

Date: January 21, 2014

To: Urban Stormwater Workgroup

From: Norm Goulet, Chairman
Tom Schueler, Workgroup Coordinator

Re: Final Recommended Guidance for Verification
of Urban Stormwater BMPs

This memo 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

The memo has been revised to incorporate comments provided by the Chesapeake Bay Program Partnership's BMP Verification Review Panel (CBP-VRP, 2013).

Part 1: The Need for Verification and the CBP Process to Define it

Given the ever increasing importance that accounting for implemented practices is taking on within the partnership—Bay TMDL reasonable assurance, two-year milestones, offsets, tradable credits—the Partnership must agree to a framework whereby we can have both expanded tracking and reporting of practices AND verifiable confidence in the outcome of those implemented practices.

The implementation, tracking, and reporting of BMPs has been at the center of the Partnership's Bay restoration efforts for close to three decades. Within the past two years, there have been numerous requests and commitments to improve the accountability of actions taken to install BMPs which prevent or reduce the loads of nutrients and sediment to Chesapeake Bay.

- The Citizens Advisory Committee has repeatedly called on the Partnership to provide for transparent and open verification of cost shared as well as non-cost shared best management practices tracked and reported by the watershed's seven jurisdictions.
- The President's Chesapeake Bay Executive Order Strategy committed the U.S. Department of Agricultural (USDA) and the U.S. Environmental Protection Agency (EPA) to develop and implement "mechanisms for tracking and reporting of voluntary

conservation practices and other best management practices installed on agricultural lands” by July 2012.

- Within its Chesapeake Bay Independent Evaluation Report, the National Research Council’s (NRC) panel put forth a series of five specific science-based conclusions all focused on their key finding that “accurate tracking of BMPs is of paramount importance because the CBP relies upon the resulting data to estimate current and future nutrient and sediment loads to the Bay.”
- The 2010 Chesapeake Bay TMDL’s Appendix S outlines the common elements from which EPA expects the watershed jurisdictions to develop and implement offset programs.

At the request of the Water Quality Goal Implementation Team (WQGIT), the Urban Stormwater Workgroup (USWG) devoted much of 2012 and 2013 to developing guidance on urban BMP verification. Eight drafts of this memo were made in response to verbal and written comments by local and state CBP partners. In addition, recommendations for BMP reporting, tracking and verification were an integral element of the deliberations of four urban BMP expert panels:

- Stormwater Retrofits
- New State Stormwater Performance Standards
- Urban Nutrient Management
- Stream Restoration

This memo represents a synthesis of the consensus reached by the Workgroup on urban sector verification issues.

Part 2: Key Definitions for Urban BMP Verification

The following terms are defined to clarify the issues related to urban BMP verification.

Urban BMPs: In this context, they are defined as stormwater practices for which definitions and removal rates have been developed and approved through the CBP BMP review protocol (WQGIT, 2010). These urban BMPs fall into four broad categories:

1. *Traditional stormwater BMPs* that were historically installed through a local stormwater plan review process in response to state stormwater requirements (primarily stormwater treatment (ST) practices as defined by SPSEP, 2012).
2. *New runoff reduction BMPs* that will be implemented in the future to meet new state stormwater performance standards that typically go through a local stormwater review process (primarily runoff reduction (RR) practices as defined by SPSEP, 2012).
3. *Non-structural or operational BMPs* that are typically applied by a municipal agency (e.g., street sweeping, urban nutrient management, illicit discharge elimination).

4. *Restoration BMPs* installed by localities to treat existing impervious cover (e.g., stormwater retrofits and stream restoration).

Regulated BMPs: Refers to any BMP that is installed in a jurisdiction that has a Phase 1 or 2 Municipal Separate Storm Sewer System (MS4) permit. These permits establish a requirement that a locality have a BMP maintenance program and the capacity to inspect all of their BMPs within a portion or all of each permit cycle (typically 5 years). As can be seen in Figure 1, however, only a portion of the developed/developing land in the Bay watershed occurs within communities that are regulated under MS4 permits.

