one **MS4** Forum in the State of Virginia during the course of the grant for a total of **2,020** training hours:

1. Capital Region Council of Governments Training, September 2014, (**698**)
2. MS4 Managers Workshop, Blair County, PA, April 2015, (**143**)
3. Pennsylvania MS4 Chesapeake Bay Pollution Reduction Plans Webcast, May 2015, (**382**)
4. Virginia MS4 Forum, May 2015, (**564**)
5. Blair County Restoration Workshop, June 2015, (**233**)

In addition, the Partnership provided assistance to Blair County, PA on prioritization of retrofit projects within the County.

Figure 2. Chesapeake Stormwater Network staff conducting training for MS4 managers under Phase 3 of the Partnership grant

5. Communicate with Bay Stormwater Practitioners; Maintain and Expand Online Content.

CSN continues to communicate with the Bay-wide stormwater community and be a one-stop shop for all stormwater needs. Online content is created in direct proportion to the development of new training modules for webcasts and workshops. CSN has also produced a series of Urban BMP "Fact Sheets" which translate the Chesapeake Bay Program's expert panel reports into easy to understand tips and techniques for local governments and private sector consultants working to meet the requirements of MS4 permits and the Bay TMDL. U-5. Urban Nutrient Management in the Chesapeake Bay Watershed is included in **Appendix 4** as an example of the fact sheets. The complete collection of fact sheets can be found at the link above. Specifically, over the course of the grant CSN has:

- Sent out 64 'research alerts' or emails alerting the stormwater community to newly developed tools and resources, upcoming training events and general Bay specific news
- Grew membership of the Network to 9,044 professionals from across the Bay watershed (a 140% growth from when the grant began)
- Increased overall traffic to the website to an average of 8,300 visitors each month

Network Update

The Chesapeake Stormwater Network now has **9,044** members. There is representation from 48 states in the USA (missing Nevada and Wyoming) and 84 members are from international countries. As you can see from **Figure 3**, the majority of members are either from the private sector or local government. After that there is a pretty even distribution between academia, federal government, state government and non-profits. A few in the Network identify as regional or "other".

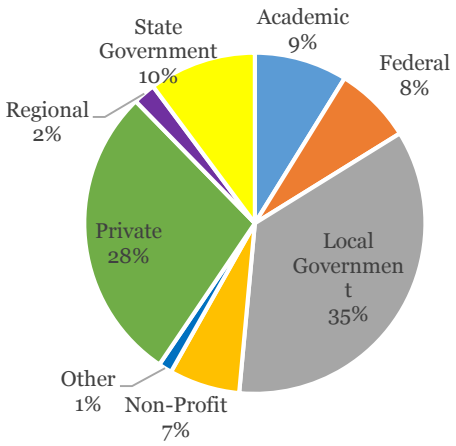


Figure 3. Chesapeake Stormwater Network Members by Professional Sector (January 2016)

The majority (~62%) of Network members are from Chesapeake Bay watershed states. **Figure 4** demonstrates how the members of the Chesapeake Stormwater Network are distributed geographically across the Chesapeake Bay watershed.

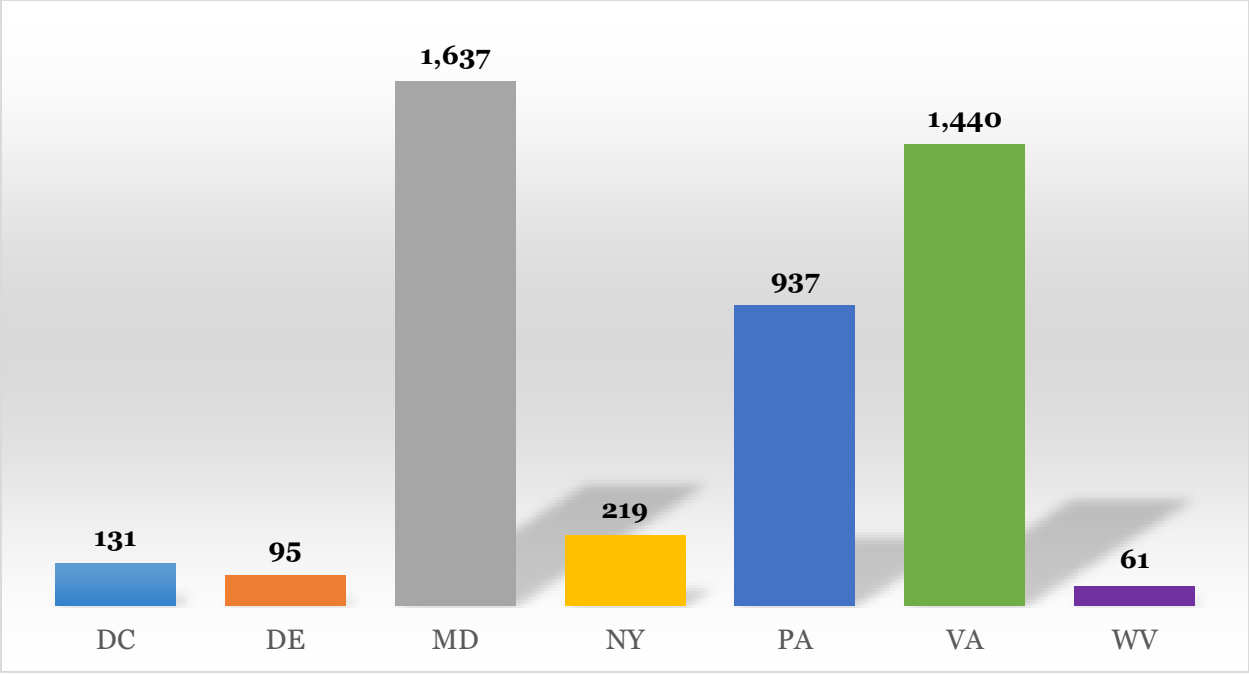
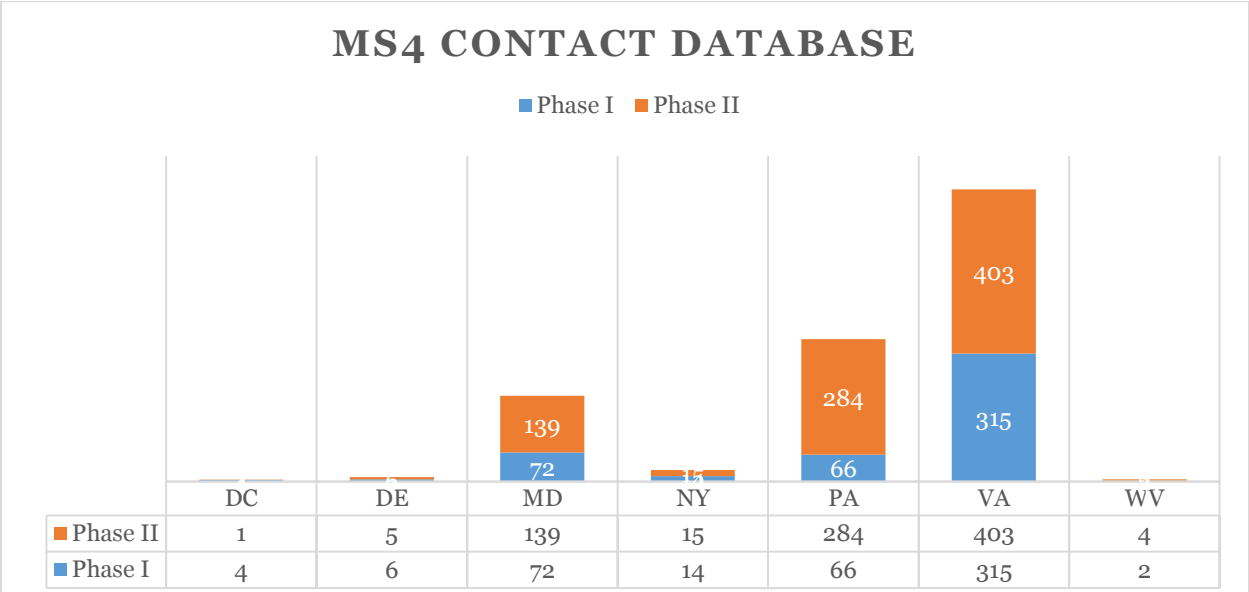


Figure 4. Chesapeake Bay Watershed members of the Chesapeake Stormwater Network (January 2016)

Creation of an MS4 Contact Database

Over the course of the grant CSN began to segregate the Network for the purposes of the creation of an MS4-specific database so that CSN has the capability to communicate directly with each Bay state's MS4 community and their regulators. There are currently **1,176** people in the MS4 contact database and it is growing every day. The breakdown of those members by Bay state and permit type can be seen in **Figure 5**.



	DC	DE	MD	NY	PA	VA	WV
Phase II	1	5	139	15	284	403	4
Phase I	4	6	72	14	66	315	2

Figure 5. Members of the Chesapeake Stormwater Network's MS4 Contact Database by Bay State (January 2016)

The Chesapeake Stormwater Network is consistently ranked as one of the most trusted organizations in the Bay watershed that people go to for stormwater guidance (**Figure 6**).

