MAY 12, 2014 REVISED DRAFT-SUBJECT TO REVISION

Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework

Report and Documentation from the Chesapeake Bay Program Partnership Water Quality Goal Implementation Team's BMP Verification Committee

Chesapeake Bay Program
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Executive Summary

The Chesapeake Bay Program Partnership and the public at large must have confidence in scientific rigor and transparency of the Chesapeake Bay TMDL and Watershed Implementation Plans accountability system which are built, in part, on crediting nutrient and sediment pollutant load reductions based on reported practices. The Partnership must be fully responsive to calls by the Partnership's Citizens Advisory Committee, the National Academy of Sciences, the President's Executive Order, and others to make improvements in the transparency and scientific rigor of our efforts to verify the implementation of these nutrient and sediment pollutant reducing technologies, treatment techniques, and practices. Therefore, we must build this rigor and transparency for verification up through the Partnership and out through our many local partners who have pollutant load reduction implementation responsibilities.

Verification Role in Bay and Watershed Restoration

The Partnership must view verification as the means to strengthen our confidence in local implementation efforts to ensure they are designed to help land owners, municipalities, and facility managers take the actions necessary to protect their properties, lands, riparian habitats, and local streams. Practices which are not properly installed and functioning as designed *don't* prevent local flooding, protect sources of drinking water, ensure against the collapse of stream banks, and support local economies through the return of clean water and viable habitats suitable for recreational activities. The Partners must have confidence that these reported practices are actually being implemented, are functioning, and are reducing pollutant loads. Implementation of the verification protocols described here will not only increase public certainty in the reported practices, it will help ensure those practices are operating in the intended ways to carry out these local benefits and reduce nutrient and sediment pollutant loads to local streams and Chesapeake Bay tidal waters.

Must Fully Account for All Pollution Reduction Efforts

There is also a growing, increasingly vocal demand for the tracking and reporting of nutrient and sediment pollutant load reducing practices, treatments, and technologies to expand well beyond the sources and cost share programs the Chesapeake Bay watershed jurisdictions have traditionally relied upon—state agricultural departments and environmental agencies, USDA, and county conservation districts. Counties, municipalities, non-governmental organizations, private sector third party consultants, technical certified planners, businesses, agricultural producers, and even individual homeowners are now implementing and reporting on nutrient and sediment pollutant load reducing practices. One of the primary areas of concern expressed by all seven watershed jurisdictions and many local stakeholders regarding the accountability under the Chesapeake Bay TMDL is receiving credit for nutrient and sediment pollutant reducing practices implemented outside of state or federal regulatory programs without the benefit of state or federal cost share funding.

Changes Needs to Existing BMP Tracking and Reporting Programs

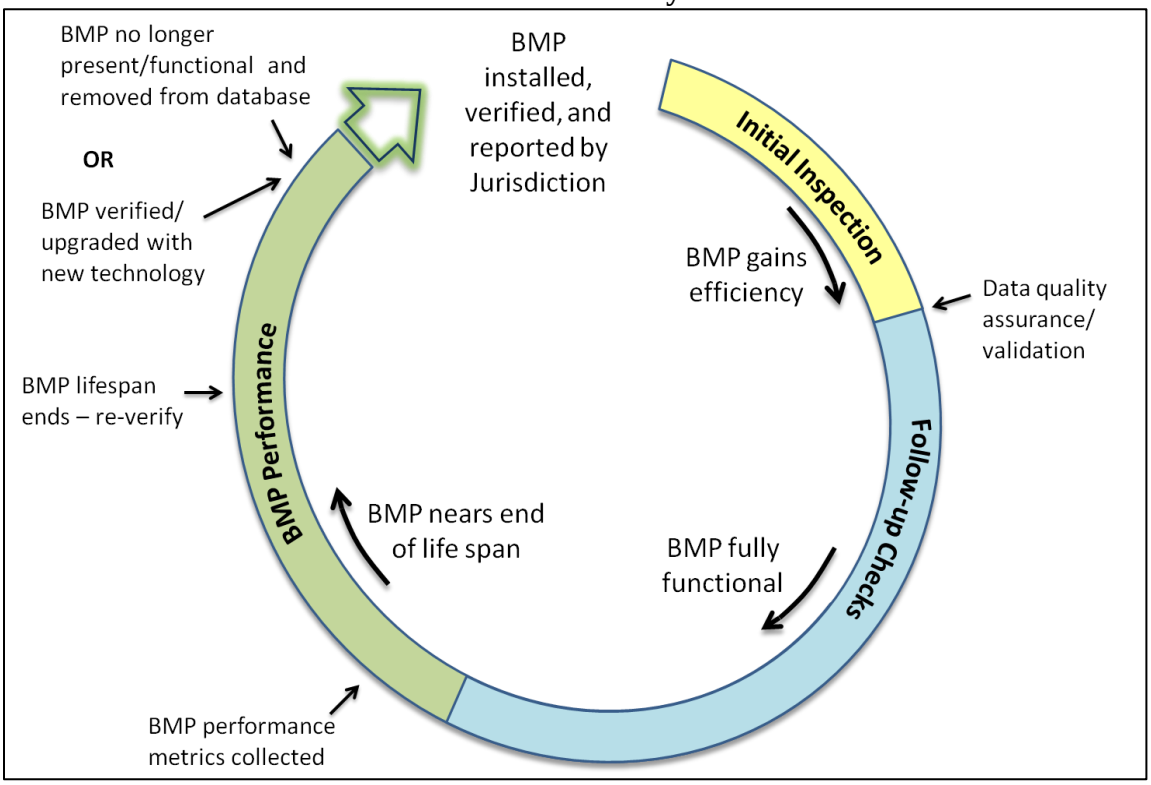
The five BMP Verification Principles adopted by the Partnership recognize the need for changes and enhancements and the opportunity to build from existing local, state, and federal jurisdictional BMP tracking and reporting programs. There are local, state, and federal programs with strong BMP verification programs in place and working effectively in carrying out the principles. However, the Partnership recognizes none of our seven jurisdictions' existing BMP

tracking, verification, and reporting programs, across *all* sectors and habitats, fully achieves all five principles.

BMP Verification as a Life Cycle

Within its BMP verification principles, the Partnership has formally defined verification "as the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly." The Partnership's BMP Verification Review Panel has recommended the Partnership view verification as a life cycle process, including initial inspection, follow-up checks, and evaluation of BMP performance (Figure 1).

Figure 1. Illustration of the BMP Verification Life Cycle



Basinwide BMP Verification Framework

The Chesapeake Bay basinwide BMP verification framework is defined by 12 elements, key among them being the five BMP verification principles, the Partnership technical sector workgroup's verification guidance, the BMP Verification Review Panel's recommendation documentation of the jurisdictions' enhanced BMP tracking, verification, and reporting programs, and commitments to ongoing evaluation and oversight. This basinwide BMP verification framework applies across *all* local, regional, state, and federal agencies and facilities, institutions, and organizations involved in the implementation, tracking, verification, and reporting of practices for nutrient and sediment pollutant load reduction crediting.

Developing Enhanced Jurisdictional BMP Verification Protocols and Programs

In the process of developing new and revising existing BMP tracking, verification, and reporting protocols and programs, the jurisdictions are strongly encouraged to consult the four products

and extensive recommendations developed by the Partnership's BMP Verification Review Panel. The Panel recommended the jurisdictions focus on:

- Taking full advantage of their choice to vary to the level of BMP verification based on the relative importance of a specific practice to achieving the jurisdiction's Watershed Implementation Plan nutrient and sediment pollutant load reduction targets.

- Grouping the hundreds of BMPs they be tracking and reporting into categories that make sense for each jurisdiction and then develop and document the appropriate protocols and procedures followed for each logical grouping of BMPs.

- Structuring their verification programs to carry out an initial inspection for answering the question "is the BMP there?" and then follow-up checks carried out at the appropriate frequency to answer the question "is the BMP still there and operating?" throughout the lifespan of the practice.

- Providing documentation on procedures in place which prompt the need for conducting a follow-up check of a BMP at the end of its approved lifespan and for removing BMPs which go beyond their lifespans and are not follow-up checked to confirm the BMP is still there and operational.

- Having written procedures in place for assuring the quality of the data for which they are now accountable for, which includes any practice data report to them by other local, regional, and federal agencies, and non-governmental organizations.

Ensuring Ongoing Evaluation and Oversight

The Partnership has committed to a suite of ongoing evaluation and oversight procedures to ensure the five BMP verification principles adopted by the Partnership are adhered to and effectively carried out: amending Partnership BMP Protocol to address BMP verification; amending the Chesapeake Bay Program Grant Guidance to reflect BMP verification; annual reviews of progress data submissions to confirm verification of each submitted practice; annual reviews of the jurisdictions' quality assurance plans by EPA; periodic audits of the jurisdictions' verification programs by EPA; and independent evaluations, at the request of the Partnership, conducted by the Partnership's three advisory committees.

Implementation of the Basinwide Framework

The Partnership has committed to carry out a series of actions, processes, and procedures to ensure full, basinwide implementation of the BMP verification framework equitably across all jurisdictions, source sectors, and habitats. The Partnership will use the two years following Principals' Staff Committee adoption of the basinwide BMP verification framework as the period within which to ramp up the jurisdictions verification programs and make necessary internal adjustments and adaptations for implementation of the basinwide BMP verification framework. In the first full annual progress reporting cycle coming two years after the date of adoption of the basinwide BMP verification framework by the Principals' Staff Committee, those reported practices, treatment, or technologies for which documentation of verification has not been provided for through each jurisdictions' NEIEN-based report systems will not be credited for nitrogen, phosphorus or sediment pollutant load reductions for that year.

Basinwide BMP Verification Framework

Supporting Documentation

All supporting documents are available online under the Project & Resources tab at http://www.chesapeakebay.net/groups/group/best_management_practices_bmp_verification_committee

Foreword

The Chesapeake Bay Program Partnership must be fully responsive to calls by the Partnership's Citizens Advisory Committee, the National Academy of Sciences, the President's Executive Order, and others to make improvements in the transparency and scientific rigor of our efforts to verify the implementation of nutrient and sediment pollutant reducing technologies, treatment techniques, and practices. Verification of these best management practices or BMPs is fundamental to ensuring increased public confidence in the Partnership's accounting for implementation under the 2-year milestones. Estimated load reductions using the Partnership's models and other decision support tools, used in shared decision-making as a common currency for defining implementation progress, depend on accurate reporting of BMPs. The Partners must have confidence that these reported practices are actually being implemented, are functioning, and are reducing pollutant loads as they will be used in explaining the observed water quality trends. Municipalities and conservation districts need to fully understand what practices have been implemented and that they are functioning as designed so that they can make better local decisions on investment of their resources for benefits to local streams and rivers as well as Chesapeake Bay.

The Partnership and the public at large must have confidence in scientific rigor and transparency of the Chesapeake Bay TMDL and watershed implementation plans accountability system. Therefore, we must build this rigor and transparency for verification up through the Partnership and out through our many local partners who have pollutant load reduction implementation responsibilities.