Semi-Regulated BMPs: Refers to any BMP that is installed locally under a state construction general permit (CGP) outside of a MS4 community. While the permit applicant must sign an agreement that they will maintain the BMP, the locality is not required to have an inspection program to enforce maintenance, and the state may not have sufficient staff resources to do so on their behalf.

National Environmental Information Exchange Network (NEIEN): In the context of the Chesapeake Bay partnership, a state-federal data sharing partnership to share, integrate and submit BMP data to get credit for pollutant reduction in Scenario Builder. The BMP data is then credited in the Chesapeake Bay Watershed Model to track progress made in overall load reduction within each state. Some of the requirements for submitting BMP data into NEIEN include the geographic location of each individual BMP, as well as the year it was installed and other BMP-specific data to ensure proper tracking and verification.

Non-regulated BMPs: Refers to any BMP that is voluntarily installed in a community that was not triggered by an explicit MS4 requirement or stormwater regulation. Examples might include rain gardens built by homeowners or demonstration BMPs constructed through grants.

Legacy BMPs: Refers to the population of urban BMPs in a community that the state has reported to EPA for inclusion into any past version of the CBWM for sediment or nutrient reduction credit. Legacy BMPs fall into three categories:

- *Actual BMPs with a geographic address*
- *Actual BMPs that lack a specific geographic address*
- *Estimated BMPs that were projected based on some assumed level of development activity and compliance with state stormwater regulations.*

Discovered BMPs: Refers to any BMP that was installed in the past but was never reported to the state or CBP, and has not received any prior nutrient removal credit. These often include older BMPs installed prior to the establishment of state BMP reporting systems.

Part 3: Background on Verification of Urban Stormwater BMPs

As part of the development review process, localities in the Chesapeake Bay typically conduct a post-construction inspection of stormwater BMPs to ensure that they are functional, maintain project engineering files and then periodically inspect them to ensure they are still working.

Phase 1 and Phase 2 communities have NPDES MS4 permit conditions which require them to have programs and staff in place to ensure that maintenance inspections are done according to a prescribed cycle. The frequency of maintenance inspections ranges from 3 to 5 years, depending on the permit status of the jurisdiction.

In addition, most MS4 communities have an annual BMP reporting requirement, and often provide aggregate information to the state on the number and type of BMPs that are installed during the reporting period.

Existing local and state procedures to review, inspect and verify many urban BMPs have existed for many years. Some of their common elements are outlined in Table 1. With some minor adaptations (primarily in the area of reporting and ongoing performance inspection), these existing procedures provide a strong foundation for a reliable BMP reporting, tracking and verification system in the watershed.

Table 1: Existing Review and Inspection Procedures for Select Urban BMPs *

<i>Urban BMP Type</i>	<i>Key Procedures</i>
Stormwater BMPs for New Development or Redevelopment	Detailed engineering review, geotechnical feasibility tests, performance bond, multiple inspections during BMP construction, final inspection to accept the facility, preparation of "as-built" drawing, release of performance bond, prescribed maintenance agreement, creation and maintenance of local BMP file, local reporting to state stormwater authority, routine owner maintenance, periodic regulatory inspections
Erosion & Sediment Control BMPs	Site analysis, detailed engineering review of ESC plan, pre-construction meeting, weekly self-inspection by contractor, routine regulatory inspections (weekly to monthly), final inspection, release of ESC performance bond.
Stream Restoration	Stream reach data collection and analysis, detailed engineering review, state and federal environmental permit review, multiple environmental and engineering inspections during project construction, final inspection and preparation of as-built drawings, post-construction project monitoring, ongoing project maintenance
Stormwater Retrofits	Generally the same as for new stormwater BMPs, but the inspection and maintenance requirements may be vested with the property owner or the governmental jurisdiction that is financing the retrofit
* the exact procedures will differ somewhat from locality to locality and from state to state, depending on their land development ordinance and review procedures, and state permit and regulatory requirements.	