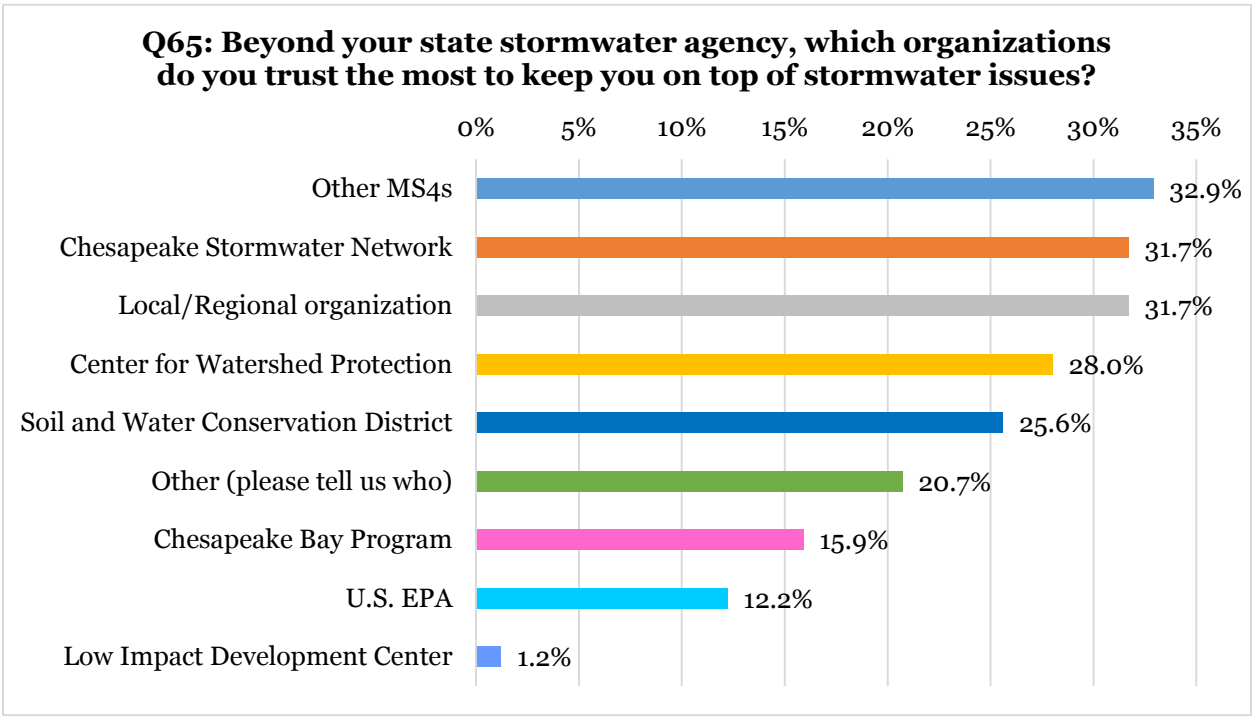


Figure 6. Select Responses from the Chesapeake Stormwater Network's 2016 MS4 Needs Survey

Part 4 Challenges and Lessons Learned

- Throughout this grant we have learned that there is a real demand for more training on the inspection, maintenance and verification of urban BMPs, a fact that is supported by the number of workshops that were requested.

- While we were able to meet our grant objectives for the state-specific training, we still have had some difficulty getting certain states to sanction or endorse our training initiatives (i.e., Pennsylvania).

- Engaging the Urban Nutrient Management crowd was equally as challenging and while we feel that we were able to meet our grant deliverables we may have just scratched the surface. UNM managers and applicators are just now beginning to consider stormwater as part of their vocation.

- Regrettably the status of state reporting of BMPs is currently inadequate to make statistically significant comparisons over time in urban BMP implementation, however anecdotal data suggests there has been an significant improvement.

- Stormwater training and stakeholder engagement are critical to multiply or amplify more widespread adoption of more effective BMPs. However the INSR grant vehicle is not the best mechanism to get the job done and as such we really appreciate the fact that CSN is now part of the NFWF support team.

- A small fraction of the CBSTP grant funds were used to support specific technical sessions at the annual Bay-wide Partner's Stormwater Retreat. The retreat has been an extremely popular and effective way to disseminate stormwater knowledge among NFWF grantees and the wider stormwater community. We look forward to conducting additional retreats as well as regional stormwater forums in the future.

- The two rounds of the Best Urban BMP in the Bay Award (BUBBA) contest were very well received by the Bay stormwater community. These kinds of funky contests played a major role in expanding the CSN Network in terms of members but also in terms of distribution of existing material that was developed under previous NFWF funded grants. We are glad that we can use our new arrangement to support portions of future contests.

- The initial reaction to our industrial stormwater work was very positive; however, we felt that we only reached the tip of the iceberg. Much more can be done to engage the industrial stormwater community in the Chesapeake Bay watershed and we look forward to doing so as part of our new agreement.

- CSN feels that our work along with the work of other NFWF grantees has pretty much saturated the market and filled the need for technical resources and training for design, construction, installation and verification of residential stewardship practices. However, there is still a clear need for stronger guidance on MS4 outreach and education, and we look forward to tackling that task under our new agreement.

Part 5 Dissemination

The entire grant was used to disseminate materials to the Chesapeake Bay watershed stormwater community. Please see Parts 2 to 4 of this final report for more information.

Part 6 Project Documents

Included in this final report are the following attachments:

- Appendix 1. List of webcasts offered under Phase 3 of the Partnership grant
- Appendix 2. List of Inspection, Maintenance and Verification Training that occurred under Phase 3 of the Partnership grant
- Appendix 3. Identification of High Risk Lawns Guidance for Chesapeake Bay Communities
- Appendix 4. U-5: Urban Nutrient Management Fact Sheet in Chesapeake Bay

Appendix 1. Webcasts Offered Under Phase 3 of the Chesapeake Bay Stormwater Partnership Grant

No.	Webcast	Live Training Hours Provided	Training Hours from Downloads*	Total Training Hours Provided
1	Make Your Lawn More Bay-Friendly This Spring!	319	746	1064
2	Advanced Stormwater Design: Bioretention and Dry Swales	203	150	353
3	Advanced Stormwater Design: Permeable Pavement	293	306	599
4	Urban Stream Restoration Frequently Asked Questions	371	455	826
5	Advanced Stormwater Design: Infiltration	413	117	530
6	Urban Nutrient Management Frequently Asked Questions	420	399	819
7	The Real Dirt: Soils and Soil Amendments	383	116	498
8	Enhanced Erosion and Sediment Controls	405	461	866
9	Advanced Stormwater Design: Constructed Wetlands	424	326	749
10	Advanced Stormwater Design: Rainwater Harvesting	319	128	446
11	Advanced Stormwater Design: Grass Channels, Filter Strips and Disconnections	330	228	558
12	Urban Stormwater Retrofits: Discovery and Accounting	300	377	677
13	Advanced Stormwater Design: Grass Channels and Dry Swales	229	173	401
14	Creating or Enhancing Your Local Residential BMP Program	304	437	740
15	Industrial Stormwater and Basics of Pollution Prevention and Retrofits	225	305	530
16	Crediting BMPs Used for New Development and Redevelopment	420	369	789
17	Basics of Maryland Industrial Permit	289	344	632
18	Innovations in Retrofit Delivery	368	269	636
19	Crediting On-Site Wastewater Treatment Systems in the Bay Watershed	176	246	422
20	Chesapeake Bay Restoration Requirements for Meeting the MDE Industrial Permit	263	303	566
21	Verification Simplified!	225	303	528
22	The Best Urban BMP in the Bay Award Contest Part 1	53	264	317
23	Crediting Nutrient Discharges from Grey Infrastructure	334	309	643
24	Discharge Discovery Techniques	364	326	689
25	Bioretention Maintenance: In the Trenches	341	302	643
26	Pennsylvania MS4 Chesapeake Bay Pollution Reduction Plans	154	228	382
27	Where are the Urban Nutrients Coming From?	274	281	554
28	Shoreline Erosion Management 101 to Support Chesapeake Bay Health	218	266	483
29	Neighborhood Engagement in Restoration…Easy as 1-2-3!	154	101	254
30	Street Sweeping and Storm Drain Cleaning Expert Panel Recommendations "Debut Webinar"	116	N/A	116
31	Managing Nutrients in Residential and Recreational Areas	341	120	461
32	Managing Nutrients on Golf Courses	169	90	259
33	Becoming RiverWise! An Introduction to Becoming a RiverWise Community	56	59	115
34	Building Local Technical Capacity Networks for Small Scale Stormwater BMPs	120	66	186
35	Monitoring Results and Lessons Learned from BUBBA Award Winning Restoration Projects	206	89	295
36	Identifying and Targeting High Risk Turf Areas using GIS	68	32	99
37	The State of Urban Nutrient Management	195	41	236
38	Modeling Pollutant Load Reductions for TMDL and Pollution Reduction Plans	281	68	349
			Total:	**19,307**

*Downloads are as of March 11, 2016
N/A Street Sweeping Debut webinar was not recorded due to technical difficulties

Appendix 2. Inspection, Maintenance and Verification Training that Occurred under Phase 3 of the CBSTP Grant