The five BMP Verification Principles adopted by the Partnership recognize the need for changes and enhancements and the opportunity to build from existing local, state, and federal jurisdictional BMP tracking and reporting programs. There are local, state, and federal programs with strong BMP verification programs in place and working effectively in carrying out the principles. However, the Partnership recognizes none of our seven jurisdictions' existing BMP tracking, verification, and reporting programs, across *all* sectors and habitats, fully achieves all five principles. The National Academy of Science's in-depth evaluation of the Partnership's existing practice accountability systems made that very clear. The task before us is to ensure that each jurisdiction's comprehensive verification program, across all source sectors and habitats, achieves the adopted principles.

The Partnership's work on BMP verification is a foundational element that is absolutely essential to the success of the Partnership's Chesapeake Bay restoration efforts. This report describes the basinwide framework for ensuring we continue our restoration actions, building on a solid, transparent scientific foundation.

Nicholas A. DiPasquale, Director
Chesapeake Bay Program

Acknowledgements

This document, and the principles, guidance, and supporting evaluation and oversight procedures contained within it, were developed through the collaborative efforts of the Chesapeake Bay Program Partnership. Principally, this document was developed through the efforts of the Chesapeake Bay Program (CBP) Water Quality Goal Implementation Team's BMP Verification Committee, and the Team's Agriculture, Forestry, Urban Stormwater, and Wastewater Treatment workgroups, the Habitat Goal Implementation Team's Wetland and Stream Health workgroups, and the CBP Partnership's independent BMP Verification Review Panel. The CBP's Principals' Staff Committee made final decisions on behalf of the partnership and CBP's Management Board and the Water Quality Goal Implementation Team provided direction to the BMP Verification Committee. Advice, reviews, and independent perspectives were provided throughout the framework development process by the CBP's Citizen's Advisory Committee, Scientific and Technical Advisory Committee, and Local Government Advisory Committee.

The document resulted from the collaborative expertise, input, feedback, comments, and recommendations from literally hundreds of individuals from the multitude of CBP partnering agencies and institutions, local governments, nongovernmental organizations, businesses, and many other involved stakeholders. Their individual and collective contributions are hereby acknowledged.

Special acknowledgment is made to members the following CBP committees, teams, workgroups, and panels: BMP Verification Committee, Agriculture Workgroup, the Agriculture Workgroup's Functional Equivalents Expert Review Panel, the Agriculture Workgroup's Management Plan Verification Expert Panel, Forestry Workgroup, Urban Stormwater Workgroup, Wastewater Treatment Workgroup, Wetland Workgroup, Stream Health Workgroup, Water Quality Goal Implementation Team, Habitat Goal Implementation Team, BMP Verification Review Panel, Scientific and Technical Advisory Committee, the Scientific and Technical Advisory Committee's BMP Verification Subgroup, Local Government Advisory Committee, Citizens Advisory Committee, the Citizens' Advisory Committee's Workgroup on Verification and Transparency, Management Board, and the Principals' Staff Committee. Appendix A provides detailed members listings of each of these panels, committees, teams, and workgroups who were instrumental developing this Chesapeake Bay basinwide BMP verification framework.

The work of the members of the Partnership's BMP Verification Committee in leading and coordinating the work going into development, review, and approval of the basinwide verification framework is hereby acknowledged. Those members include the following individuals (in alphabetical order): Bill Angstadt, Delaware Maryland Agribusiness Association; Rich Batiuk, U.S. Environmental Protection Agency; Russ Baxter, Virginia Department of Environmental Quality; Evan Branosky, World Resources Institute; Pat Buckley, Pennsylvania Department of Environmental Protection; Valerie Frances, U.S. Department of Agriculture; Melanie Frisch, U.S. Department of Defense; Jack Frye, Chesapeake Bay Commission; Roy Hoagland, HOPE Impacts; Susan Marquart, U.S. Department of Agriculture; Beth McGee, Chesapeake Bay Foundation; Matt Monroe, West Virginia Department of Agriculture; Tom Morgart, U.S. Department of Agriculture; George Onyullo, District of Columbia Department of Environment; Marel Raub, Chesapeake Bay Commission John Rhoderick, Maryland Department of Agriculture; Aaron Ristow, Upper Susquehanna Coalition; Ann Swanson, Chesapeake Bay

Commission; Jennifer Volk, University of Delaware; Andy Zemba, Pennsylvania Department of Environmental Protection; and Hank Zygmunt, Resource Dynamics, Inc.

The following members of the Partnership's BMP Verification Review Panel, an external independent group of expertise selected because of their varied verification experiences, provided invaluable advice, feedback, and recommendations during the development of the framework (in alphabetical order): Dr. Curtis Dell, U.S. Department of Agriculture Agricultural Research Service, University Park, Pennsylvania; Mike Gerel, Sustainable Northwest, Portland, Oregon; Dr. Tim Gieseke, Ag Resource Strategies, New Ulm, Minnesota; Rebecca Hanmer, U.S. Environmental Protection Agency (retired), Fredericksburg, Virginia; Dr. Dianna Hogan, U.S. Geological Survey Eastern Geographic Science Center, Reston, Virginia; Richard Klein, Community and Environmental Defense Services, Owings Mills, Maryland; Dr. Andrew Sharpley, University of Arkansas, Fayetteville, Arkansas; Dr. Tom Simpson, Watershed Stewardship, Annapolis, Maryland; Dr. Gordon Smith, Wildlife Works Carbon LLC, Mill Valley, California; Rebecca Stack, District of Columbia Department of Environment, Washington, DC; Dr. Robert Traver, Villanova University's Department of Civil and Environmental Engineering, Philadelphia, Pennsylvania; Dana York, Green Earth Connection, Centreville, Maryland; and Dan Zimmerman, Warwick Township, Lancaster County, Pennsylvania.

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Thanks to Jeremy Hanson, Chesapeake Research Consortium/Chesapeake Bay Program Office, and Rich Batiuk, U.S. Environmental Protection Agency Chesapeake Bay Program Office, for drafting and editing the several versions of this document in response to comments from the CBP Partnership and the Partnership's BMP Verification Review Panel members.

Section 1. Background

The implementation, tracking, and reporting of best management practices or BMPs, which lead to reductions in nutrient and sediment pollutant loads to local waters and the tidal Chesapeake Bay, has been at the center of the Chesapeake Bay Program Partnership's (the Partnership) Chesapeake Bay and watershed restoration efforts for close to three decades. Within the past five years, there have been numerous requests and commitments to improve the accountability of actions taken which prevent or reduce the loads of nutrient and sediment pollutants to Chesapeake Bay, its tidal tributaries, and embayments.

- The CBP Partnership's 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 Chesapeake Bay watershed's seven jurisdictions.

- The President's Chesapeake Bay Executive Order and resultant Strategy committed the U.S. Department of Agriculture (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 Academy of Sciences National Research Council's Chesapeake Bay 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."

- In 2011, the U.S. Department of Agriculture released results from a Conservation Effects Assessment Program (CEAP) study of the Chesapeake Bay watershed. The study, based on a combination of surveys from over 1,400 producers from 2003 to 2006 and modeling, found a significant level of voluntary implementation on cropland. For example, 88 percent of the cropland acres were found to have a conservation tillage system in place. It also identified opportunities to improve water quality in the region, such as through more complete and consistent application of nutrient management.

It is evident that existing state and federal programs for verifying BMP installation and operation vary widely, and that existing programs are often insufficient to meet a confidence level that could be termed robust.

There is also a growing, increasingly vocal demand for the tracking and reporting of nutrient and sediment pollutant load reducing practices, treatments, and technologies to expand well beyond the sources and cost share programs the Chesapeake Bay watershed jurisdictions have traditionally relied upon—state agricultural departments and environmental agencies, USDA, and county conservation districts. Counties, municipalities, non-governmental organizations, private sector third party consultants, technical certified planners, businesses, agricultural producers, and even individual homeowners are now implementing and reporting on nutrient and sediment pollutant load reducing practices. One of the primary areas of concern expressed by all

seven watershed jurisdictions and many local stakeholders regarding the accountability under the Chesapeake Bay TMDL is receiving credit for nutrient and sediment pollutant reducing practices implemented outside of state or federal regulatory programs without the benefit of state or federal cost share funding.

BMP Verification Definition

This chorus of calls for improved and expanded tracking and reporting of practices points to the need for strengthened verification of the installation and maintenance of the array of pollutant load prevention and reduction practices. Within its BMP verification principles, the Partnership has formally defined verification "as the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly." This definition was based on the work of the U.S. Department of Agriculture's Office of Environmental Markets[1] and the Willamette Partnership[2].

BMP Verification Framework

There has been significant increases in the importance placed on accounting for implemented practices within the partnership in recent years due to:

- Publication of the December 2010 Chesapeake Bay TMDL and its underlying tracking and accountability system;
- Acceleration of implementation of nutrient and sediment pollutant load reducing practices through the jurisdictions' Phase I and Phase II Watershed Implementation Plans;
- Focus on demonstrating reasonable assurance that desired pollutant loading reductions can be achieved;
- In-depth EPA evaluations of achievement of the jurisdictions' two-year milestones;
- Requiring offsets to new sources of nutrient and sediment pollutants;
- Increasing demand for tradable credits; and
- Interpretation and explanation of the factors behind the long-term observed trends in local streams and Bay tidal water quality conditions based on reported up-stream and up-tide pollutant load reducing practices, treatments, and technologies.

[1] Chesapeake Bay Environmental Markets Team. 2011. *Verification of Environmental Credits: Chesapeake Bay Environmental Markets Team Discussion Paper*. Prepared by Katie Cerretani and Al Todd. Available online at www.usda.gov/oce/environmental_markets/index.htm.

[2] Willamette Partnership. "Pilot Verification Protocol: Willamette Basin Version 1.0." September 1, 2009.

As a direct result, the Partnership has built a basinwide BMP verification framework, as described in this document, whereby the Partners can have both expanded tracking and reporting of practices *and* verifiable confidence in the outcome of those implemented practices.

Working to verify that practices are properly designed, installed, and maintained over time is a critical and integral component of transparent, cost efficient, and pollutant reduction effective program implementation. We, the Partnership, all must view verification as the means to strengthen our confidence in local implementation efforts to ensure they are designed to help land owners, municipalities, and local, state and federal facility managers take the actions necessary to protect their properties, lands, riparian habitats, local streams, and sources of drinking water.

Verification helps ensure the public of achievement of the expected nitrogen, phosphorus, and sediment pollutant load reductions over time. The Partnership will build from existing local, state, and federal agency practice tracking and reporting systems and work towards achieving or maintaining the verification principles adopted by the Partnership.

The Chesapeake Bay Basinwide BMP Verification Framework contains twelve specific elements summarized below and described in more detail in the sections which follow, and in the separate supporting documentation appendices.