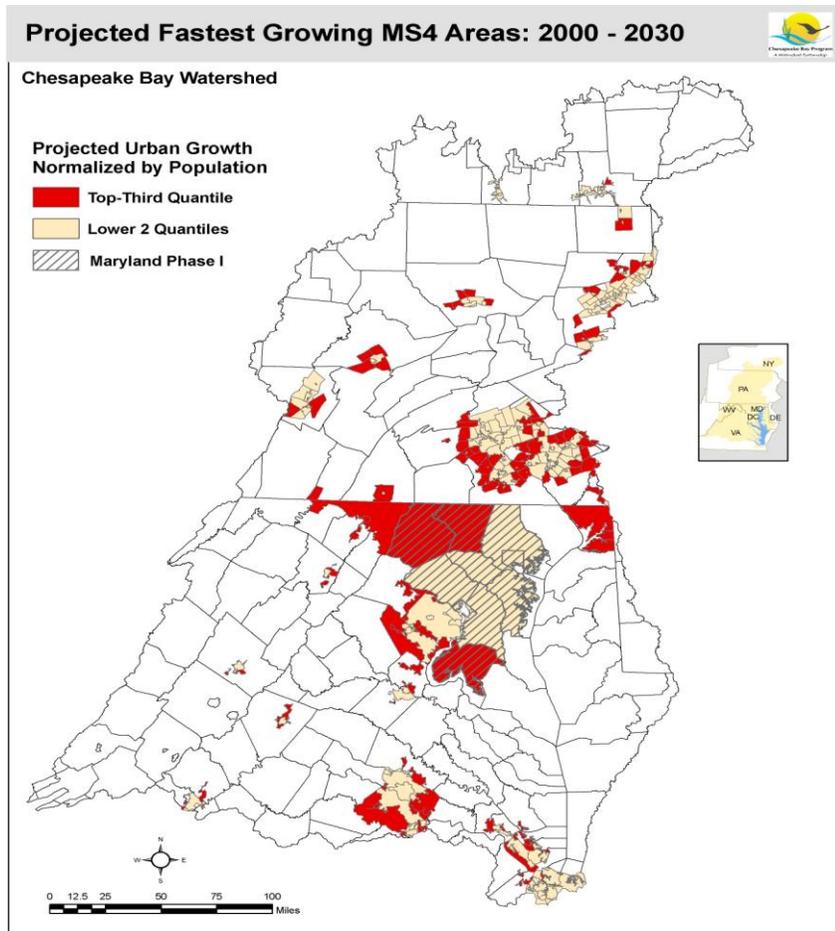


Figure 1: Distribution of MS4 Communities in the Bay Watershed

Source: Claggett, 2010

Several challenges still need to be addressed to develop an effective verification system for the Bay watershed.

- Larger MS4 communities have an existing urban BMP inventory that numbers in the thousands, with hundreds more being added each year.
- Some Ms4s do not currently report all of the individual BMP information needed by the state to prepare the input deck for the Chesapeake Bay Watershed Model (CBWM), such as Chesapeake Bay Program (CBP) BMP classification, drainage area served, geographic location and year of installation.
- Very few localities have yet digitized their individual BMP files and integrated them within a spreadsheet and/or GIS system.
- In the absence of good geo-spatial data, the prospect for double counting of BMPs is significant, particularly when multiple BMPs of different ages are located within same drainage area. In other cases, BMPs that have failed or don't really meet the CBP BMP definition are counted when they should not be.