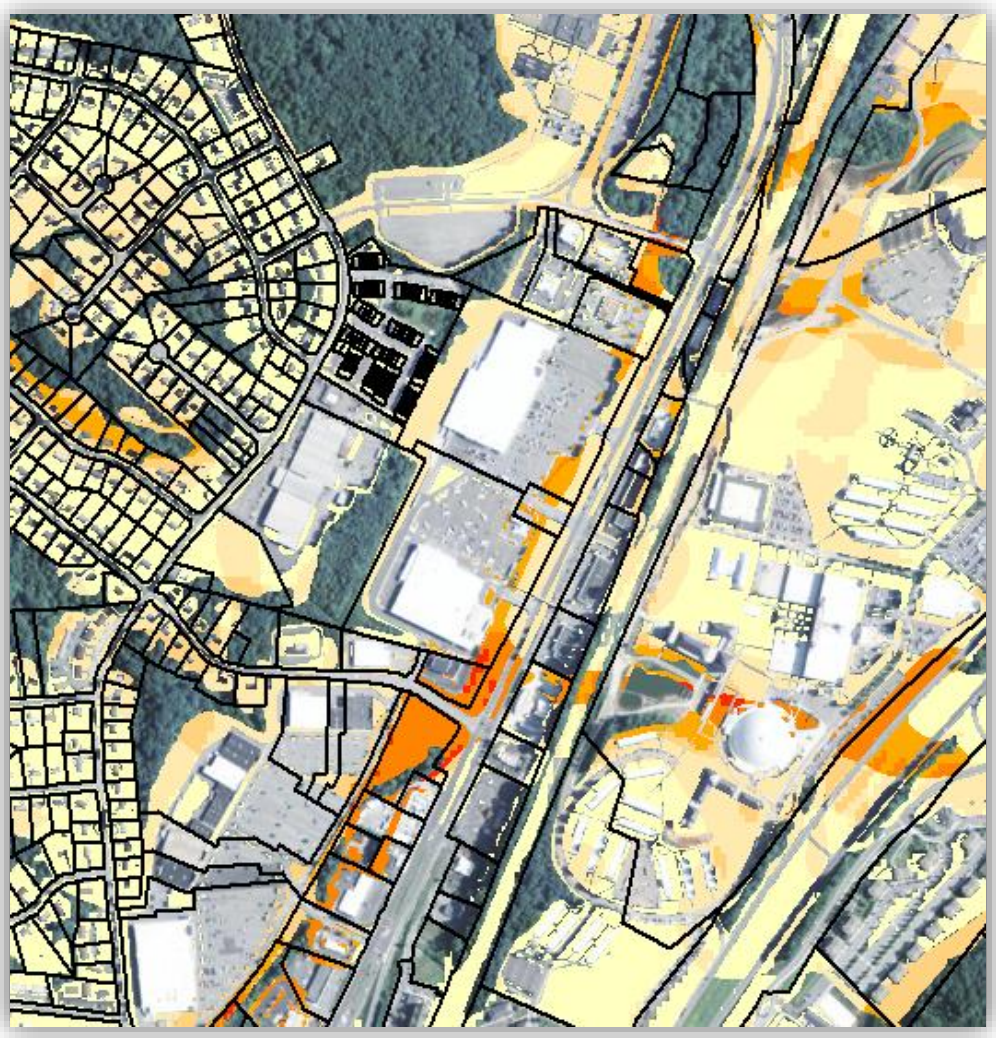
No.	Date	Title	Location/ Partner	General Topic Area	Total Training Hours Provided
1	June 2014	BMP Inspection and Maintenance Training	Howard County, MD	Inspection & Maintenance	240
2	July 2014	Training of Landscape Contractors	Northern Virginia Regional Council (NVRC)	Design and Installation of Residential BMPs	200
3	July 2014	Inspecting BMPs During and After Construction	VA DEQ	Inspection & Maintenance	204
4	October 2014	BMP Inspection, Maintenance and Retrofit Training	Anne Arundel County, MD	Inspection & Maintenance	287
5	December 2014	Verification Simplified!	CBPO	BMP Verification	528
6	April 2015	Urban BMP Verification Talk	Shepherdstown, WV	BMP Verification	83
7	April 2015	Urban BMP Verification Talk	Department of Defense	BMP Verification	135
8	June 2015	BMP Inspection and Maintenance Training	Dover, Delaware DNREC	Inspection & Maintenance	192
9	June 2015	BMP Inspection and Maintenance Training	Frederick County, MD	Inspection & Maintenance	300
10	September 2015	BMP Inspection and Maintenance Training	Charles County, MD	Inspection & Maintenance	160
11	September 2015	The Effect of Stormwater Maintenance	Chesapeake Watershed Forum	Inspection & Maintenance	83
12	October 2015	BMP Inspection and Maintenance Training	Prince George's County, MD	Inspection & Maintenance	273
13	October 2015	BMP Inspection and Maintenance Training	Aberdeen Proving Ground, MD	Inspection & Maintenance	208
Total:					**2,892**

Identification of High Risk Lawns for Water Quality: Guidance for Chesapeake Bay Communities

Center for Watershed Protection

and

Chesapeake Stormwater Network



December 1, 2015

Table of Contents

This document was developed as part of the Chesapeake Bay Stormwater Training Partnership with funding provided by the National Fish and Wildlife Foundation.

Identification of High Risk Lawns for Water Quality: Guidance for Chesapeake Bay Communities

1.0 Introduction

In 2010, the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load (TMDL). The TMDL limits the load of pollutants that can enter waterways, essentially establishing a comprehensive "pollution diet" with rigorous accountability measures to restore the Chesapeake Bay and all streams feeding it. The goal of the pollution diet is to reduce nitrogen (N) by 25%, phosphorus (P) by 24%, and suspended sediment by 20%. Each of the six Chesapeake Bay states (PA, NY, MD, VA, WV, and DE) and the District of Columbia developed a Watershed Implementation Plan, or WIP, which is a plan that identifies how the states and DC intend to meet their pollutant limits. The Watershed Implementation Plan has 3 Phases. Phase I entails large scale statewide efforts and strategies to meet overall basin pollutant load allocations. Phase II WIPs, are designed to more closely engage local governments, watershed organizations, conservation districts, citizens, and other key stakeholders in real on the ground strategies and programs aimed at reducing water pollution. Phase III will take place in 2017 and will seek to further refine and develop strategies based on programs and projects to meet load reduction requirements implemented after the Phase II WIP process.

Pervious urban lands comprise nearly 10% of the total watershed area of the Chesapeake Bay, and about 80% of pervious urban lands are specifically devoted to home lawns. These turf areas can be significant sources of nutrients to surface waters and the Bay; therefore, better management of fertilizer and turf biomass can help to reduce nutrient runoff from these areas. The Chesapeake Bay Program defines these management actions as a best management practice (BMP) called Urban Nutrient Management (UNM) and recently convened an expert panel to quantify the nutrient reductions associated with this BMP. The panel found that UNM has the greatest potential to reduce nutrient inputs from lawns categorized as "high risk," i.e., having greater potential to contribute nutrients to surface waters or groundwater.

The purpose of this document is to provide guidance for Chesapeake Bay communities to identify high risk lawns in order to target their Urban Nutrient Management practices and outreach to those sites where the greatest benefit can be achieved. With this information, every community in the Chesapeake Bay can maximize the use of Urban Nutrient Management practices on public and private turf as a major strategy to help meet the Bay pollution diet.

2.0 Urban Nutrient Management and the Chesapeake Bay Watershed Model

UNM is defined as the proper management of major nutrients for turf and landscape plants on a property to best protect water quality. Core practices that involve the use of appropriate fertilizer and application, proper lawn mowing, maintenance of dense grass or conservation landscaping, and increasing lawn porosity and infiltration capability can make lawns more Bay-friendly and reduce the risk that fertilizers or plant biomass will be exported to the Bay. When combined with much lower

phosphorus content in lawn fertilizer due to recent state laws, these practices can greatly reduce the risk that nitrogen and phosphorus will get into stormwater or move through groundwater.

The 2013 Chesapeake Bay Program Expert Panel Report (Schueler and Lane, 2013) identifies two different credits that are available to Bay communities:

- The first is a state-specific phosphorus reduction credit that reflects the adoption of state-wide legislation to limit or eliminate phosphorus in fertilizer products sold to the consumer. These recent laws prompted the fertilizer industry to phase phosphorus out of its products, so even states that have not yet passed laws are eligible for phosphorus reduction credit. Local governments do not have to do anything to receive the credit.

- The second is a site-specific credit for properties that employ ten core urban nutrient management practices, as confirmed by a written plan or pledge. Both a nitrogen and phosphorus reduction credit are given, the actual size of which is based on the risk that the lawn will export nutrients to the Bay. Local governments simply report the aggregate acres of urban land that are subject to UNM plans on an annual basis to get the credit.

This guidance document focuses on the second credit for individual properties that employ the core urban nutrient management practices. There are three levels of risk: high, low and blended. High risk lawns exhibit one or more of the 'risk factors' listed below in Section 3.0, while low risk lawns do not. A blended risk level may be considered a 'default' if a locality does not have data to characterize the acreages of pervious land as either high or low risk. Table 1 presents the nutrient load reduction credit for properties with urban nutrient management plans.

Table 1. Credit for urban nutrient management plans

Management Action	Nitrogen Reduction	Phosphorus Reduction
Low Risk	6%	3%
High Risk	20%	10%
Blended	9%	4.5%

3.0 Identification of High Risk Lawns

The Urban Nutrient Management Expert Panel Report (Schueler and Lane, 2013) defined high risk lawns as those with the factors listed below. Not all of these factors can be incorporated into the geospatial targeting matrix due to limitations in available GIS data layers. For example, few, if any, communities collect data on which landowners are currently over-fertilizing or over-irrigating their lawns. This guidance document relies on data that is generally available for the Chesapeake Bay watershed. However, localities are encouraged to use their own local data and incorporate additional data layers if available to improve accuracy. Section 4.0 provides a local example.