BMP Verification Principles

The Chesapeake Bay Program Partnership defined five principles to guide partners' efforts as they build on existing state and federal practice tracking and reporting systems and make enhancements to their BMP verification programs (Table 1). The five principles are discussed in detail in Appendix B.

Table 1. Chesapeake Bay BMP Verification Principles adopted in December 2012.

Principle	Description
Practice Reporting	Affirms that verification is required for practices, treatments, and technologies reported for nitrogen, phosphorus, and/or sediment pollutant load reduction credit through the CBP partnership. This principle also outlines general expectations for verification protocols.
Scientific Rigor	Asserts that verification should assure effective implementation through scientifically rigorous and defensible, professionally established and accepted sampling, inspection, and certification protocols. Recognizes that verification shall allow for varying methods of data collection that balance scientific rigor with cost-effectiveness and the significance of or priority placed upon the practice in achieving pollution reduction.
Public Confidence	Calls for verification protocols to incorporate transparency in both the processes of verification and tracking and reporting of the underlying data. Recognizes that levels of transparency will vary depending upon source sector, acknowledging existing legal limitations and the need to respect individual confidentiality to ensure access to non-cost shared

	practice data.
Adaptive Management	Recognizes that advancements in Practice Reporting and Scientific Rigor, as described above, are integral to assuring desired long-term outcomes while reducing the uncertainty found in natural systems and human behaviors. Calls for verification protocols to recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting of funds.
Sector Equity	Calls for each jurisdiction's program to strive to achieve equity in the measurement of functionality and effectiveness of implemented BMPs among and across the source sectors.

BMP Verification Review Panel

Through a process described in Appendix C, a BMP Verification Review Panel[3] of 13 regionally and nationally recognized experts was established to examine the degree to which jurisdictions' practice tracking, verification, and reporting programs meet the parameters delineated in the Partnership's adopted verification principles and verification guidance. The panel members and the panel's charge are provided in Appendix C.

Source Sector and Habitat Specific BMP Verification Guidance

Six technical workgroups under the Partnership's Water Quality Goal Implementation Team[4] and the Habitats Goal Implementation Team[5], respectively, were tasked with the development of verification guidance for use by the seven watershed jurisdictions in further developing and enhancing their existing BMP tracking, verification, and reporting programs. The six sets of workgroup-based verification guidance are as follows:

- Agriculture
- Forestry
- Urban stormwater
- Wastewater
- Wetlands
- Streams

The six sets of source sector and habitat specific BMP verification guidance are provided in Section 2.

Practice Life Spans

The BMP Verification Review Panel recommended that the Partnership establish practice life spans for all Partnership approved BMPs and apply these life spans according to the workgroups' verification guidance and within the jurisdictions' verification programs and underlying

[3] http://www.chesapeakebay.net/groups/group/bmp_verification_review_panel
[4] http://www.chesapeakebay.net/groups/group/water_quality_goal_implementation_team
[5] http://www.chesapeakebay.net/groups/group/habitat_goal_implementation_team

protocols (Appendix D)[6]. Future BMP expert panels will include lifespan recommendations in their reports, as well. The Panel recommended the Partnership's support for continued crediting of a practice even after its recorded lifespan as long as the proper level of re-verification occurs confirming the practice is still present and functioning (see Section 3 and Appendix D).

Ensuring Full Access to Federal Cost-shared Agricultural Conservation Practice Data

A number of the six Chesapeake Bay watershed states do not have direct access to USDA cost-share data and, therefore, have less than a full accounting for practices implemented on agricultural lands within their jurisdiction supported by federal cost-share programs (Hively et al. 2013). Having comprehensive and consistent 1619 data sharing agreements in place across all six watershed states is a key objective for ensuring each state has full access to federal conservation practice data for crediting the implementation efforts of their agricultural producers. Efforts underway and commitments to ensure full access to this data by all six Chesapeake Bay watershed states are described in Section 3 and Appendix E.

Enhance Data Collection and Reporting of Federally Cost Shared Practices

The jurisdictions directly depend on USDA's tracking and reporting of federal cost shared agricultural conservation practices as part of their larger efforts to credit producers for all their actions to prevent and reduce pollutant runoff from their agricultural production operations. As described in Section 3 and Appendix F, the Partnership's Agriculture Workgroup has identified opportunities to enhance the tracking and reporting of USDA conservation practice data attributes. USDA has committed to working towards addressing these identified jurisdictional needs for enhanced data collection and reporting systems. USDA should develop a specific schedule and list of objectives for this project in full consultation with the states.

Accounting for Non-cost Shared Practices

It is important to account for agricultural conservation practices implemented throughout the Chesapeake Bay watershed, including those practices funded solely by the farmer, not funded by state or federal cost share funding or required by regulation (see Sections 2 and 3). For non-agricultural practices implemented voluntarily, the technical workgroups provide guidance for improving crediting and verification (see Section 2).

Preventing Double Counting

There are many situations where a state tracks an implemented cost-shared conservation practice and the USDA also tracks the identical practice. Typically, both the state and USDA are tracking the same practice because they both provided cost-share to the producer for the practice implementation. In the other sectors, there are state and federal agencies as well as an increasing number of non-governmental organizations funding implementation of practices. Section 3 describes the state-specific procedures being followed in choosing which data to report, to avoid double counting.

[6] *Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions*. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

Clean-up of Historical BMP Data Bases

The seven watershed jurisdictions have built up records of pollutant load reducing practice and treatment technology implementation starting in the mid-1980s and continuing through up to today as part of the Partnership. As further described in Section 3, each jurisdiction has committed to a clean-up of their historical BMP databases directed towards eliminating past practices which have since expired and are no longer reducing nutrient and sediment pollutant loads to local streams and Chesapeake Bay.

Development and Documentation of Jurisdictional BMP Verification Programs

In the process of developing new and revising existing BMP verification protocols and programs, the jurisdictions are strongly encouraged to consult the four products developed by the Partnership's BMP Verification Review Panel:

- The *Chesapeake Bay Program BMP Verification Program Design Matrix*
- The *Jurisdictional BMP Verification Program Development Decision Steps for Implementation*
- The *Jurisdictional Verification Protocol Design Table*
- The *State Verification Protocol Components Checklist*

Each of these matrices and checklists are presented and described in Section 4.

Partnership Processes for Evaluation and Oversight

The Partnership has agreed to a suite of ongoing evaluation and oversight procedures and processes to ensure the five BMP verification principles adopted by the Partners are adhered to and effectively carried out. As described in Section 5, these procedures and processes also reflect the Partnership's commitment to adapt to new scientific findings and experiences from verification efforts underway.

Communication and Outreach Strategy

The Partnership's Communications Workgroup[7] has developed a communications and outreach strategy to enable the partners and the Partnership to have consistent, clear messages internally as they gradually build toward public implementation of the BMP verification framework. As described in Appendix G, having solid internal understanding and messages will enable partners to more smoothly and consistently communicate about BMP verification with various external audiences and "implementers" across the watershed as the BMP verification process moves forward.

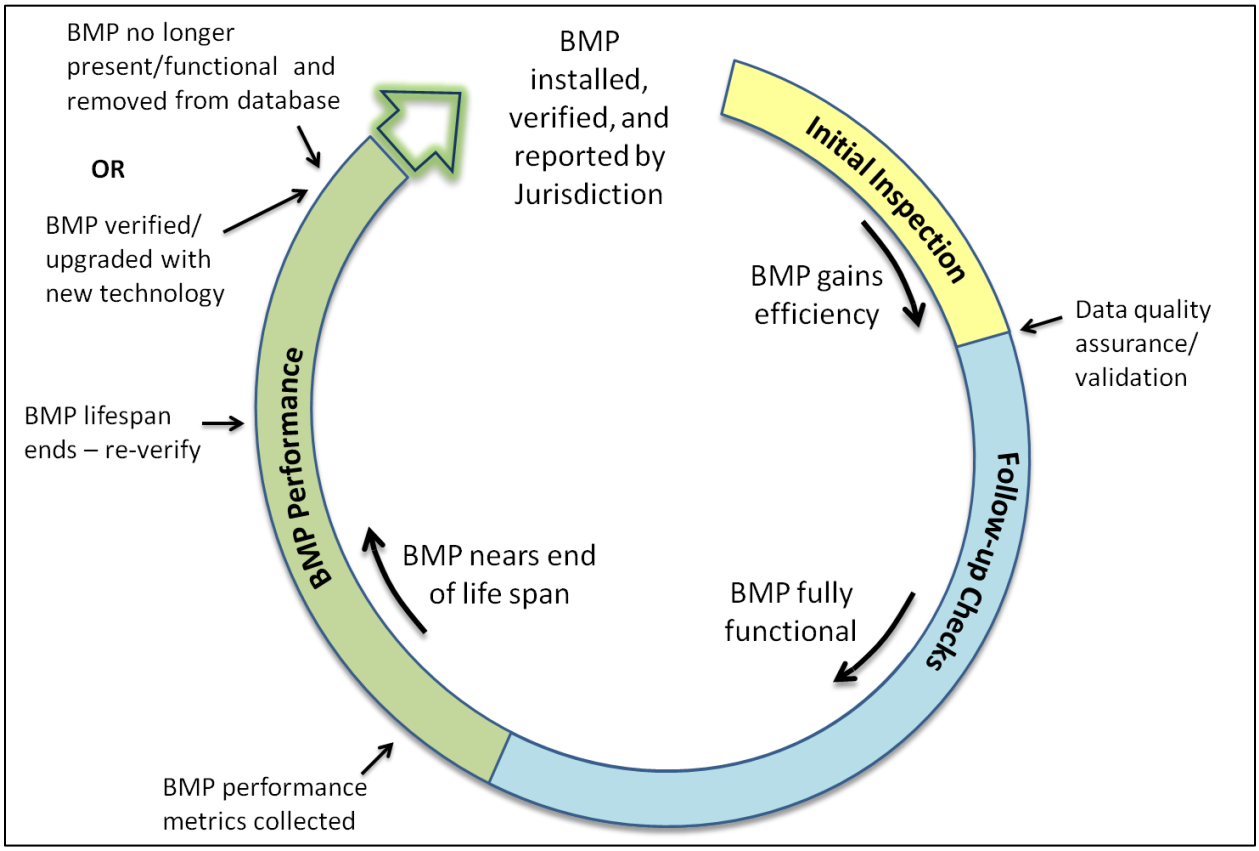
BMP Verification as a Life Cycle

The Partnership's BMP Verification Review Panel has recommended the Partnership view BMP verification as a life cycle process (Figure 1), including initial inspection, follow-up checks, and evaluation of BMP performance.

[7] http://www.chesapeakebay.net/groups/group/communications_workgroup

So what is verification? It's the process through which agency partners ensure practices, treatments and technologies resulting in reductions of nitrogen, phosphorus, and sediment pollutant loads are implemented and operating correctly.

Figure 1. Illustration of the BMP Verification Life Cycle



The first part of the life cycle is the initial inspection upon installation of the BMP directed towards answering the question "is the BMP there?" Following the initial inspection and reporting of the data, quality assurance and validation of the data ensures the review of the submitted data to determine if the data was collected, compiled, and submitted correctly and that issues of double counting and the clean-up of historical data have been addressed.