- Most non-MS4 localities have little experience in reporting BMP implementation data for new or existing development (e.g., retrofits). These communities are classified as being semi-regulated, in that they have limited authority to inspect or enforce maintenance on private land.
- Several urban BMPs are routinely implemented outside the MS4 permit or local/state/federal stormwater review process, and therefore may not be properly counted or reported (e.g., street sweeping, reforestation, urban nutrient management, tree planting and stream restoration). Localities may need to internally coordinate with multiple agencies and/or departments to accurately report this BMP data.
- Most localities do not currently report on voluntary BMPs that are installed by homeowners or watershed groups, even if they provide them financial or other incentives to do so.
- Most Bay watershed states are just now developing BMP reporting systems to track the BMPs installed by individual localities and federal facilities, and several have not been able to keep up with BMP information submitted by 70 to 400 MS4s in their jurisdiction.
- Up to now, few states have allocated sufficient staff resources to fully enforce MS4 permit maintenance conditions, verify that local BMP information is accurate, and cull out BMPs from the CBWM input deck that are no longer achieving their intended nutrient or sediment removal rate.
- Some urban BMPs are installed in non-regulated areas in the watershed (i.e., not covered by MS4 permits). Consequently some of these communities may not yet have in place all of the legally required BMP inspection and maintenance provisions found in MS4 communities. As a consequence, BMP reporting and verification may be challenging in non-MS4 communities, particularly in smaller communities with limited staff resources.
- Perhaps the greatest weakness of the current system is that current post construction and maintenance inspection efforts are not oriented toward verifying the actual pollutant removal performance of the BMP in the field. Instead, local inspections primarily focus on whether a BMP was installed per design, and that its future condition will not cause harm to public safety and/or cause nuisance problems in the community. Consequently, it will be necessary to develop improved inspection guidelines that utilize visual indicators to verify that the hydrologic performance of the BMP is adequate to still achieve the intended nutrient and sediment removal rate.
- The past assumption is that nearly all structural urban BMPs are permanent in nature. This means that a twenty year old wet pond keeps on performing in perpetuity, with no discount for their age, diminished capacity and lack of maintenance.

Part 4: Guidance for Verifying Regulated BMPs (e.g., MS4s)

The following guidance is offered on 17 aspects of the urban BMP verification process for MS4s in each of the Bay watershed states:

1. *Verification methods will differ depending on the class of urban BMPs (traditional, runoff reduction, operational, and restoration).* Historically, the CBP Partnership has approved nearly 20 different BMPs in the urban sector, and new expert panels are adding more every year. Consequently, specific verification protocols need to be crafted to address each class of BMPs.
2. *Key Role of Maintenance in Performance.* Regular inspections and maintenance of BMPs are critical to ensure their pollutant removal performance is maintained and extended over time, as well as maintain other local design objectives (e.g., flood control, public safety, stream protection and landscape amenity). Therefore, a core verification principle is to ensure that BMPs are installed and maintained properly over their design life to qualify for their pollutant removal rates. To ensure this, verification protocols are needed to define (1) the cycle for field verification of BMPs and (2) the process for BMP downgrades if maintenance is not performed.

These protocols also need to reflect the recent shift to Low Impact Development (LID) practices in the Bay states, which has fundamentally changed how BMPs are maintained. LID practices require more frequent but less intense maintenance activity, as well as routine inspections to ensure they perform properly over time (CSN, 2013).

3. *Utilize Existing MS4 Framework.* The existing MS4 inspection and maintenance framework should be the foundation of any BMP verification system for the Bay TMDL. Ongoing BMP reporting and maintenance inspections requirements in MS4 permits may need to be adjusted slightly to verify BMP performance, but the modifications should be limited to reduce the administrative burden for local and state agencies, as well as federal facilities.
4. *Removal Rate Tied to Visual Inspections.* The basic concept is that urban BMPs will have a defined time-frame in which the pollutant removal rate applies, which can be renewed or extended based on a visual inspection that confirms that the BMP still exists, is adequately maintained and is operating as designed. An example of how BMP verification can be integrated with ongoing MS4 BMP inspections is shown Figure 2.

A rapid inspection is conducted to quickly assess urban BMP performance in the field using simple visual indicators. This approach was refined and tested through an extensive analysis of BMPs located in the James River basin of the Chesapeake Bay watershed. More detail on the methods and results can be found in CWP, 2009. The basic form can be modified or adapted to meet the unique BMP terminology and design criteria employed in each Bay watershed jurisdiction. CSN (2013) has also developed a broader visual indicator framework to assess BMP performance.