High risk lawn factors with available GIS data layers:

- Steep slopes (more than 15%)
- High water table (within three feet of surface)

- Soils that are shallow, compacted or low water holding capacity
- High use areas (e.g., athletic fields, golf courses)
- Sandy soils (infiltration rate more than 2 inches per hour)
- Adjacent to stream, river or Bay (within 300 feet)
- Karst terrain
- Newly established turf

High risk lawn factors not typically gathered in GIS data layers:

- Owners are currently over-fertilizing beyond state or extension recommendations
- P-saturated soils as determined by a soil analysis
- Exposed soil (more than 5% for managed turf and 15% for unmanaged turf)
- Over-irrigated lawns

Additional Virginia UNM High Risk Factors Stipulated by Regulation:

- Soils with high potential for leaching based on soil texture or excessive drainage
- Shallow soils less than 41 inches deep likely to be located over fractured or limestone bedrock
- Subsurface tile drains
- Soils with high potential for subsurface later flow based on soil texture and poor drainage
- Floodplains as identified by soils prone to frequent flooding in county soil surveys
- Lands with slopes greater than 15%

Localities should also consult their state TMDL implementation guidance documents for further any additional restrictions on where credit can be taken for UNM. For example, in Virginia, credit for nutrient management plans is only provided for lands outside the MS4 service area, public lands within the MS4 service area that are one contiguous acre or less, or privately owned lands where nutrients are applied that are not golf courses (Commonwealth of VA DEQ, 2015).

An overlay analysis can be used to identify high risk lawns. This method involves overlaying GIS data layers that correlate to the high risk factors listed above. All of the layers are assigned a score and intersected using GIS. The result is a new layer that contains all of the attribute information from the intersected layers so that a score can be summed for each individual polygon, which indicates its relative importance to nutrient reduction.

3.1 Obtaining Data Layers

GIS data related to this analysis that can be obtained for the entire Bay watershed is described below, including data sources and how to extract the high risk factors from the data. The USDA Geospatial Data Gateway can be used to obtain the SSURGO, NHD, and DEM data listed below all in one place - https://gdg.sc.egov.usda.gov/GDGHome.aspx. Note that individual jurisdictions may have more detailed/accurate data layers that would be more useful and should be used if available.

- USDA NRCS SSURGO Data – The USDA Natural Resources Conservation Service soil survey geographic (SSURGO) data layer is available online at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/. The NRCS Soil Data Viewer Tool is recommended to create the needed layers. The link to install Soil Data Viewer is: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053620.

After installing the tool, the Access database that comes with the SSURGO data download can be opened and the soil tabular data files for the county of interest can be imported. In ArcMap, the Soil Data Viewer tool (found under Toolbars) should be turned on. This requires loading the appropriate spatial file for the soil data, as well as loading the newly created soil database. The Soil Data Viewer allows you to select the attribute of interest and click on the "map" button to create a map layer based on the selected attribute. High risk lawn factors can be obtained using the Soil Data Viewer are included in Table 2 below.

Table 2. High risk lawn factors that can be obtained from the NRCS Soil Data Viewer.

High Risk Lawn Factor	Attribute and (Folder) in Soil Data Viewer	Description
High Water Table	Depth to Water Table (Water Features)	Select all soils that have a depth to water table of 3 feet or less. Note that the units in the soils data are in centimeters and will need to be converted.
Shallow Soils	Depth to Any Soil Restrictive Layer (Soil Qualities and Features)	Select all soils that have a depth to a restrictive layer less than 41 inches. Note that the units in the soils data are in centimeters and will need to be converted.
Sandy Soils	Saturated Hydraulic Conductivity (Ksat), Standard Classes (Soil Physical Properties)	Select all soils with a Ksat of high and very high.[1]
Floodplains	Flooding Frequency Class (Water Features)	Select all soils where flooding is classified as Frequent or Very Frequent.

[1]*Permeability (percolation) was historically included in the soils data where anything greater than 2 in/hr for permeability was classified as moderately rapid, rapid, or very rapid. NRCS has declared Ksat as the scientific standard and is now using it in place of permeability. Percolation rates typically exceed Ksat by a minimum of 15% and there is no simple transformation to convert percolation rates to Ksat. The standard Ksat classifications of high and very high correlate to 1.4 in/hr and greater and are used here as a conservative estimate of the 2.0 in/hr or greater infiltration rates for permeability notes as a high risk factor in the Urban Nutrient Management Panel Expert Report (Schueler and Lane, 2013).*

- Slope – Slope data can be derived from a Digital Elevation Model (DEM), such as the USGS National Elevation Dataset (NED) data. This seamless data is available in 1 Arc Second (30 meter) and 1/3 Arc Second (10 meter) data at: http://seamless.usgs.gov/. However, for many communities, locally-derived contour layers are available that provide more detail than the NED. The Topo to Raster Tool (an Interpolation tool found in Spatial Analyst) can be used to create a DEM from a contour layer where the cell values represent elevation in feet. The chosen grid cell size should be determined by the resolution of the data. Whether the NED is used or a DEM is derived from local contours, the ArcMap Surface Slope tool (part of Spatial Analyst) can be used to create a slope raster from the DEM. The raster can then be converted to a polygon using the ArcMap Raster to Polygon tool (under Conversion Tools). Select all polygons with a slope greater than 15%.

- High Use Areas (athletic fields and golf courses) – These areas can be identified by querying the locality's parcel data for schools, recreational areas, and golf courses. A visual analysis of aerial photography can also identify these areas to either verify the parcel data or to identify the high use areas when they can't be easily extracted from the parcel data.

- Streams, Rivers, or Waterbodies – The National Hydrography Dataset (NHD), unless more detailed data is available locally. NHD is a comprehensive set of digital spatial data that represents the surface water of the United States using common features such as lakes, ponds, streams, rivers, and canals. Polygons are used to represent area features such as lakes, ponds, and rivers; lines are used to represent linear features such as streams and smaller rivers. Use the ArcMap Buffer tool (under Proximity) to create a 300 foot buffer around all streams, rivers, and waterbodies. The buffers should all be merged and dissolved into one single GIS layer.

- Karst Terrain – USGS National Karst Map - These data were compiled by the U.S. Geological Survey to delineate the distribution of karst and potential karst and pseudokarst areas of the United States. Most of the spatial data originated as lithologic map units on geologic maps produced by various State geological surveys. The resolution of the geologic data ranges from 1:24,000 to 1:500,000. http://pubs.usgs.gov/of/2014/1156/.

3.2 Data Analysis

Once all the data layers are obtained, the basic steps of the high risk lawns overlay analysis are to:

1. Save all of the data identified as a high risk lawn factors as separate GIS layers. For example, one layer that contains all the soils with a depth to water table greater than 3 feet, one layer for slopes greater than 15%, and so forth.
2. Add an attribute field called "Score" in each of the layers. The Score for all of the attributes in each of the layers will be 1.
3. Union all of the high risk lawns layers using the ArcMap Union tool (part of Analysis Tools).
4. Add an attribute field called "Tot_Score." Use this attribute field to sum up the total score of all the high risk lawns layers.
5. The total score represents the potential for high risk lawns. The higher the total score, the higher the potential.

Note that a simple scoring approach is used as part of this guidance document where all identified high risk lawn factors are assigned a score of 1. In comparison, a weighted scoring approach could be used to assign a weight and rank to the individual high risk factors based on their importance or priority. The simple scoring approach was selected because high risk lawns are defined as those that exhibit one or more of the 'risk factors' listed in the UNM Expert Panel Report, without a distinction as to which factor(s) are a higher priority or variations in ranking within the individual factors. In addition, a feature overlay (intersecting polygons) approach was used. If you are conducting this analysis for a large area or want to do weighted scoring, a raster overlay may be a better option because it is computationally less demanding. For an example of a weighted scoring approach and a raster overlay analysis, see Okay and Feldt (2010).

The next step is to clip the high risk lawn ranking layer to the turf areas within your watershed or community boundary. The Chesapeake Bay Program is in the process of developing 1-meter land use

data for Phase 6 of the Chesapeake Bay Watershed Model. This data will include turf areas and is estimated to be released in 2016. In the interim, turf areas can be approximated through the use of local planimetric data and land use/land cover data. By subtracting impervious cover, agricultural land, forest cover, tree canopy, and water bodies from your watershed or community boundary, the remaining areas provide a rough approximation of the turf cover. Local data will need to be used for impervious cover and agricultural land because national and Bay-wide data sources do not have a high enough resolution to be of value. Water bodies can be obtained from the National Hydrography Dataset, as described in Section 3.1. Sources of forest and tree canopy data are provided below if a local dataset is not available.

- Virginia Department of Forestry - http://www.dof.virginia.gov/gis/dwnload/index.htm
- EarthDefine Spatial Tree Canopy for Pennsylvania - http://www.earthdefine.com/spatialcover_treecanopy/pennsylvania_2013/
- Maryland iMap Forest and Canopy Cover - http://geodata.md.gov/imap/rest/services/Biota/

3.3 Using the Results

The results can be overlain with parcels in GIS to determine priority properties to target for urban nutrient management plans. The layers of interest and process for identifying priority parcels will be different for each community based on available layers and local goals. A good place to start is public lands, which can represent as much as 15% of all the pervious land in a community. These lands include parks, schools, road rights-of-ways, athletic fields, and municipal open space. The next step is to work with residents, businesses, and institutions to apply UNM practices on private lands, particularly in partnership with a local UNM plan provider.