The second part of the life cycle is the follow-up checks carried out at the appropriate frequency to answer the question "is the BMP still there and operating correctly" throughout the lifespan of the practice.

The third part of the life cycle is performance outcomes, focused on the systematic collection of data to be used to ensure the BMPs are working as expected, adapt approaches to future installation and maintenance of practices, and to help further refine the pollutant reduction efficiencies into the future.

Application of the Basinwide Framework

As described in more detail later in the document, this basinwide BMP verification framework applies across all local, regional, state, and federal agencies and facilities, institutions, and organizations involved in the implementation, tracking, verification, and reporting of practices for nutrient and sediment pollutant load reduction crediting.

Calls for/Commitments to BMP Verification within the Chesapeake Bay Watershed

Executive Order 13508

The *Chesapeake Bay Protection and Restoration Executive Order*--Executive Order 13508, signed by President Obama on May 12, 2009, called for development of a system of accountability for tracking and reporting conservation[8] (Appendix H). The Executive Order describes full accounting of conservation practices applied to the land as "a necessary data input for improving the quality of information and ensuring that the practices are properly credited in the Bay model." In development of this system, the Executive Order directs USDA to uphold all privacy requirements as called for in Section 1619 of the 2008 Farm Bill.

The Executive Order also directed USDA and EPA, "by December 2011, to work with state and local partners to expand existing tracking and reporting systems for conservation practices, best management practices and treatment technologies to ensure reporting and tracking at local scales of implementation – counties, conservation districts and/or small watersheds." Furthermore, the Executive Order called for "mechanisms for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands will be developed and implemented by July 2012."

National Academy of Sciences' Chesapeake Bay Evaluation Committee

At the November 2008 Chesapeake Executive Council meeting,[9] the Governors, the Mayor, the EPA Administrator, and the Chesapeake Bay Commission Chair requested "that the Chesapeake Bay Partnership be evaluated by a nationally recognized independent science organization" to increase accountability. The Partnership, under the leadership of the Principals' Staff Committee,[10] convened an Independent Evaluator Action Team[11] to construct the evaluation questions and work with EPA to establish and manage a contract with the National Academy of Sciences.

In 2009, EPA requested that the National Research Council (NRC) of the National Academy of Sciences to evaluate and provide advice on the CBP Partnership's nutrient and sediment reduction programs and strategies. The National Research Council established the "Committee on the Evaluation of Chesapeake Bay Program Implementation for Nutrient Reduction to Improve Water Quality." The Committee was charged to assess the framework used by the six Chesapeake Bay watershed states, the District of Columbia, and the overall Partnership for

[8] Executive Order No. 13508. Signed May 12, 2009, printed 74 FR 23099, May 15, 2009. See the CBP Partnership's Executive Order website for more details: http://executiveorder.chesapeakebay.net/default.aspx
[9] http://www.chesapeakebay.net/about/ecmeeting/2008_executive_council_meeting
[10] http://www.chesapeakebay.net/groups/group/principals_staff_committee
[11] http://www.chesapeakebay.net/groups/group/independent_evaluator_action_team

tracking nutrient and sediment control practices that are implemented in the Chesapeake Bay watershed and used to evaluate the two-year milestones. The Committee was also charged to assess existing adaptive management strategies and to recommend improvements that could help the Partnership to meet its nutrient and sediment reduction goals.

On May 4, 2011, the National Research Council released the report entitled *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation*. [12] The NRC Committee reached a number of conclusions and recommendations about the Partnership's BMP tracking and accounting efforts, including: [13]

- 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 current accounting of BMPs is not consistent across the Bay jurisdictions. Additionally, given that some source-sector BMPs are not tracked in all jurisdictions, the current accounting cannot on the whole be viewed as accurate.

- The committee was unable to determine the reliability and accuracy of the BMP data reported by the Bay jurisdictions.

- The committee was not able to quantify the magnitude or the likely direction of the error introduced by BMP reporting issues.

- A consolidated regional BMP program to account for voluntary practices and increase geo-referencing of BMPs presents opportunities to improve the tracking and accounting process.

- Additional guidance from the EPA on the optimal extent of field verification of practices in relation to expected benefits would improve tracking and accounting of both cost-shared and voluntary practices.

- Electronic tracking and data transfer systems are likely to improve the quality of reporting and reduce the jurisdictions' tracking and accounting burden but may currently be contributing to delayed assessments of implementation progress.

Please see Appendix I for more information about the NRC's detailed findings and conclusions relevant to BMP tracking, verification, and reporting.

[12] National Research Council. 2011. *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation*. Washington, DC: The National Academies Press. Available online at http://www.nap.edu/catalog.php?record_id=13131

[13] The list of conclusions is adapted from Chapter 2, National Research Council (2011). (See Appendix I).

USDA NRCS 2011 CEAP Report

In 2011, the U.S. Department of Agriculture released results from a Conservation Effects Assessment Program (CEAP) study of the Chesapeake Bay watershed.[14] The study was performed through a combination of surveys from over 800 producers over 2003 to 2006 and modeling used to estimate the impact of conservation practices on the landscape. Among its findings, the study found a significant level of voluntary BMP implementation on cropland. For example, 88 percent of the cropland acres were found to have a conservation tillage system in place. The study also identified opportunities to improve water quality in the region, such as through more complete and consistent application of nutrient management.

USDA/U.S. EPA Chesapeake Bay Conservation Data Collaboration

In response to the President's May 2009 Chesapeake Bay Executive Order, EPA's publication of the December 2010 Chesapeake Bay TMDL, and the findings from the 2011 USDA CEAP report, USDA and EPA have develop Chesapeake Bay Conservation Data Collaboration[15] and supporting work plan.

EPA and USDA committed to collaborate to ensure consistency between the CBP Partnership and CEAP modeling efforts and that both are informed by the best conservation data available that describes implementation by farmers in the Bay region through the following commitments:[16]

- The USDA and the EPA will work with state agricultural agencies, conservation districts, and other key agricultural groups to develop a mechanism for tracking, verifying, and reporting non-cost shared conservation practices on agricultural lands for use in the CBP Partnership's Chesapeake Bay Watershed Model.

- Using CEAP results from 2003-2006 and the pending 2011-12 analysis, the USDA and the CBP Partnership will explore inclusion of the additional practices identified in these surveys into the CBP Partnership's Chesapeake Bay Watershed Model.

CBP Citizens Advisory Committee

The Partnership's Citizens Advisory Committee (CAC) is charged with responsibility for representing residents and stakeholders of the Chesapeake Bay watershed in the restoration effort and advising the CBP Partnership on all aspects of Chesapeake Bay restoration. In this role, they have been strong, vocal advocates for increased transparency, accountability, and independent evaluation of the restoration work of the Partnership. In their January 3, 2012 letter[17] addressed to the Partnership's Principals' Staff Committee, the CAC called on the partners to begin

[14] USDA NRCS. 2011. *Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region.* Available online at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/pub/?cid=stelprdb1041684

[15] U.S. EPA Associate Administrator Arvin R. Ganesan June 28, 2011 letter to the Honorable Glenn Thompson, Chairman, U.S. House of Representatives Committee on Agriculture, Subcommittee on Conservation, Energy, and Forestry, Washington, DC.

[16] http://www.chesapeakebay.net/channel_files/18692/final_usda_epa_data_collaboration_workplan.pdf.

[17] Citizens Advisory Committee to the Chesapeake Executive Council's January 3, 2012 Letter to the Principals' Staff Committee. Available on-line at http://www.chesapeakebay.net/channel_files/20829/cac_letter_to_psc_on_nas_recs_jan_2012.pdf

implementation of the National Research Council Chesapeake Bay Panel's recommendations. The CAC specifically recommended implementation of the action to "bring forward through the Partnership a set of integrated recommendations for a comprehensive BMP tracking, verification and reporting system" (Appendix J). In their December 17, 2012 letter[18] addressed to Chesapeake Bay Program Director Nick DiPasquale, the CAC outlined their concerns and challenges back to the Partnership on the development of the basinwide BMP verification framework (Appendix J). In their July 25, 2013 letter[19], the CAC followed through on their previous correspondence and provided six specific recommendations for addressing the need for transparency throughout the verification process (Appendix J).

Chesapeake Bay TMDL

Under the Chesapeake Bay total maximum daily load (TMDL) published in December 2010[20], the EPA set forth the expectation for the seven watershed jurisdictions to account for and manage new or increased loadings of nitrogen, phosphorus, and sediment (U.S. EPA 2010a). EPA described its expectations that each of the jurisdictions will accommodate any new or increased loadings of nitrogen, phosphorus, or sediment that lack a specific allocation in the Chesapeake Bay TMDL with appropriate pollutant load reduction offsets supported by credible and transparent offset programs subject to EPA and independent oversight. EPA outlined expectations for common elements of such offset programs in Appendix S of the Chesapeake Bay TMDL (U.S. EPA 2010b)[21]. Verification, tracking, and accountability are among the elements described in Appendix S. Credits generated to offset new pollutant loads are expected to be routinely verified–through monitoring, inspection, reporting, or some other mechanism–to ensure they are producing, and continue to produce, the expected pollutant load reductions.

The verification and accountability procedures and requirements for offset programs are currently under various stages of development in the seven Chesapeake Bay watershed jurisdictions and through the Partnership's Trading and Offsets Workgroup.[22] While the jurisdictions continue to define verification for their offset programs and for trading programs, it is considered by the Partnership to be separate from BMP verification of practices reported to the Partnership's for annual progress assessment.

The Chesapeake Bay watershed jurisdictions are required to report conservation practice implementation on an annual basis to the EPA Chesapeake Bay Program Office and the

[18] Citizens Advisory Committee to the Chesapeake Executive Council December 17, 2012 Letter to Nick DiPasquale, Director, Chesapeake Bay Program. Available on-line at: http://www.chesapeakebay.net/channel_files/19255/final_cac_letter_to_cbpo_on_ag_bmp_verification_dec_17_2012.pdf

[19] Citizens Advisory Committee to the Chesapeake Executive Council's July 25, 2013 Letter to Nick DiPasquale, Director, Chesapeake Bay Program. Available on-line at: http://www.chesapeakebay.net/channel_files/20829/cac_bmp_verification_letter_final_july_25_2013.pdf

[20] U.S. Environmental Protection Agency. 2010. Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment. December 29, 2010. Available on-line at: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html

[21] U.S. Environmental Protection Agency. 2010. Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment: Technical Appendices. December 29, 2010. Available on-line at: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html

[22] http://www.chesapeakebay.net/groups/group/trading_and_offsets_workgroup

Partnership for use in the Partnership's Chesapeake Bay Watershed Model (U.S. EPA 2009). Although the jurisdictions have reported annual progress since the 1990s, this reporting has come under additional public scrutiny since 2010, when the EPA issued the Chesapeake Bay TMDL allocations for nitrogen, phosphorus, and sediment (U.S. EPA 2010a). The Partnership's Annual Progress Review is used to assess to what extent the seven Chesapeake Bay watershed jurisdictions are making progress towards meeting their respective set of watershed nutrient and sediment pollutant load allocations. Each jurisdiction reports annual progress (July 1 to June 30) in their implementation of conservation practices and treatment technologies for all pollutant source sectors: agriculture, forestry, urban stormwater, wastewater treatment facilities, septic systems, and air emissions.