5. *BMP Verification as Adaptive Management.* The purpose of verification is to maintain or enhance the pollutant removal performance of existing and future local stormwater infrastructure assets. Field assessments are used to identify which BMPs are working well and which ones require preventative or corrective maintenance to maintain their function. In addition, field verification enables local governments to analyze their historical inventory of private and public stormwater BMPs to identify which individual projects present the best opportunities for additional nutrient reduction through retrofits or restoration.

Real world data collected on actual BMP performance also enables local and state agencies to improve the next generation of BMPs in an adaptive management process. This process can isolate the specific site conditions, design features and maintenance tasks that improve BMP longevity and performance, which can then be incorporated into better design specifications and maintenance practices. Future BMP expert panels could review such data to determine if these improved BMPs would qualify for a higher removal rate.

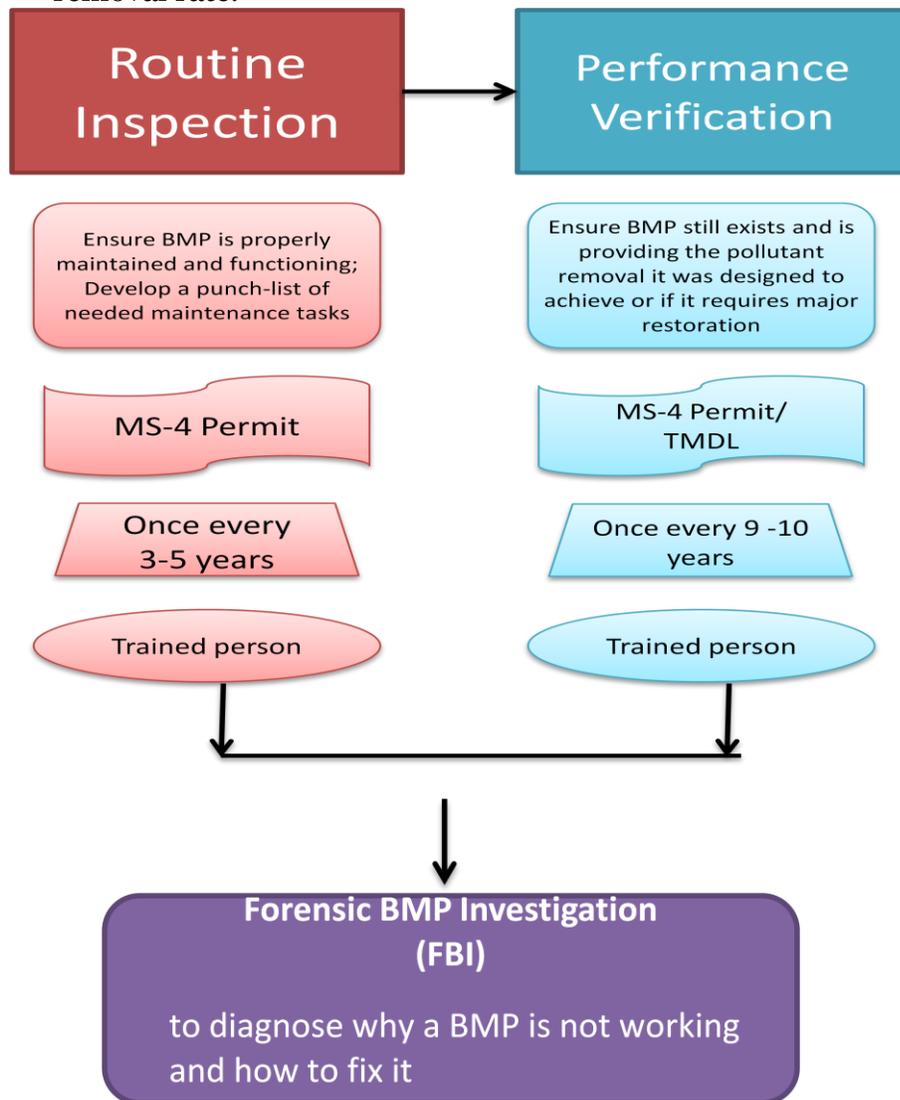


Figure 2: Relationship of Routine MS4 BMP Inspections to Verification Inspections