4.0 Example from Lynchburg, VA

This section provides an example of identification of high risk lawns within the Blackwater Creek watershed in the City of Lynchburg, VA. Table 3 describes the high risk indicator layers used as part of the analysis and Figure 1 shows them each displayed individually.

Table 3. Indicator layers used to identify high risk lawns in the Blackwater Creek watershed.

Indicator Layer	Data Source	Steps to Prepare the Data
High Use Areas	City	The City's parcel data was overlain with additional layers from the City that included public schools, colleges and universities, and parks to locate athletic fields and recreational area. All parcels that contained athletic fields and recreational areas were selected.
Newly Established Turf	City	Parcels with a build date of 2013 or later were selected to identify areas that may have new turf cover.
Karst	USGS	The National Karst Map data was clipped to the watershed. Only one small area was noted as having carbonate rocks at or near the land surface.
High Water Table	SSURGO	The soil data viewer was used to select all soils with a depth to water table of 3 ft or less.

Shallow Soils	SSURGO	The soil data viewer was used to select all soils that have a depth to restrictive layer of 41 inches or less.
Floodplains	SSURGO	The soil data viewer was used to select all soils where flooding is classified as frequent. No soils were classified as very frequent within the watershed.
Adjacent to Stream, River, or Water Body	City	The City's hydrology data contains streams, rivers, lakes, ponds, river areas, and stream areas. A 300 ft buffer was created around all of these layers.
Sandy Soils	SSURGO	The soil data viewer was used to select all soils with a Ksat standard classification of high or very high.
Steep Slopes	City	A DEM was created from the City's contour data and then converted to a polygon layer. All polygons with a slope greater than 15% were selected.

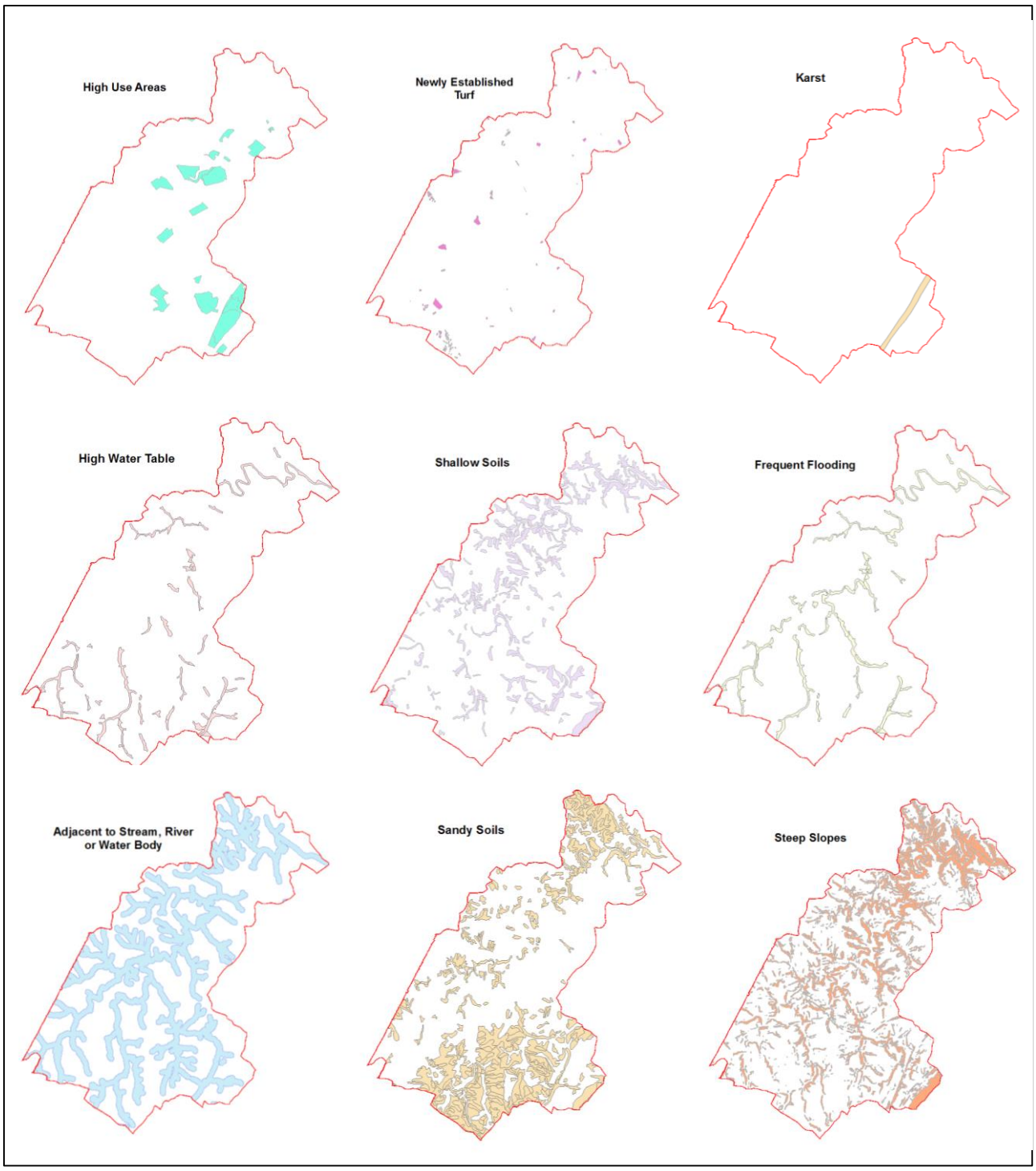


Figure 1. Blackwater Creek indicator layers

A field was added to the attribute table of each data layer to note the score. All of the features in each data layer were assigned a score of 1. A union was then done to combine all of the layers and attributes into one data layer, as shown in Figure 2. A field was added to the combined data layer to denote the total score and the scores from each of the individual data layers were summed. There were a total of 9 indicator layers, and therefore, the highest possible score was 9. After the layers were combined, the

scores ranged from 1 to 6, with the higher scores indicating areas with a greater potential for high risk lawns.

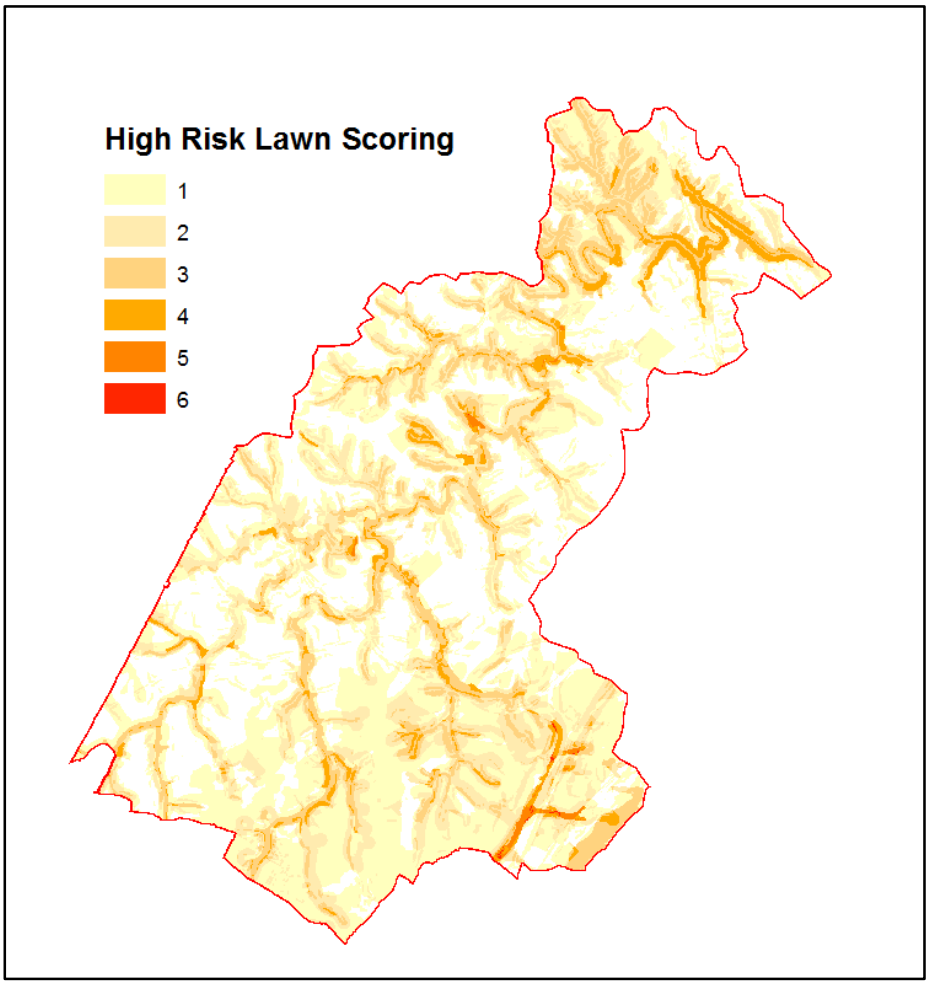


Figure 2. Combined high risk lawn indicator layers.

The next step was to identify the turf areas within the watershed. Local planimetric data obtained from the City that was used includes: bridge areas, driveways, roadway areas, parking areas, sidewalk areas, and structures (buildings). In addition to this planimetric data, a tree line layer was also obtained from the City. This layer was last edited in 2006/2007 and is not currently maintained. However, it has a higher resolution than the Virginia forest cover/tree canopy layers provided in Section 3.2 and was the best data currently available for use. Lastly, the City's lake, pond, river area, and stream area data layers were also used. A union was done to combine all of these layers into one layer that represents areas within the watershed that are not turf. The ArcMap Erase tool (under Analysis Tools) was used to subtract the areas that were not turf from the watershed boundary. The areas that remain as a result were assumed to approximate the turf cover within the watershed. The results from these analyses are shown in Figure 3 below as the areas within the watershed that are not turf and the approximated turf areas.