Importance of BMP Verification to the Partnership

As described in the foreword, the Partnership must view verification as the means to strengthen our confidence in local implementation efforts to ensure they are designed to help land owners, municipalities, and facility managers take the actions necessary to protect their properties, lands, riparian habitats, local streams, and sources of drinking water. Practices which are not properly installed and functioning as designed *don't* prevent local flooding, protect sources of drinking water, ensure against the collapse of stream banks, support local economies through the return of clean water and viable habitats suitable for recreational activities. The Partners must have confidence that these reported practices are actually being implemented, are functioning, and are preventing and reducing pollutant loads to local streams, groundwater, and Chesapeake Bay. Implementation of the verification protocols described here will not only increase public certainty in the reported practices, it will help ensure those practices are operating in the intended ways to carry out these local benefits and reduce nutrient and sediment pollutant loads to local streams, groundwater, and Chesapeake Bay tidal waters.

Credit All that's Been Implemented on the Ground and is Working. The Partnership wants to make sure we are fully accounting for all nutrient and sediment pollutant load reduction actions taken across the watershed. For example, the Partners are clearly under accounting the non-cost shared practices that agricultural producers are implementing without government funding.

Increased Confidence of Pollutant Reduction Outcomes. Furthermore, verifying what's on the ground and is functioning gives everyone confidence that we will achieve the expected nitrogen, phosphorus, and sediment pollutant load reductions over time.

Direct Benefits to Local Decision Making. Having better data at the municipality, county, and state levels better informs local decision-making by conservation districts, townships, cities, and counties, and helps them relate their local decisions focused on local water quality, flooding, resource protection, and conservation benefits to downstream improvements in Chesapeake Bay water quality. As an added benefit, the same information can be used to inform decision-making at the state, federal and partnership levels.

Consistency Across Pollutant Source Sectors. The Partnership wants to ensure that BMP verification protocols and procedures have a consistent level of rigor, transparency, and confidence across all source sectors and habitats, with the understanding that the highest attention within each sector is given to those BMPs on which the jurisdictions are relying the

most to achieve the nutrient and sediment reductions called for in their Watershed Implementation Plans.

Planning and Targeting Implementation of Agricultural Conservation Practices. Obtaining accurate, consistent, detailed information on conservation practice implementation can improve the knowledge used for planning and targeting conservation practices, promoting sustainable agricultural management strategies, and supporting an adaptive management approach to improving water quality in the Chesapeake Bay watershed. Tracking conservation progress provides the information necessary for prioritizing BMP implementation across the landscape and comparing implementation to pollutant load trends and water-quality response.

Jurisdictions are encouraged to focus more rigorous verification on the practices that account for the greatest reductions. The Partnership supports focusing BMP verification on those practices on which individual jurisdictions are relying upon for the majority of their nutrient and sediment load reductions.

Inform and Promote Changes in Management Given Better Information. A key objective of BMP verification is to provide information to promote adaptive management by providing data to improve future performance, assess management effectiveness, and identify further opportunities for directing/targeting program implementation.

Inform Explanation of Observed Trends in Water Quality Conditions. The Partnership directly benefits from direct observations of water quality conditions in local streams, rivers and the Bay's tidal waters at hundreds of monitoring stations, many with data records dating back to the mid-1980s or earlier. Information on the practices implemented on lands upstream (and up tide) of these monitoring stations is used in the interpretation of causes leading to the long term trends in observed water quality conditions in local streams, rivers, and the Bay's tidal waters.

Save Staff and Financial Resources. By enhancing efforts to ensure that states have full access to federal cost shared practice data, the states could save time and dollars to ensure their agricultural producers were fully credited for their conservation efforts. Other opportunities to improve verification efficiency should be identified through state-local government and nongovernmental organization (NGO) cooperation, and through improved technology for aerial imagery.

It's a Partnership Approach. All the partners recognize the importance of maintaining flexibility and not being overly prescriptive given the unique nature of each of the seven watershed jurisdictions in how they work with their localities and citizens and differences in their Watershed Implementation Plans. The Partnership is offering up a partner-focused, common sense approach to work towards a consistent level of rigor and transparency across geography and source sectors, but whereby each jurisdiction can take a different path toward this common objective, focusing on its most important BMPs.

Increased Confidence Practices are Reducing Pollutant Loads. Estimated load reductions using the Partnership's suite of models and other decision support tools, used in shared, collaborated decision-making, depend on accurate, comprehensive reporting of BMPs. The

Partnership's scientific experts are continuing to interpret and the reasons behind the trends in the decades of monitored observations of water quality in local streams, larger rivers throughout the watershed of the Chesapeake Bay and across the Bay's tidal waters. The Partners must have confidence that these reported practices are actually being implemented and reducing pollutant loads as they will be used in explaining the observed water quality trends.

Section 2. Source Sector/Habitat Specific BMP Verification Guidance

Role of the Workgroups' Guidance within the Larger Framework

At the heart of the basinwide BMP verification framework has been the development of the source sector and habitat specific BMP verification guidance by the Partnership's six technical workgroups. These six sets of guidance outline the Partnership's recommended guidance for consideration by local, state, and federal agency partners as they work to document and carry out specific procedures and protocols to ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly. The verification guidance development and review process is described in Appendix K.

Agriculture Verification Guidance

Version: May 9, 2014; subject to further review and changes from the Agriculture Workgroup

Part 1: The Need for Agricultural BMP Verification and the CBP Process

With the establishment of a Chesapeake Bay Total Maximum Daily Load (TMDL) and the jurisdictions' commitment to demonstrate reasonable assurance that the TMDL goals will be met, tracking, reporting, and verification of best management practice (BMP) implementation is essential. An improved approach to verification is needed to expand the tracking and reporting of implemented BMPs from agency incentive programs to private, non-cost shared and resource improvement practices in a manner that ensures public confidence that the water quality benefits from the practices are achieved. The Chesapeake Bay TMDL has brought new urgency to the matter, reinforced by calls for enhanced verification by:

- The Chesapeake Bay Independent Evaluation Report developed by the National Research Council's (NRC) panel identified five specific science-based conclusions. These conclusions focused on the 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."

- President Obama's Chesapeake Bay Executive Order Strategy committed relevant federal agencies, including the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA), to develop and implement "mechanisms of for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands" by July 2012.

- EPA's Chesapeake Bay TMDL's Appendix S outlined the common elements for the jurisdictions to develop and implement trading and offset programs in conjunction with the requirements of the TMDL.

- Several of the Chesapeake Bay Program's independent advisory committees, including the Scientific and Technical Advisory Committee (STAC) and the Citizen's Advisory Committee (CAC), have consistently requested the partnership to develop and implement an open and transparent process to verify cost-share and non-

cost shared BMPs being annually tracked and reported by the jurisdictions to the Chesapeake Bay Program Office (CBPO).

In 2012 the Chesapeake Bay Program (CBP) Partnership's Water Quality Goal Implementation Team requested each of the source and habitat sector workgroups, including the Agriculture Workgroup, to develop guidance for jurisdictions as they seek to enhance verification of BMP implementation. As a part of this effort, the Agriculture Workgroup identified several key factors critical to building a verification protocol for agricultural BMPs.

- Were public funds used to implement the practice, or was the practice funded entirely with private dollars?
- Was the practice implemented to satisfy a regulatory requirement or was it implemented voluntarily?
- Is the practice structural, with a multi-year life-span, or must it be implemented annually?
- Is the practice implemented "on-the-ground" or is it a plan or other enhancement of farm management?

These factors influence the reliability of reported information and the reasonable assurance of whether the practice is implemented properly and remains functional. The following narrative considers these factors and the consequent guidance to jurisdictions for a science- and best professional judgment informed verification protocol.

Part 2: Defining and Categorizing Agricultural BMPs

The Partnership approved agricultural BMPs represent the largest and most diverse group of conservation practices and land use conversions across all sectors. The diversity of BMPs reflects the diversity of agricultural production and land uses across the Chesapeake Bay watershed. To address the challenge of providing verification guidance for this diverse collection of BMPs in a simple format, agricultural BMPs are organized into three categories (Table 2). The three BMP categories are based on the assessment method for their physical presence, primarily, as well as on the respective life spans or permanence on the landscape.

2a. Visual Assessment BMPs - Single Year

A practice that can be visually assessed and with a limited physical presence in the landscape over time, i.e., lasting as short as several months to a single growing season. In order to accurately account for nutrient and sediment load reduction benefits, this type of BMP must be verified and reported on an annual basis.

2b. Visual Assessment BMPs - Multi-Year

A practice that can be visually assessed and has a protracted physical presence on the landscape, i.e., of more than one year when properly maintained and operated. This type of BMP often requires increased technical and financial resources to implement compared with a single year practice.

2c. Non-Visual Assessment BMPs

A practice that cannot typically be visually assessed because it is a type of management system or enhanced approach, rather than a physical BMP. This class of BMPs is more challenging to verify since it does not have a physical presence on the landscape. However, considerable nutrient and sediment reductions are possible in well-implemented plans that can last either a single season or multiple years.

Table 2. Examples of agricultural BMPs by category.

2a. Visual Assessment- Single Year	2b. Visual Assessment - Multi-Year	2c. Non-Visual Assessment
Conservation Tillage	Animal Waste Management Systems	Decision/Precision Agriculture
High-Residue Minimum Disturbance Management	Barnyard Runoff Control	Enhanced Nutrient Management Plans
Traditional Cover Crops	Stream Side Grass/Forest Buffers	Poultry Litter Transport
Commodity Cover Crops	Prescribed Grazing	Precision Intensive Rotational Grazing Plans
	Water Control Structures	Soil Conservation and Water Quality Plans

Part 3: Defining Implementation Mechanisms for Agricultural BMPs

The diversity of agricultural BMPs is mirrored in the range of approaches and funding sources supporting implementation and the resultant level of oversight across the Chesapeake Bay watershed. The sources of BMP implementation data and their maintenance oversight are grouped into four broad categories with potential for mixing between categories dependent upon the specific BMP. How a BMP is funded and implemented has direct implications for how verification of presence and function is conducted:

3.a. Non-Cost-Shared (Privately Funded) BMPs

BMPs that are implemented without public funding assistance and are a source of agricultural BMPs installed without the verification benefits inherent to the other categories - public cost-share, regulatory programs, and permit-issuing programs As a result, establishment of verification programs similar to those for publically funded or regulated practices will be needed.