6. *BMP Reporting Must Be Consistent with CBP Standards.* Each state has a unique system to report BMPs as part of their MS4 permit. In some cases, states are still developing and refining their BMP reporting systems. Consequently, it may not be possible or even desirable to implement a Bay-wide BMP reporting format. However, to get credit in the context of CBWM progress runs, states will need to report BMP implementation data using CBP-approved rates or methods, reporting units and geographic location (generally consistent with NEIEN standards), and periodically update data based on local field verification of BMPs.
7. *More flexible NEIEN reporting standards are needed for certain classes of urban BMPs.* Several operational BMPs, such as street sweeping, urban nutrient management plans, enhanced erosion and sediment control, inappropriate discharge elimination, do not lend themselves well to the specific geographic requirements of NEIEN. In addition, some non-regulated urban BMPs, such as homeowner practices, are so small but potentially so numerous that it is neither practical or useful to give them a specific individual geographic address in NEIEN.

In these situations, it is recommended that only aggregate BMP data be reported for the county/river basin segment in which it occurs. Local governments that report the data are still required to retain specific geographic data records individual practices in order to track and verify them over time.

8. *Initial Verification of BMP Installation.* MS4s and federal facilities will need to verify that urban BMPs are installed properly, meets or exceeds the design standards for its CBP BMP classification, and function in the hydrologic manner they were designed for prior to submitting the BMP for credit in the state tracking database. This initial verification is provided either by the BMP designer or the local inspector as a condition of project acceptance, as part of the normal local stormwater BMP plan review process. The BMP data may need to be validated by spot-checks before it is reported to the state. In addition, MS4 communities should outline their BMP review and inspection procedures and staffing in their required MS4 annual reports.
9. *Recommended Cycle for Field Verification of Urban BMPs.* Local inspectors should perform field performance verification for all of their BMPs at least once every other MS4 permit cycle (typically a permit cycle is 5 years). It is recommended that these rapid investigations of visual indicators be integrated into the routine stormwater BMP inspections already required under MS4 permits.
10. *Suggested Process for BMP Downgrades.* If a field inspection indicates that a BMP is not performing to its original design, localities and/or federal facilities would have a defined time frame (e.g., one year) to take corrective maintenance or rehabilitation actions to bring it back into compliance. If a facility is not fixed during the defined timeframe, the pollutant reduction rate for the BMP would be eliminated, and the locality would report this to the state in its annual MS4 report. If corrective maintenance actions were verified for the BMP at a later date, the MS4 could take credit for it then.

11. *Special Procedures for Urban BMPs Used for Offsets, Mitigation and Trading.* Some urban BMPs are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. Examples include stream restoration mitigation and stormwater retrofit offsets when full compliance with stormwater performance standards is not possible at a new development site.

In other cases, urban BMPs may be built for purposes of trading nutrient credits within a community or a state. Special procedures need to be developed in both cases to prevent double counting of BMPs. In addition, states and localities may elect to require more frequent BMP field inspection for these types of projects to assure they are meeting their intended nutrient reduction objectives.

12. *The Intensity of Verification Efforts Should be in Direct Proportion to Contribution that a BMP makes to overall TMDL Pollutant Reduction in a State's Urban Source Sector.* The workgroup was mindful of the extensive resources needed to support BMP verification, and fully supports the "verification intensity" concept recommended by the CBP-VRP (2013). The basic notion is to prioritize local and state verification resources on the BMPs that produce the greatest load reduction for each state's urban source sector, as reported in their progress runs over time.

This also implies that less verification resources be devoted to BMPs that make only minor overall load reductions, although any BMP should still meet certain minimum criteria for initial inspection and reporting. Operationally, the workgroup defines "minor BMPs" as those that collectively contribute less than 1% to the overall total urban source sector nutrient reduction in the most recent progress run year submitted to the CBP.