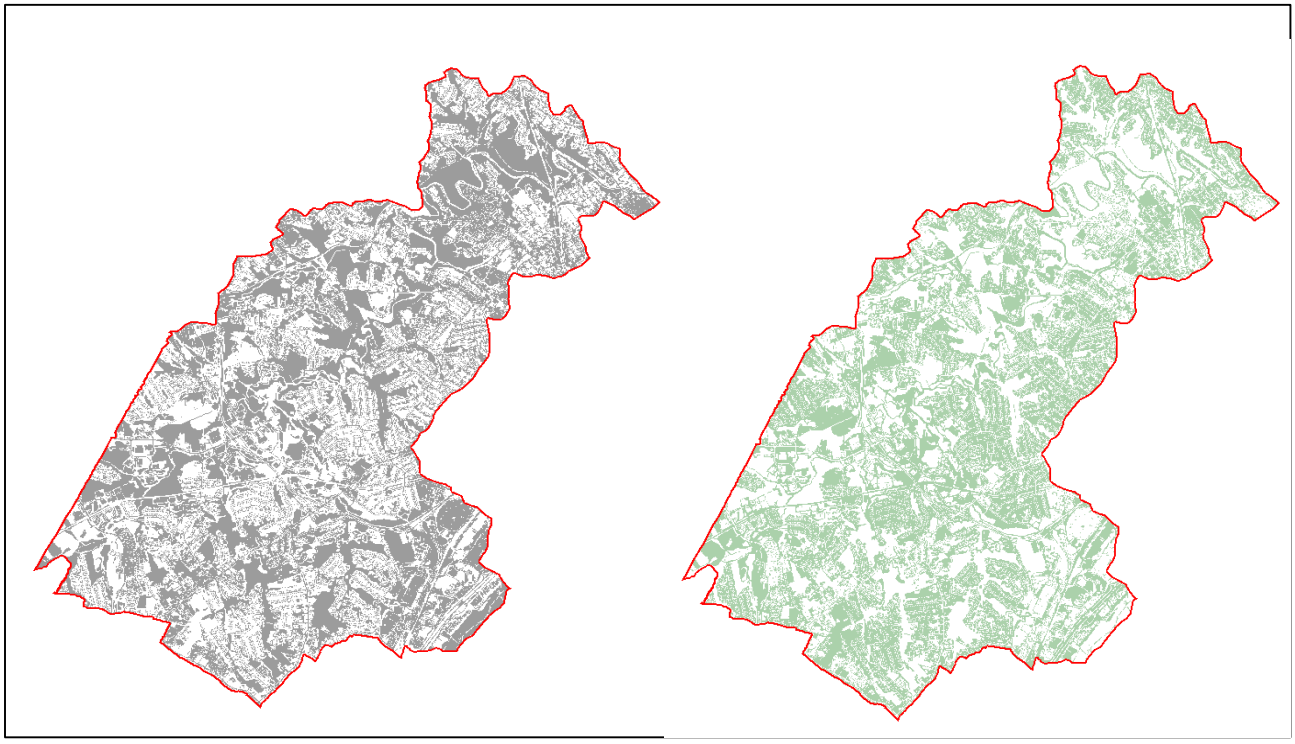


Figure 3. Areas within the watershed that are not turf (left) and approximated turf areas within the watershed (right).

The final step was to intersect the approximated turf areas from Figure 3 above with the high risk lawn scoring in Figure 2. The result is shown in Figure 4 below and represents the turf areas within the watershed that are ranked by their potential to be high risk.

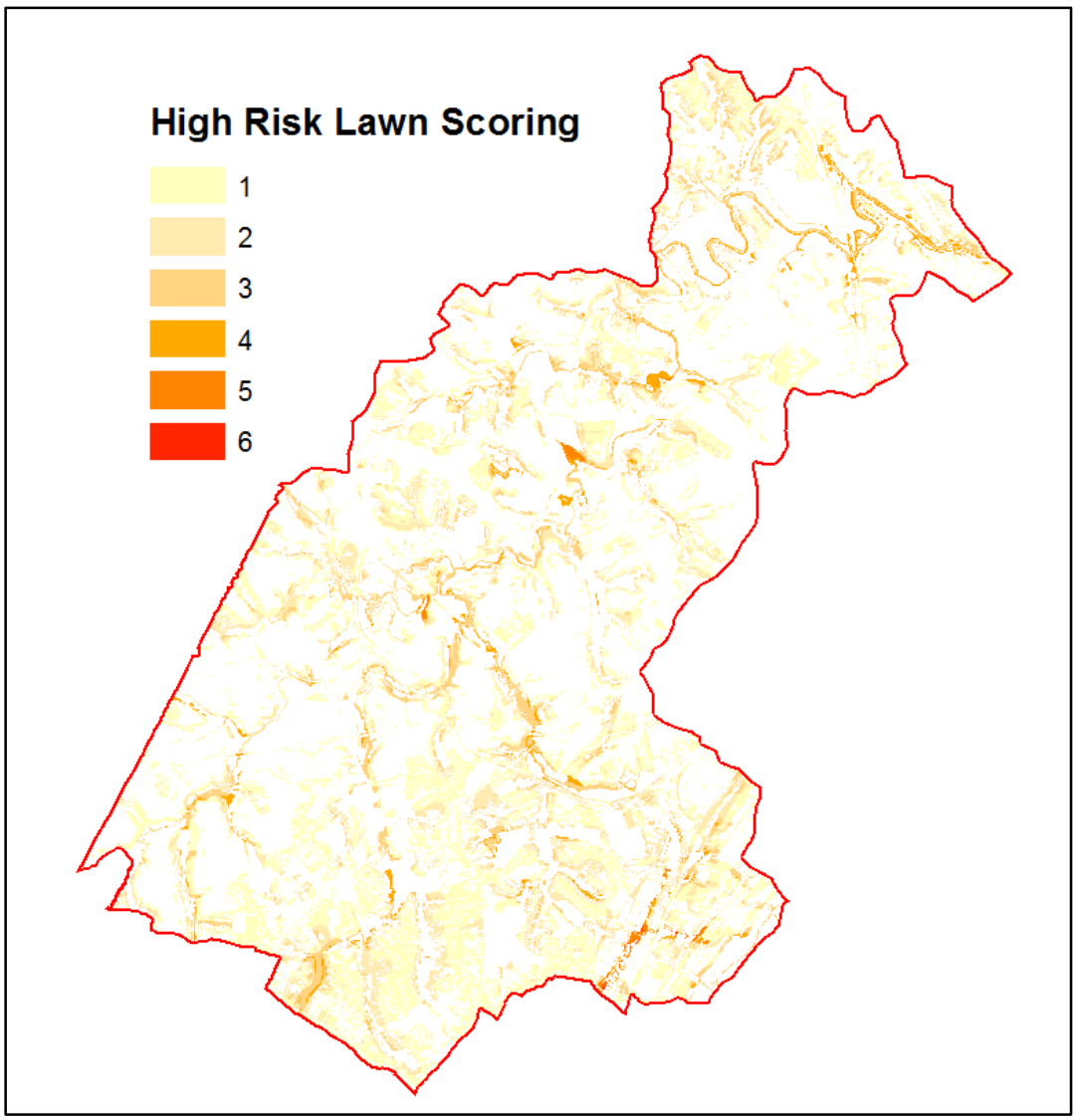


Figure 4. Turf areas within the Blackwater Creek watershed ranked according to their potential to be high risk.

The next steps that the City could take is to select the parcels that overlap the higher risk areas, verify them in the field, and evaluate them for the possibility to implement UNM plans. Figures 5 and 6 below show examples of parcels that contain high risk lawns that could be targeted for UNM.

Figure 5. Parcels within a commercial area that contain high risk lawns.