Non-cost share BMPs are typically financed by the operator or other non-public entity or source, and may or may not meet the practice standards associated with federal and state cost-share programs. Non-cost-shared practices may lack the contractual provisions of cost-shared BMPs as well as the corresponding implementation and maintenance oversight. Non-cost share BMPs also include BMPs which are described as "resource improvement (RI) practices." RI BMPs are practices which provide an identical annual environmental benefit for water quality but which may not fully meet all design criteria of existing governmental standards such as designed lifespan.

The minimum expectation of verification for non-cost-shared BMPs is recommended to be 100 percent of the initial identification of annual or multi-year structural BMPs and

plan implementation by trained and certified technical field staff or engineers[23] with supporting documentation that it meets the governmental and/or CBP practice standards. Visual assessment for single year BMPs, such as tillage practices, can be statistically sub-sampled utilizing scientifically accepted procedures.[24] During the course of the identified physical lifespan period of multi-year BMPs, a reoccurring annual verification that the BMPs are being maintained and operated as per the appropriate practice standards at a minimum expectation for follow-up sub-sampling of 10% for BMPs achieving greater than 5% of the jurisdiction's WIP agricultural sector goals.[25]

It is important to note that BMPs which were initially implemented and/or operated under a cost-share, regulatory, or permit program but are transitioned out of these programs and no longer are under the oversight of a cost-share agreement, regulation, or permit, will be verified by the same level of verification described for non-cost shared BMPs if they are continued to be considered for ongoing pollution reduction crediting.

3. b. Cost-Shared BMPs

BMPs that are implemented with public funds; these funds are managed by federal, state, and county agencies, and in some cases non-governmental organizations (NGOs). Cost-shared BMPs typically have contractual oversight elements such as the required involvement of certified engineers, planners and technicians who evaluate the BMPs according to governmental established design standards. These standards are intended to ensure proper installation and maintenance of the BMP over the life span of the contract and consequently so as to allow tracking and reporting on the BMPs during the life of the contract. BMPs implemented through these programs typically have existing defined verification protocols in place for the BMP during the life of the contract with the landowner dictating implementation, operation and maintenance requirements, and may provide a sufficient level of verification.

The minimum expectation of verification for cost-shared BMPs is recommended to be 100 percent of the initial physical installation of annual or multi-year BMPs and plan implementation by trained and certified technical field staff or engineers with supporting documentation that it meets the governmental and/or CBP practice standards. During the course of the contractual oversight period involving multi-year BMPs, a reoccurring annual verification that the BMPs are being maintained and operated in accordance with the funding agency standards at a minimum expectation for follow-up sub-sampling of 10% for BMPs achieving greater than 5% of the jurisdiction's WIP agricultural sector goals.

[23] Trained and certified technical field staff or engineers include those agency personnel, cooperative organization personnel, and other private- and non-governmental entities that have participated in training provided by NRCS, jurisdictions, and partnering agencies for practice implementation and assessment.

[24] Statistically sub-sampled may be acceptable for visual assessment of widely-used single-year BMPs (such as conservation tillage), where 100% verification is not feasible. Sub-sampling protocols will be subject to approval by the Verification Review Panel and should utilize scientifically accepted procedures developed in consultation with statistical experts.

[25] For BMPs that constitute ≤5% of the agricultural sector load reductions in the jurisdiction's approved WIPs, 5% statistical sub-sampling of tracked and reported practices is permissible for the non-cost share and regulatory program BMP categories in this section. For cost-shared category BMPs, 5% of the active contracts is permissible, and for permit-issued BMPs, 100% sampling is required.

3.c. Regulatory Programs

Programs that provide oversight of a BMP through a legally imposed regulatory system. Some BMPs may be specifically identified as a legal requirement, while others may be the result of implementation of a legally-required management plan or system. Because regulations differ by state, there are differences in oversight by federal, state and local agencies across the Bay watershed.

BMPs implemented under the requirements of governmental regulatory programs typically have existing but varied verification protocols in place for BMP implementation, operation, and maintenance over the design lifespan of the practice and may provide a sufficient level of verification.

Included within the regulatory program, understanding that offset and credit programs are continuing to evolve, are BMPs tied to offsets, mitigation, and trading. Agricultural verification protocols need to include procedures for identifying and separately managing practices which are tied to offset, mitigation, and trading programs to ensure that BMPs are not double-counted. BMPs tied to offsets, mitigation, and trading programs typically have their own specified verification protocols to achieve their intended programmatic environmental objectives.

The minimum expectation of verification for regulatory program BMPs is recommended to be 100 percent of the initial identification of annual or multi-year BMPs and plan implementation by trained and certified technical agency field staff or engineers, or compliance/enforcement staff, with supporting documentation that it meets the governmental and/or CBP practice standards. Visual assessment for single year BMPs such as tillage practices can be statistically sub-sampled utilizing scientifically accepted procedures (when allowed within the regulatory program structure). During the course of the identified physical lifespan period of multi-year BMPs, a reoccurring annual verification that the BMPs are being maintained and operated consistent with the regulatory standards at a minimum expectation for follow-up sub-sampling of 10% for BMPs achieving greater than 5% of the jurisdiction's WIP agricultural sector goals.

3.d. Permit-Issuing Programs

Regulatory programs that require an agricultural production operation to operate or conduct certain activities under a permit. Inspections conducted by the regulating authority are typically a condition of the permit. A permit may require periodic renewals for multi-year extensions. Implementation, operation and maintenance of BMPs are permit elements.

BMPs implemented under the oversight of permitting programs typically include defined verification protocols for all stages of BMP implementation, operation, and maintenance for the life of the permit, and may provide a sufficient level of verification.

The minimum expectation of verification for permit-issuing program BMPs is recommended to be 100 percent of the initial identification of annual or multi-year BMPs and plan implementation by trained and certified technical agency field staff or engineers, or compliance/enforcement staff, with supporting documentation that it meets the governmental and/or CBP practice standards. During the course of the identified physical

lifespan period of multi-year BMPs, a reoccurring annual verification that the BMPs are being maintained and operated consistent with the permitting standards is recommended to be 100 percent of the total number of tracked and reported BMPs.

Part 4: Agricultural BMP Verification Methods

Depending on the jurisdiction, a significant number of agricultural operations may legally operate without oversight from federal and state permitting and regulatory programs or participation in voluntary cost-share programs. Verification of BMPs for all farms, regardless of presence or absence of cost-shared or regulatory programs can be accomplished through the following or combination of the following:

4a. Farm Inventory

A survey or listing of physical BMPs completed by certified, trained technical staff, or by the producer. The survey or listing is based on physical inspection. The reliability of the information and the level of verification depends upon the intensity and frequency of the survey, the training of the person completing the survey, and whether the person completing the survey must certify to its accuracy with penalties for false information. Producer completed inventories without third-party verification are not considered an adequate method for verification.

4b. Office/farm Records

An evaluation of paperwork on record at the conservation district office or the farm operation itself rather than an on-site inspection of physical BMPs. Records alone are not considered an adequate method for verification, but can be a critical compliment to other methods, especially when associated with non-visual assessment BMPs.

4c. Transect Survey

An inspection of a statistical-based sampling of BMPs. A transect survey is appropriate for a single year visual assessment of practices such as tillage management. The reliability of this method is based on the sampling and inspection methods and the training and independence of the inspectors. Transect surveys as a visual verification method are not considered an adequate method for verifying non-visual BMPs, or multi-year visual BMPs which require direct inspection, office/farm records, or certified training and engineering.

4d. Agency-sponsored Surveys

A survey of a statistical sampling of farms. Limitations on the reliability of data are similar to those for farm inventory and office/farm records. Periodic surveys and associated reports published by the National Agricultural Statistics Service (NASS), Conservation Effects Assessment Program (CEAP) and Natural Resources Inventory (NRI) are examples of this type of survey.

4e. Remote Sensing

A science-based review of images or photographic signatures verified through aerial photography, satellite imagery, or similar methods to identify physical practices on the landscape. This method may involve site-by-site imaging or statistical sampling. Implementing a sufficient land-based sampling validation protocol is necessary for

ensuring the analysis of the remote images or photographic signatures are calibrated to actual conditions.

Part 5: Agricultural BMP Verification Priorities

The CBP's BMP Verification Subcommittee and the BMP Verification Review Panel have acknowledged the potential financial and technical limitations that exist when seeking to fully implement the elements of this verification guidance. For this reason, public and private entities engaged with agricultural BMP verification are encouraged to direct their verification efforts in direct proportion to the environmental benefits that a BMP contributes towards the TMDL pollutant reduction for a jurisdiction's agricultural source sector. Agricultural BMPs that result in the highest pollutant reductions for each jurisdiction's agricultural source sector should correspondingly be the highest priority for implementing statistically significant verification protocols.

The Jurisdictional Agriculture Verification Protocol Design Table described in the following section (Tables 4-6) provides specific guidance as to identify the minimum expected levels of verification inspections by agricultural BMP category (Visual – 1 year, Visual – multi-year, and Non-Visual). Tracked and reported BMPs achieving greater than 5% of the sector's WIP reduction goals should receive the highest level of verification rigor. Those BMPs calculated to achieve ≤5 % of the sector goal), can be verified with less rigor.

Part 6: Jurisdictional Agricultural Verification Protocol Design Table and Supplementary Information

The CBP's Jurisdictional Agriculture Verification Protocol Design Table provides the jurisdictions, the CBP and public with a streamlined guidance and overview of the minimum expectations for agricultural BMP verification (Tables 4-6), supplementary to the "Chesapeake Bay Program Best Management Practice Verification Program Design Matrix" and the "State Protocol Components Checklist" provided in the draft basin-wide framework report by the CBP. The elements of the Jurisdictional Agricultural Verification Protocol Design Table follow:

6a. WIP Priority

As described within the draft basin-wide verification framework report, jurisdictions can choose to vary the level of verification based on the relative importance of a specific practice to achieving the jurisdiction's WIP nutrient and sediment pollutant load reduction targets. By clearly documenting the relative WIP priority for a BMP or group of related BMPs, a jurisdiction can target its verification investments to those BMPs which provide the greatest pollution reductions, or are employed the most often.

6b. BMP Grouping

Jurisdictions do not need to develop and document detailed protocols for individual BMPs across the universe of BMPs that they track, verify, and report for nutrient and sediment reduction load credit. Instead, jurisdictions should take their complete listing of tracked and reported BMPs and organize them by the categories that best account for the jurisdiction's relative Watershed Implementation Plan (WIP) priority, in logical groupings of the data specific to the jurisdiction, and consideration of the BMP types described in the relevant Agriculture Verification Guidance. Then, as presented within

the Jurisdictional Agricultural Verification Protocol Design Table, the jurisdiction would document the appropriate protocols and procedures followed for each logical grouping of BMPs.

6c. Initial Inspection and Follow-up Checks

The Jurisdictional Agricultural Verification Protocol Design Table illustrates the CBP Partnership's BMP Verification Review Panel's recommendation to the jurisdictions for structuring their verification programs to carry out an initial inspection for answering the question "is the BMP there?" and then follow-up checks carried out at the appropriate frequency to answer the question "is the BMP still there and operating" throughout the lifespan of the practice.