13. *State Oversight of Local BMP Reporting.* To provide accountability, Bay watershed states should spot-check a subset of local and federal facility BMP project files to validate the reported BMP data. This may entail an analysis of local maintenance inspection records, or joint field BMP inspections to verify performance under their existing MS4 regulatory authority. The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real.
14. *EPA Review of State Verification Oversight.* EPA Regions 2 and 3, under their existing NPDES MS4 permit oversight role, should periodically review the implementation of state BMP verification protocols to ensure they are being effectively implemented.
15. *Review and Verification of CBP BMP Accounting:* The accounting methods and verification procedures used by the Chesapeake Bay Program Office must be clear and transparent so that local governments and the states can readily understand how the urban BMPs they report are being used to calculate pollutant reductions in the Partnership's Chesapeake Bay Watershed Model. Better communication among the Chesapeake Bay Program Office and its state and local government partners will help to improve BMP reporting and ensure a fair representation of State and local program implementation.

16. *More Tools and Technology are Needed to Streamline the BMP Verification Process.* Actual implementation of the BMP performance verification protocols will require considerable investment in tools and technologies by federal, state and local partners. Some major needs include:

- Development of visual indicators to rapidly assess BMP performance in the field
- Training and certification programs for the "verifiers" that go out in the field
- GIS/website platforms to upload BMP data to local and state databases
- Quality control checks to validate the uploaded data

17. *Urban BMP Definitions Preclude the Need for "Functional Equivalency".* The policy of the USWG has been to develop Bay-wide urban BMP definitions that can be easily interpreted in the context of each individual Bay state's stormwater design manual and regulations (i.e., sizing and design specifications for individual urban BMPs). Each Expert Panel has developed detailed protocols to estimate removal rates for individual practices based on common design and sizing elements for that class of BMP (see SPSEP, 2012 and SREP, 2012).

The BMP design specification in each Bay state are very prescriptive as to the minimum sizing and design criteria that each urban BMP must meet in order to receive permit approval. Consequently, the issue of "functional equivalency" among BMPs, as defined by the agricultural sector in the Chesapeake Bay, does not apply to the urban sector.

Part 5: Guidance for Verification for Semi-Regulated BMPs

The Workgroup created several options to address verification for semi-regulated BMPs (see definition in Part 2). These BMPs are typically installed locally under a state construction general permit (CGP) outside of a MS4 community. Some of these semi-regulated communities are not required to have an inspection program to enforce maintenance, or rely on the state to do it on their behalf (who in turn, may currently lack inspection/enforcement resources). In general, states should focus verification accountability efforts in the fastest growing semi-regulated communities, since they will produce the greatest number of BMPs reported.

The following options are recommended in these situations:

Option 1: Local/state agency or federal facility 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 an 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 Chesapeake Bay watershed.

If a local government or federal facility fails to perform verification inspections, it will receive a gradual downgrade in BMP performance over time. Full performance credit will be given for the first five years, followed by a 20% downgrade each year over the next five years, such that entire BMP credits expires after ten years. Hopefully, smaller communities will develop effective verification programs over the next decade to prevent the downgrades from occurring.

Given the importance of BMP verification, states may wish to allocate some of their Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants to support BMP targeting and verification efforts in targeted non-MS4 communities.

Part 6: Guidance for Verifying Non-Regulatory BMPs

Non-regulatory refers to any BMP that is voluntarily installed in a community (i.e., not triggered by a MS4 permit requirement or stormwater management regulation). The most common examples are homeowner BMPs that are installed on private land (e.g., rain gardens, permeable pavers, downspout disconnection, etc.). To promote greater engagement by land owners in Bay restoration, the work group developed streamlined verification procedures for this class of non-regulatory BMPs (USWG, 2013) which is considered a minor source of state-wide urban sector nutrient reductions, as defined by the CBP-VRP (2013).