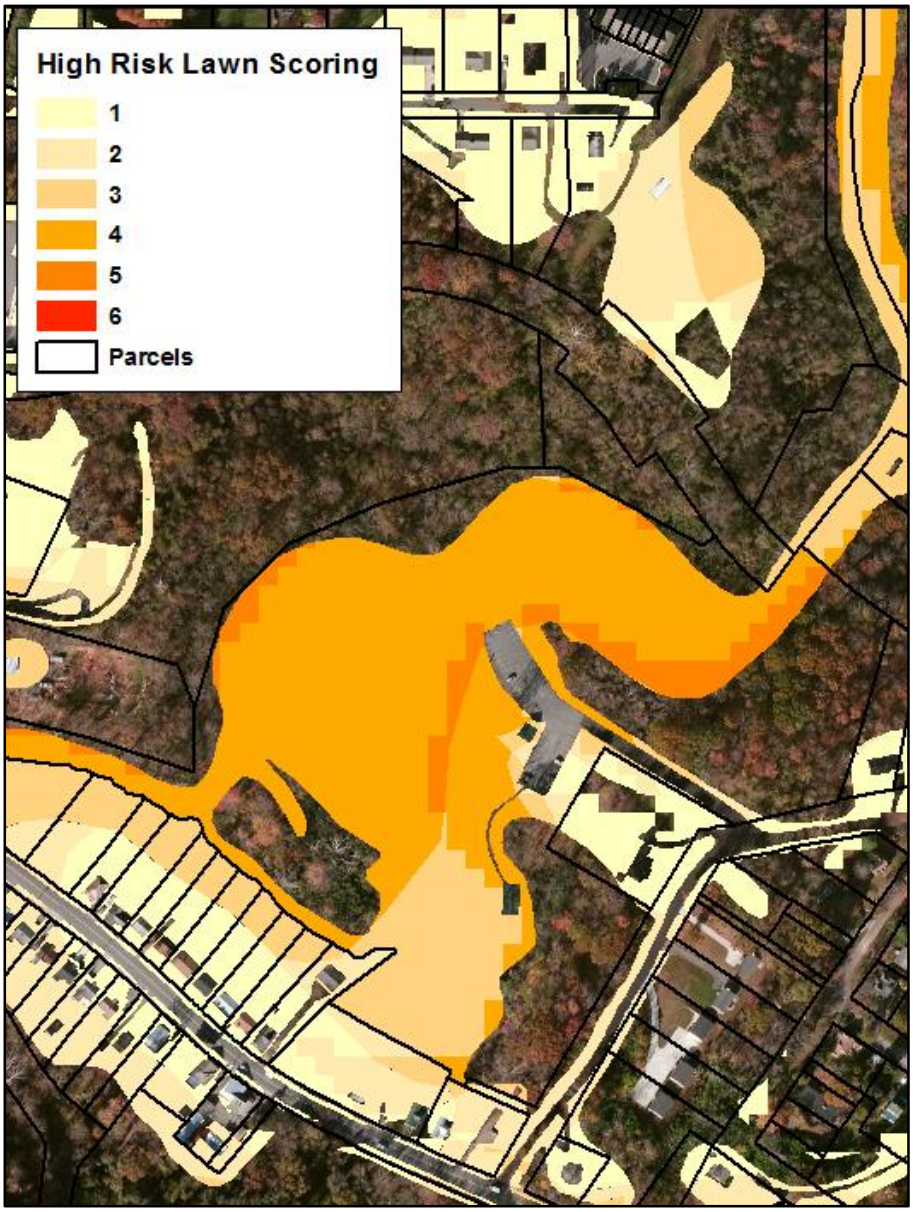


Figure 6. High risk turf identified in the Blackwater Creek recreational area.

In the example shown in Figure 5, municipal staff might select all properties where greater than 20% of the parcel has a High Risk Lawn score of 5 or 6. The parcel data could then be used to contact landowners to target an outreach program on UNM. Similarly, a community could select all single family residential properties or recreational areas (as shown in Figure 6) with greater than 1 acre of turf categorized as High Risk (a score of 4 or greater) to target for an UNM outreach or incentive program.

The exact parameters used to select the parcels of interest will depend upon the results of the ranking as well as the interest of the local program. This example analysis for the City of Lynchburg resulted in 176 acres categorized as High Risk with a score of 4 or greater. A total of 684 of the City's 31,515 parcels were found to contain high risk lawns.

5.0 Conclusion

This guidance document focused on the site-specific credit identified in the 2013 Chesapeake Bay Program Expert Panel Report (Schueler and Lane, 2013) for properties that employ ten core UNM practices. Through the identification of high risk lawns, communities can target their UNM practices and provide outreach to those sites where the greatest benefit can be achieved. The information provided in this guidance document was developed to help communities in the Chesapeake Bay maximize the use of UNM practices on public and private turf as a major strategy to help meet the Bay pollution diet.

6.0 References

Commonwealth of Virginia Department of Environmental Quality (VA DEQ). 2015. Chesapeake Bay TMDL Special Condition Guidance. Guidance Memo No. 15-2005.

Okay, J. and R. Feldt. 2010. Guidance for Use of Landscaping Targeting Matrix for Riparian Forest Buffer Effectiveness. http://archive.chesapeakebay.net/pubs/calendar/FWG_09-01-10_Handout_4_10993.pdf

Schueler, T., and C. Lane. 2013. Recommendations of the expert panel to define removal rates for urban nutrient management. CBP Approved Final Report.

Virginia Department of Conservation and Recreation. 2005. Virginia nutrient management standards and criteria. Commonwealth of Virginia. Richmond, VA.

U-5 URBAN NUTRIENT MANAGEMENT

PRACTICE AT A GLANCE

Pervious lands comprise nearly 10% of the total watershed area of the Chesapeake Bay, of which about 80% is specifically devoted to home lawns. Better management of fertilizer and turf biomass can help reduce nutrient runoff, especially from high risk lawns.

Two different credits are available to Bay communities.

- The first is a state-specific phosphorus reduction credit that reflects the adoption of state-wide legislation to limit or eliminate phosphorus in fertilizer products sold to the consumer. These recent laws prompted the fertilizer industry to phase phosphorus out of its products, so even states that have not yet passed laws are eligible for phosphorus reduction credit. Local governments do not have to do anything to receive the credit.

- The second is a site-specific credit for properties that employ ten core urban nutrient management practices, as confirmed by a written plan or pledge. Both a nitrogen and phosphorus reduction credit are given, the actual size of which is based on the risk that the lawn will export nutrients to the Bay. Local governments simply report the aggregate acres of urban land that are subject to Urban Nutrient Management (UNM) plans on an annual basis to get the credit.

Every community in the Chesapeake Bay will want to maximize the use of UNM practices on both public and private turf as a major strategy to help meet the Bay pollution diet.

In general, the costs for UNM planning are low in relation to other practices, and reporting and record-keeping requirements for local agencies are fairly modest. UNM plans need to re-confirmed every 3 years to verify practices, and renew the credit for an additional three years.

PRACTICE DESCRIPTION

Urban Nutrient Management is defined as the proper management of major nutrients for turf and landscape plants on a property to best protect water quality. Ten core practices can make lawn's more Bay-friendly and reduce the risk that fertilizers or plant biomass will be exported to the Bay. When combined with much lower phosphorus content in lawn fertilizer due to recent state laws, these practices can greatly reduce the risk that nitrogen and phosphorus will get into stormwater or move through groundwater.

1. Maintain a dense cover of grass or conservation landscaping to reduce runoff, prevent erosion, and retain nutrients
2. Reduce or Eliminate Fertilizer:
    a. Choose not to fertilize, OR
    b. Adopt a Reduce Rate/Monitor Strategy, OR
    c. Apply less than a pound of Nitrogen per 1000 square feet per each individual application
3. Do not apply fertilizers before spring green up or after the grass becomes dormant
4. Maximize use of slow release N fertilizer
5. Immediately sweep off any fertilizer that lands on a paved surface
6. Never apply fertilizer within 15 to 20 feet of any water feature and manage this zone as a grass, meadow, or forest buffer
7. Keep clippings and mulched leaves on the lawn and keep them out of streets and storm drains
8. Set mower height at 3 inches or taller
9. Use other practices to increase the porosity and infiltration capability of your lawn to treat stormwater
10. Consult with your local extension service office or lawn care company to get the best advice on how to have a Bay-friendly lawn, which might involve a soil test analysis

No credit is given for sediment removal for UNM plans, although it is clearly recognized that dense vegetative cover should reduce the risk of soil erosion.

Some of the benefits associated with urban nutrient management are:

- Can keep pesticides and other toxins out of our streams and rivers
- Prevent erosion and soil loss
- Reduce turf and landscape maintenance costs
- Provide more healthy, attractive and durable ground cover
- Can create habitat in conservation landscapes

BEST PRACTICES FOR URBAN NUTRIENT MANAGEMENT

Maintain dense turf cover; avoid bare soils

Sweep fertilizer off of pavement

Keep clippings out of storm drain

Conservation Landscaping instead of turf

Some communities may allow for a UNM pledge whereby homeowners sign a written agreement to implement the ten core UNM practices on their lawn, after an on-site visit from a trained professional to assess risk factors and collect soil samples for analysis at a lab. The nutrient reduction credit for homeowner pledges is slightly less than for lawns that have a qualified UNM plan.

WHERE TO FIND THE BEST OPPORTUNITIES IN YOUR COMMUNITY

The best opportunities to target urban nutrient management are to identify areas of turfgrass that have the greatest potential for nutrient export. High risk areas may have one or more of the following characteristics:

- Owners are currently over-fertilizing beyond state or extension recommendations
- Soils are phosphorus--saturated soils as determined by soil analysis
- Newly established turf
- Steep slopes (more than 15%)
- 5% or more of the soil is exposed soil for managed turf or more than 15% of the soil is exposed for unmanaged turf
- Water table within 3 feet of soil surface
- Over-irrigated lawns
- Soils that are shallow, compacted or have low water holding capacity
- High use areas
- Sandy soils, or soils with infiltration rates more than 2 inches per hour
- Within 300 feet of a stream, river, or Bay
- Located on karst terrain
- Active construction sites

The first place to start in your community are the turf found on public lands, which can represent as much as 15% of all the pervious land in a community. These lands include parks, schools, road right of ways, athletic fields and municipal open space. It makes sense to make sure all of them are covered by an updated urban nutrient management plan, regardless of whether they are currently fertilized or not.

The next step is to work with residents, businesses and institutions to apply UNM practices on private lands, usually in partnership with a local UNM plan provider. Some counties have contracted directly with cooperative extension or other qualified agency to provide direct technical assistance on UNM plans to local land owners.

Many local planning agencies have good GIS systems that can map key land use and data layers that are at the highest risk for nutrient export. By mapping the dozen factors linked to high nutrient export, communities can identify which parts of their jurisdiction should be targeted for more intensive outreach.