6d. Lifespan and Sunsetting Practices

The Jurisdictional Agricultural Verification Protocol Design Table prompts jurisdictions to provide documentation on procedures in place for conducting a follow-up check of a BMP at the end of its approved lifespan. **J**urisdictions would also document procedures for removing BMPs which go beyond their life spans and do not require follow-up checks to confirm the BMP is still present and operational.

6e. Data Quality Assuring, Recording, and Reporting

This section documents the systems and processes utilized by the jurisdictions to confirm that initial inspections and follow-up checks were conducted, to prevent double counting, and to ensure quality assurance of the reported data prior to acceptance by the jurisdiction. Because BMP data will likely be reported to a jurisdiction from multiple sources in addition to the state agencies, written procedures are necessary to assure the quality of the data accepted by the jurisdiction. Any additional steps taken in properly recording the accepted data prior to its reporting through the jurisdiction's NEIEN node should also be documented.

Part 7: Guidance for Development of an Agricultural Practice Verification Protocol

The guidance provided within Sections 2 – 6 above will enable the jurisdictions to select and tailor the verification for agricultural practices that best suits their respective BMP priorities while ensuring conformity in terms (definitions), choices for methods, and approaches basin-wide. Jurisdictions should refer to the *State Protocol Component Checklist*[26] for the key elements of a complete state verification protocol process. If a jurisdiction decides to eliminate a component because it is unnecessary for its state process, it should provide documentation for why that component was deleted.

Once jurisdictions have identified the WIP priorities and BMP groupings, the specific verification methodologies that the state intends to use should be established and documented including the appropriate personnel (training or qualifications) for conducting the data collection, reporting, and verification process.

Jurisdictions will select methods of documentation that provide adequate information about the BMP to enable independent spot-checks by appropriately trained individuals. Jurisdictions will

[26] The full State Protocol Component Checklist is provided in Table 11 in Section 14.

also develop an appropriate statistical selection process with the recommended review cycles of BMP implementation in their State Quality Assurance Plan.

Independent verification of BMP reporting programs and BMP implementation data will be addressed in state verification protocols. The State Quality Assurance Plans will ensure that the reported data is valid and representative of BMP implementation in the state. Independent verification can be conducted by agency personnel or qualified third parties, as long as they are trained to accurately assess BMP implementation data. Quality assurance personnel should be independent of those involved in the original BMP reporting and not directly involved with the entities responsible for the initial implementation of the BMPs.

All reported BMPs, whether non-cost shared, cost shared, regulatory or permit-required, should have distinct, CBP-approved definitions, appropriate design standards and/or indicators to enable accurate, reliable reporting of the BMP to receive the commensurate credit.

Jurisdictions will develop a method to review data reported to the NEIEN submission system to ensure that it was accurately entered and submitted according to CBP guidance documents. If BMP implementation information reported by states comes from external entities it will be subject to appropriate validation as required by the CBP.

Jurisdictions will develop a methodology to determine when and how to remove data from their BMP reporting system. Long term historical BMP's should have a distinct life spans where they are either re-verified or removed from the reporting system.

Part 8: Supplemental Assistance for Development of an Agricultural Practice Verification Protocol

Because a single verification method will not be relevant to all BMPs, or even across a single category of BMPs, jurisdictions will need to carefully evaluate the resources available for verification and the relative priority or significance of the BMPs it expects to verify. To assist jurisdictions, the Agriculture Workgroup has developed detailed supplemental matrices for the categories of agricultural BMPs described in Part 2:

- Visual Assessment BMPs - Single Year (Table 4)
- Visual Assessment BMPs - Multi-Year (Table 5), and
- Non-Visual Assessment BMPs (Table 6).

The supplementary matrices are arranged by type of verification method and provide reliability factors determined by the implementation mechanisms.

Table 3. Descriptions of the BMP performance measures provided by Supplementary Matrices for Jurisdictional Use.

BMP Performance Measure	Description
BMP detection	Can the practice be physically detected through visual or other assessment methods such as sample analysis, historic images

	or photographic signatures, or farm and office records.
Meets USDA/State/CBP design specifications	Those practices which are designed and implemented according to applicable federal or state standards which typically form the basis for assigning relative environmental benefits by the Chesapeake Bay Program partnership.
Meets federal/state/CBP operation and maintenance (O&M) specifications	Those practice which are being operated and maintained in accordance to applicable federal or state standards which typically form the basis for assigning relative environmental benefits by the Chesapeake Bay Program partnership.
Resource Improvement (non-specification)	Those practices which do not fully meet the applicable federal or state design specifications, and may have a shortened physical effective lifespan, but will provide equivalent environmental benefits on an annual basis.
Non-performance equivalent (non-specification)	Those practices which do not fully meet the applicable federal or state design specifications, and may not be operated or maintained to provide an equivalent environmental benefit on an annual basis to receive recognition by the Chesapeake Bay Program partnership.
Installation date	The installation date of the practice is important for determining the period of time it has provided environmental benefits, and if those benefits should be reported for credit, or have been previously accounted for in the Chesapeake Bay Program partnership's calibrated modeling tools.
Expiration date	The expiration date of the may refer to the physical effective lifespan of the practice such as the expiration of a management plan, or may refer to the expiration of the associated permit or contract, which could necessitate the use of an alternative verification assessment method for further crediting.

Table 4. Jurisdictional Agriculture Verification Protocol Design Table
Chesapeake Bay Program Partnership's Agriculture Workgroup
May 9, 2014

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Lifespan/ Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Visual Assessment: Single Year	Non-Cost Shared BMPs	**On-Site Visual Assessment (Limited Statistical Sampling)**	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Single Year	**10%[1] / 5%[2] QA of All Tracked & Reported BMPs (within the year)**	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Visual Assessment: Single Year	Cost-Shared Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Single Year	**10% / 5% QA of All Active Contractual BMPs (within the year)**	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data

Table 5. Jurisdictional Agriculture Verification Protocol Design Table
Chesapeake Bay Program Partnership's Agriculture Workgroup
May 9, 2014

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Lifespan/ Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Visual Assessment: Multi-Year	Non-Cost Shared BMPs	**On-Site Visual Assessment (Limited Statistical Sampling)**	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Multi-Year	10%[1] / 5%[2] Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Visual Assessment: Multi-Year	Cost-Shared Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet appropriate government and/or CBP practice standards	Multi-Year	**10% / 5% of All Active Contractual BMPs**	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data

High / Low	Visual Assessment: Multi-Year	Permit-Issuing Programs	On-Site Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Multi-Year	**100% Annually of All Active Permits**	Bring into compliance within one year or less, or remove from reported BMPs	Multi-Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
EXAMPLE BMP	Visual Assessment: Multi-Year	State CAFO Permit Program: Animal Waste Storage Structure	On-Site Visual Assessment: Initial CAFO Permit Inspection	100% of All Active CAFO Permits	State Agency CAFO Certified Inspector	State CAFO Permit Inspection Certification Form	On-Site Visual Assessment: State CAFO Permit Compliance Inspection	**100% of All Active CAFO Permits**	State CAFO Program Permit Compliance Policy	State CAFO Permit Lifespan: 5 Years	State CAFO Program Documentation / 5% QAQC Compliance Checks by EPA / Tracking & Reporting Protocol

Table 6. Jurisdictional Agriculture Verification Protocol Design Table
Chesapeake Bay Program Partnership's Agriculture Workgroup
May 9, 2014

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (*Is the BMP there?*)				E. Follow-up Check (*Is the BMP still there?*)			F. Life-span / Sunset (*Is the BMP no longer there?*)	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
High / Low	Non-Visual Assessment	Non-Cost Shared BMPs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	10%[1] / 5%[2] Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Non-Visual Assessment	Cost-Shared Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency/NGO field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	**10% / 5% of All Active Contractual BMPs**	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data

High / Low	Non-Visual Assessment	Regulatory Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	10% / 5% Annually of All Tracked & Reported BMPs	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data
High / Low	Non-Visual Assessment	Permit-issuing Programs	On-Site Non-Visual Assessment Only	100% of All Tracked & Reported BMPs	Trained and certified technical agency field staff or engineers	BMPs meet the appropriate government and/or CBP practice standards	Single Year	**100% Annually of All Active Permits**	Bring into compliance within one year or less, or remove from reported BMPs	Single Year	Document initial inspections/follow-up checks, prevent double counting, and QA reported data
EXAMPLE BMP	Non-Visual Assessment	State Regulatory Programs: Nutrient Application Management	On-Site Non-Visual Assessment: Nutrient Management Plan Implementation	100% of All Tracked & Reported Nutrient Application Management Plans	County Conservation District Technician - State Nutrient Management Program Certified	State Nutrient Management Program Certification Form	On-Site Non-Visual Assessment: Nutrient Application Management O&M Compliance	10% of All Tracked & Reported Nutrient Application Management Plans	State Nutrient Management Regulatory Compliance Policy	3 Year Plans	State Nutrient Management Program Documentation / 5% QAQC Compliance Checks by State Agency / Tracking & Reporting Protocol

[1] WIP High: Minimum expectation for follow-up sub-sampling of BMPs achieving greater than 5% of the jurisdiction's WIP agricultural sector goals.
[2] WIP Low: Minimum expectation for follow-up sub-sampling of BMPs achieving equal to/less than 5% of the jurisdiction's WIP agricultural sector goals.

Draft Agricultural BMP Verification Guidance Matrix: Version 4.1

Chesapeake Bay Program Agriculture Workgroup (AgWG)

May 9, 2014

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the partnership. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program Partnership's BMP Verification Principles, including any supporting addendums.

Visual Assessment BMPs - Single Year: Conservation Tillage; High-Residue Minimum Soil Disturbance; Cover Crops; Commodity Cover Crops / **Interim BMPs-** Dairy Manure Injection; Annual No-till; Poultry Litter Injection

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Visual Assessment BMPs - Single Year	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)
1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Not Eligible	Not Eligible	Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Eligible	Eligible
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
11.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified NGO personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
23.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified NGO personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

Draft Agricultural BMP Verification Guidance Matrix: Version 4.1

Chesapeake Bay Program Agriculture Workgroup (AgWG)

May 9, 2014

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the partnership. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program Partnership's BMP Verification Principles, including any supporting addendums.