The basic premise is to simplify the homeowner BMP reporting process while still retaining a high degree of verification rigor, using the following measures:

- Allow localities to aggregate individual homeowner BMP data into a single practice at the county level, which is then reported to the state without any specific geographic location data (apart from the river-basin segment in which it occurred).
- To receive credit, local governments must maintain records for each individual homeowner BMP, including contact information and geographic information (lat/long or street address).
- The actual installation of each homeowner BMP must be field-verified by the local government or designated third party at the time of construction, and homeowner submitted BMP data will require validation, by spot checking it against typical default values for the practice.
- The credit duration for homeowner BMPs has been reduced to 5 years as compared to the 10 years afforded to larger retrofits (UREP, 2012). The credit can be renewed based on verification that the practice still exists and is working.
- Local governments may opt to use the sub-sampling approach outlined in Part 5, Option 2 of this memo. Alternatively, they may request homeowners to submit digital photos to confirm their practices, with the final decision on BMP condition made by the locality.

Part 7: Guidance for Verifying Legacy BMPs

The Workgroup discussed the process by which states and MS4 communities would account for both legacy and discovered BMPs.

Legacy BMPs are those that have been reported to EPA for inclusion into any past version of the CBWM for reduction credit over the past two decades. The goal over time is to clean up local and/or state BMP databases so that all entries are actual BMPs with a geographic address that can be subject to inspection verification. This implies that desktop and/or field inspections will be needed to confirm the geographic address of the BMP and determine whether estimated BMPs actually exist. Assembling an actual BMP inventory from historical data is a major task, and may take several years in some communities.

Localities may benefit when they clean up their BMP inventory since it is likely they will discover BMPs that were installed in the past but were never reported to the state for credit in the CBWM. They may also find cost-effective retrofit opportunities involving BMP conversion, enhancement or restoration (SREP, 2012).

The Workgroup noted that the MS4 communities should seek to assess their entire BMP population with two MS4 permit cycles using the methods outlined in the recently approved Stormwater Performance Standards Expert Panel report (SPSEP, 2012). The Workgroup also noted that the burden of assessing legacy BMPs could be sharply reduced if the most problematic older BMPs were targeted first. For example:

- Assess all pre-2000 BMPs in first permit cycle, and focus on pre-1990 BMPs in the first two years of that cycle.
- Initially sub-sample their population of BMPs by type and year installed to look for problematic BMP types and design eras, and then focus inspection efforts on the problem BMPs in future years.
- Focus initial efforts to confirm whether estimated BMPs actually exist, and what their current condition is.

Part 8: Process for Developing More Specific BMP Verification Protocols

The process for developing specific urban BMP protocols relies on the work of numerous expert panels, as shown in Table 2. Additional verification protocols for other urban BMPs will be developed as new expert panels are formed.

Table 2: Status of Verification Guidance for Individual Urban BMP Categories

BMP Class	BMP Types	Developed By	Status
Traditional Stormwater BMPs (CBP-approved)	Wet ponds, Dry ED Ponds, Constructed Wetlands, Bioretention, Infiltration, Filtering Practices, Grass Channels, Bioswales, Permeable Pavement	Use Verification Protocol Developed by Stormwater Performance Standards Panel	Agreed to at 10/16/2012 USWG Meeting
Runoff Reduction Practices	ESD and LID practices installed in response to new state SWM regulations	Stormwater Performance Standards Panel	Approved by WQGIT
Operational BMPs	Urban Nutrient Management	Expert Panel	Approved by WQGIT
	Street Sweeping	Expert Panel	Projected early 2014
	Illicit Discharge Elimination	Expert Panel	Projected early 2014
	Erosion and Sediment Control	Expert Panel	Projected early 2014
Restoration BMPs	Stormwater Retrofits	Expert Panel	Approved by WQGIT
	Stream Restoration	Expert Panel	Approved by WQGIT
	Reforestation/Tree Planting	Expert Panel	Projected early 2014
	Shoreline Erosion Control	Expert Panel	Projected early 2014

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