Some of the highest risk for fertilizer wash off occurs at active construction sites just after construction before the establishment of healthy turf and ground cover. Thus it makes sense to

require developers to prepare UNM plans as part of their overall plan for erosion and sediment control during construction.

GENERAL COST INFORMATION

In general, the costs to write UNM plans are low in relation to other urban practices, although they need to be renewed every three years. Most of the cost for UNM is incurred to assess properties, conduct lab analysis of soil samples, train staff and prepare plans or pledges. Over time, additional costs are incurred to report, track and verify individual UNM plans, and to communicate with individual landowners.

TIPS FOR GETTING STARTED IN YOUR COMMUNITY

Urban nutrient management ranks as the most state-specific restoration practice used for the Bay pollution diet. So you will need check with the appropriate agency in your state to figure out how the two UNM credits are actually applied in your community.

It is a good idea to review your procurement contracts for routine landscape maintenance on public lands to ensure these crews are trained and qualified to implement UNM plans.

If municipal lands are maintained by public employees, you should make sure that supervisors and other crew receive proper UNM training to reduce fertilizer washoff.

Work with a good UNM partner, such as master gardeners, soil conservation district, cooperative extension or a local watershed group to act as the retail provider to the general public.

Some degree of public outreach is critical to get residents engaged in UNM plans and other stewardship practices (See Fact Sheet U-3). If your community has a MS4 stormwater permit, you are already required to educate the public about stormwater. Therefore, it is a great idea to leverage these existing outreach programs to get the message out about urban nutrient management in your community.

WHAT DEGREE OF TECHNICAL SUPPORT IS NEEDED

The technical support and qualifications needed to write a UNM plan varies in each Bay State. Even the voluntary adoption of a homeowner pledge requires a site visit by a trained professional to assess risk factors at a site and collect a soil sample for analysis at a lab to determine the nutrient requirements for turfgrass. Localities should consult with State agencies to determine information requirements for UNM plans which are presented in the resources section.

COMPUTING THE POLLUTANT REMOVAL CREDIT

The statewide credit for UNM is based on the adoption of fertilizer legislation that restricts phosphorus application of fertilizers. The specific phosphorus reduction for urban land is shown in **Table 1**. The credits for applying UNM practices on an individual property are shown in **Table 2**.

There are three levels of risk: high, low and blended. High risk lawns exhibit one or more of the 'risk factors' listed above, while low risk lawns do not. A blended risk level may be considered a 'default' if a locality does not have data to characterize the acreages of pervious land as either high or low risk. **Table 2** provides an example unit load reduction based on a residential homeowner pledge and credit for a UNM plan for the same area.

Table 1. Statewide Credit for Phosphorus Fertilizer	
Management Action	**Phosphorus Reduction**
Statewide Fertilizer Legislation	25%
No Statewide Fertilizer Legislation	20%
Special UNM Notes: • Due to the nature of its law, Maryland is also eligible for a modest statewide nitrogen reduction of 4.5% for residential lands and 9% for commercial lands.	

Table 2. Credit for Urban Nutrient Management Plans		
Management Action	**Nitrogen Reduction**	**Phosphorus Reduction**
Low Risk	6%	3%
High Risk	20%	10%
Blended	9%	4.5%

HOW TO REPORT THE PRACTICE TO THE STATE

For the most part each State tracks pervious acres under urban nutrient management plans. More specifically UNM is reported in the following manner:

- Delaware: Delaware does not have fertilizer legislation or a well-developed Urban Nutrient Management Program. However, due to the industry phase-out of phosphorus in lawn fertilizer, the state can still receive a nutrient reduction credit for TP. Localities **CAN** take credit for Urban Nutrient Management plans which include soil sample analysis results and address the UNM criteria and include acres, location, date, lifespan of plan, and risk type (High; Low; Blended).

- District of Columbia: The District has not previously accepted or verified Urban Nutrient Management Plans. It will work with major landholders including District and federal agencies to develop, verify, and accept UNM plans. Landholders wishing to receive credit for a plan will need to submit their draft plan to the District Department of the Environment (DDOE) for review and approval. DDOE will ensure that the plans meet or exceed the Bay Program standards. The plans will be valid for three years and include the location of the lands covered in the UNM plan, the acres covered, and the pollution risk level.

- Maryland: As a result of statewide fertilization that impacts both nitrogen and phosphorus applications, the State takes credit for the acreage of pervious land serviced by commercial applicators and a smaller nitrogen credit for the acreage of home lawns managed by do-it-yourselfers. Localities **CAN NOT** take credit for Urban Nutrient Management plans.

- New York: New York has passed fertilizer legislation which restricts the use of lawn fertilizers that contain phosphorus except when establishing a new lawn or a soil test shows that the soil does not have enough phosphorus to support a healthy lawn. As a result the state can receive a nutrient reduction credit for TP which varies by state. New York does not have a well-developed Urban Nutrient Management Program or a process to track and report urban BMPs including Urban Nutrient Management.

- Pennsylvania: Pennsylvania currently has proposed legislation, SB1149, that was introduced in 2013 to set clear standards for the application of fertilizer to turf as well as requiring that all professional fertilizer applicators are certified in the proper application techniques and best management practices. It is specifically focused on the lawn care industry. However, due to the industry phase-out of phosphorus in lawn fertilizer, the state can still receive a nutrient reduction credit for TP. Localities **CAN** take credit for Urban Nutrient Management plans which include soil sample analysis results and address the UNM criteria and include acres, location, date, lifespan of plan, and risk type (High; Low; Blended).

- Virginia: Virginia's Urban Nutrient Management Program utilizes Certified Urban Nutrient Management Planners who develop nutrient management plans for home lawns, turf areas, landscape areas, and golf courses. These plans must conform to the States' Standards and Criteria and may be audited by DCR for compliance. Plans are valid for 3 years and include acres, location, and watershed. MS4 jurisdictions are required to develop Urban Nutrient Management plans for municipal lands over 1 acre receiving nutrient inputs, which they **CAN NOT** take credit for outside of meeting their permit requirement. Localities **CAN** take partial credit for Urban Nutrient Management plans on private land.

- West Virginia: Localities **CAN** take credit for Urban Nutrient Management plans which include soil sample analysis results and address the UNM criteria and include acres, location, date, lifespan of plan, and risk type (High; Low; Blended).

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

The verification procedures for UNM plans are handled differently by each State, as shown below.

- District of Columbia: The District is responsible for verifying the credit. It will do so through follow up inspections and audits of a sub-sample of landowners that have filed UNM plans.

- Delaware and Pennsylvania: There are no statewide programs and therefore individual localities will need to work with the state agency to determine verification standards. Verification at a minimum involves an affirmation by the plan writer, property owner or operator that the UNM plan is still valid, and is still being implemented. An audit of a sub-sample of plan writers or property owners to verify compliance with the UNM plan will also need to occur.

- Maryland: The State is responsible for verifying the credit through the use of surveys, reports from applicators, and fertilizer sales.

- New York: There is no statewide program or system to track or verify urban BMPs and therefore individual localities will need to work with the state agency to determine verification standards. Verification at a minimum involves an affirmation by the plan writer, property owner or operator that the UNM plan still valid, and is still being implemented. An audit of a sub-sample of plan writers or property owners to verify compliance with the UNM plan will also need to occur.

- Virginia: The state keeps UNM plans on record and periodically audits a sub-sample of certified applicators and certified planners to verify compliance with the UNM plan.

- West Virginia: Localities will need to work with the WV DEP to determine up to date verification standards. Verification at a minimum involves an affirmation by the plan writer, property owner or operator that the UNM plan is still valid, and is still being implemented. An audit of a sub-sample of plan writers or property owners to verify compliance with the UNM plan will also need to occur.

RESOURCES

The following resources are available for help with all aspects of this practice:

Type of Resource	Title of Resource	Web link
Expert Panel Report	Recommendations of the Expert Panel to Define Removal Rates for Urban Nutrient Management (2013)	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2015/03/CBP-APPROVED-FINAL-UNM-EXPERT-PANEL-REPORT-032514_SHORT.pdf
Archived webcast	Urban Nutrient Management to Help Restore the Chesapeake Bay (2014)	http://chesapeakestormwater.net/events/webcast-urban-nutrient-management/
Expert Panel Appendix B	Appendix B: Public Lands Literature Review	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2015/03/Appendix-B-Public-Lands-Literature-Review.pdf
Expert Panel Appendix C	Appendix C: Sample Urban Nutrient Management Plan	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2015/03/Appendix-C-Sample-Urban-Nutrient-Management-Plan.pdf
'FAQ' document	Technical Requirements for Entering the UNM Practice into Scenario Builder (2013)	http://chesapeakestormwater.net/wp-content/uploads/downloads/2014/03/Appendix-F-Tech-Requirements-to-Enter-UNM-Practices-in-Scenario-Builder.pdf
Do It Yourself Guide	Homeowner Guide For a More Bay-Friendly Property (2014)	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2013/04/Homeowner-Guide.pdf
Paper	New England Regional Nitrogen and Phosphorus Fertilizer and Associated Management Practice Recommendations for Lawns Based on Water Quality Considerations (2008)	http://chesapeakestormwater.net/wp-content/uploads/downloads/2014/05/NE_WQ_Fert_Rec_Guillard2008.pdf
More Tools & Resources		http://chesapeakestormwater.net/training-library/urban-restoration-techniques/urban-nutrient-management/