Visual Assessment BMPs - Multi-Year: Animal Waste Management Systems; Barnyard Runoff Control; Biofilters; Continous No-Till; Forest Buffers; Grass Buffers; Land Retirement; Steam-Side Forest Buffers; Stream-Side Grass Buffers; Stream-Side Wetland Restoration; Tree Planting; Lagoon Covers; Loafing Lot Management; Mortality Composters; Non-Urban Stream Restoration: Shoreline Erosion Control; Off-Steam Watering w/o Fencing; Stream Access Control with Fencing; Prescribed Grazing; Horse Pasture Management; Pasture Alternate Watering Systems; Soil Conservation & Water Quality Plan Elements; Water Control Structures; Wetland Restoration / **Interim BMPs-** Alternative Crops; Dirt & Gravel Road Erosion & Sediment Control; Cropland Irrigation Management; Irrigation Water Capture Reuse; P-Sorbing Materials in Ag Ditches; Vegetative Environmental Buffers- Poultry

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Visual Assessment BMPs - Multi-Year	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)

1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Non-annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible
2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Non- annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Non- annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Not Eligible	Eligible	Eligible

4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Eligible	Potentially Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Eligible	Eligible
5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Non-annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Not Eligible	Not Eligible	Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Eligible	Eligible
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible

8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
11.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified NGO personnel. No on-site verification.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible

12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Non-annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible
16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Non-annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible

17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible
18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Non-annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Non-annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Non-annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible
23.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Non-annual frequency of statistical remote sensing surveys implemented by trained and certified NGO personnel, for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Not Eligible	Not Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible

Draft Agricultural BMP Verification Guidance Matrix: Version 4.1

Chesapeake Bay Program Agriculture Workgroup (AgWG)

May 9, 2014

The following BMP verification methods have been identified by the Agriculture Workgroup as representing primary pathways for BMP verification and reporting being utilized by the partnership. The associated opportunities and limitations inherent for each method and BMP category type represent the current level of confidence that a sufficient level of verification can be implemented to ensure that the BMPs have been (1) implemented, are currently operational, and are being maintained to meet the BMP definition and relevant practice standards and requirements; and (2) be in compliance with the Chesapeake Bay Program Partnership's BMP Verification Principles, including any supporting addendums.

Non-Visual Assesment BMPs: Dairy Precision Feeding; Swine Phytase; Poultry Litter Transport; Poultry Litter Treatment; Poultry Phytase; Decision/Precision Ag, Enhanced Nutrient Management; Nutrient Application Management; Precision Intensive Rotational Grazing; Soil Conservation & Water Quality Plans

Agricultural BMP Verification Methods	Assessment Methods	Verification Expectations	Non-Visual Assessment BMPs	Cost-Sharing Information					BMP Performance					
				Federal C/S	State C/S	NGO C/S	Private Funded	Previously C/S BMPs (Expired Contract)	BMP Detection	Meets USDA/ State Design Specs	Meets Federal/State O&M Specs	Resource Improvement (Non-Spec)	Installation Date (M/Y)	Expiration Date (M/Y)
1.) Permit Issuing Programs	Verified compliance with federal NPDES (CAFO) or state agricultural operational permit program requirements.	Annual frequency of permit compliance inspections for all or sufficient statistical percentage of permitted operations during permit life span. Review of office/farm records.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

2.) Regulatory Programs	Verified compliance with federal or state agricultural regulatory requirements (non-operational permit).	Annual frequency of regulatory compliance inspections for all or sufficient statistical percentage of regulated operations. Review of office/farm records.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
3.) Financial Incentive Programs	Verified compliance with federal program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible
4.) Financial Incentive Programs	Verified compliance with state or county program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Eligible	Eligible	Eligible	Non-Applicable	Eligible	Eligible

5.) Financial Incentive Programs	Verified compliance with NGO program contractual requirements.	Annual frequency of contractual compliance inspections for all or sufficient statistical percentage of contracted operations during contractual life span. Review of office/farm records.	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Potentially Eligible	Potentially Eligible	Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Eligible	Eligible
6.) Farm Inventory	Farm inventory by trained and certified federal, state, and/or county agency personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
7.) Farm Inventory	Farm inventory by trained and certified NGO personnel.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
8.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified federal, state and/or county personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

9.) Farm Inventory	Farmer completes self-certified inventory survey and trained and certified NGO personnel verify on-site.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
10.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
11.) Farm Inventory	Farmer completes in-office self-certified inventory with assistance of trained and certified NGO personnel. No on-site verification.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span. Review of office/farm records.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
12.) Farm Inventory	Farmer with training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

13.) Farm Inventory	Farmer without training and certification completes self-certified inventory survey.	Annual frequency of inventories for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
14.) Office Records	Review of existing office records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of office records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
15.) Farm Records	Review of existing on-farm records by trained and certified federal, state and/or county agency personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
16.) Farm Records	Review of existing on-farm records by trained and certified NGO personnel. No on-site verification.	Annual frequency of on-farm records review and verification for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Potentially Eligible	Not Eligible	Not Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
17.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified federal, state and/or county personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible

18.) Transect Survey	Statistically designed and recognized transect survey completed by trained and certified NGO personnel.	Annual frequency of statistical transect surveys for a sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible
19.) CEAP Survey	CEAP statistical survey conducted in-person at field-level scale following NASS verification protocols.	Non-annual frequency of statistical CEAP surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
20.) NASS Survey	NASS statistical survey conducted at farm-level scale following NASS verification protocols.	Annual frequency of statistical NASS surveys for all or sufficient statistical percentage of operations during BMP life span.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible
21.) NRI Point (NRCS) or some other statistically selected sites	Statistical survey conducted in-person at field-level with NASS trained and certified personnel.	Non-annual frequency of statistical NRI surveys for a sufficient statistical percentage of operations during BMP life span may limit verification.	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Potentially Eligible	Non-Applicable	Potentially Eligible	Potentially Eligible

22.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified agency personnel, for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible
23.) Remote Sensing	Statistically designed and recognized remote sensing surveys with supporting field-level scale ground-truthing verification.	Annual frequency of statistical remote sensing surveys implemented by trained and certified NGO personnel, for all or sufficient statistical percentage of operations during BMP life span.	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Non-Applicable	Not Eligible	Not Eligible

Forestry Verification Guidance

Version: Final, May 9th, 2014

This section describes guidance on how to verify the existence and performance of forestry BMPs in the Bay watershed. It has been revised to incorporate comments delivered by the Chesapeake Bay Program Partnership's BMP Verification Review Panel at their most recent meeting in April 2014. The organization is as follows:

I. Introduction

This guidance provides information on Forestry Best Management Practices (BMPs) and how best to verify that they have been correctly reported, installed, and maintained so they are deserving of the water quality benefits (nutrient and sediment load reductions) bestowed upon such Practices.

Forests cover the majority of the landscape in each Bay state. Protection of forested lands and restoration of trees in priority areas, such as riparian forest buffers (RFBs) along streams and shorelines, are vital for Bay watershed water quality and ecological health. The CBP Executive Council adopted an ambitious, science-based RFB goal in 2007 as part of the Forest Conservation Directive. Riparian forest buffers planted on agricultural land are one of the BMPs on which the states are most relying to achieve Bay water quality goals in their Phase II Watershed Implementation Plans. In addition to RFBs, other forestry BMPs play an increasingly important role, especially in the urban sector (see Section VI.).

Forests are not generally pollution sources. Instead, they absorb and use nutrients (greatly reducing nutrients from airborne sources, for example) and retain and use sediment, thus aiding pollution prevention. Four of the five Forestry BMPs covered by this guidance are types of tree planting designed to improve environmental and water quality conditions in currently non-forested areas, including tree planting in riparian areas. These tree planting practices apply to Agriculture and Urban landscapes. The Forest Harvesting BMPs are the only BMPs applied specifically to current Forest landscapes at this time.

Generally speaking, forest planting BMPs (riparian forest buffers and tree planting) are intended to last for a very long time. After verifying that buffer and tree planting projects have been installed and surviving according to plans, and after performing site inspection and maintenance during the initial growth period or until considered established), forest BMPs will become easier to verify by aerial photography and inexpensive to maintain over the long term compared with

other types of BMPs. Once the tree planting is established, the principal remaining concern is whether effectiveness of buffers will be undermined by concentrated flow or channelization circumventing the benefits of the buffer.

The five forestry BMPs for which verification guidance is presented are: a) agricultural riparian forest buffers; b) agricultural tree planting; c) expanded tree canopy; d) urban riparian forest buffers; and e) forest harvesting BMPs. Because of similarities in how the two agricultural BMPs are implemented, and how the urban forestry BMPs are implemented, they are grouped accordingly. This guidance is for use by the Chesapeake Bay states and, in general applies to federal installations as well, so they may use it to write Protocols for verification.

The Forestry Workgroup is mindful of the extensive resources needed to support BMP verification, and fully supports the "verification intensity" concept recommended by the CBP-VRP (2013). 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 Watershed Implementation Plan. The basic notion is to prioritize local and state verification resources on the BMPs that produce the greatest modeled load reduction in each state as reported in their annual progress runs to CBP. The converse also applies: less verification resources should be devoted to BMPs that make minor contributions to overall load reductions.

II. Role of the Forestry Workgroup in Verification

Since the late 1990s, the Forestry Workgroup has worked with Bay states to improve tracking and implementation of the oldest and most important BMP for water quality improvement: riparian forest buffers on agricultural lands. Bay watershed state forestry agencies are involved to varying degrees in inspecting newly-installed buffers and providing guidance and assistance for other forest restoration activities. When the Workgroup reviewed jurisdictions' tracking practices for all forestry BMPs in a December 2011 workshop, it saw a notable disparity in how and whether jurisdictions collected BMP implementation data. For example, regulation and oversight of forest harvesting vary considerably among states. Urban forestry BMPs (urban riparian buffers and expanded tree canopy) have only begun to be reported regularly by jurisdictions, despite having been defined Bay Program practices for over 10 years.

Seeing the disparities, the Forestry Workgroup was primed to work on BMP verification and more consistent BMP tracking in 2012. The Workgroup responded to the Water Quality Goal Implementation Team's request to develop guidance for verifying BMPs as part of the CBP's overall initiative to improve accountability of restoration practices. Multiple versions of the guidance were reviewed and discussed during Workgroup meetings in 2012 and 2013. The Expert Panels for Riparian Forest Buffers and Urban Tree Canopy provided input. In addition to BMP verification, the Forestry Workgroup tackled an even more difficult accounting issue: the extent to which agricultural riparian buffer planting has resulted in a net gain of forest buffers watershed-wide, given the loss of riparian forest to development and, in some areas, to crops. The Workgroup also looked at tools for assessing the net effect of urban tree planting.

The process was aided by interactions with the Agriculture and Stormwater Workgroups, who are keenly interested in forestry practices taking place on agricultural and urban lands. These Workgroups have agreed that the Forestry Workgroup should develop technical verification definitions and guidance for forestry practices which supplement the general verification

guidance they produce. In particular, the Forestry Workgroup guidance goes beyond that guidance to focus on net gain in riparian forest buffers and tree cover.

III. Background on Forestry BMPs Implemented on Agricultural Lands

Agricultural riparian forest buffers and tree planting are most often implemented in the Chesapeake Bay watershed through the USDA and state agricultural cost-sharing programs. In fact, a single project may be funded by multiple agencies. Cost-shared project design and implementation are guided by technical standards, and there are verification programs already being implemented by the funding agencies. In some states, state forestry departments provide additional monitoring for agriculture cost-share projects involving tree planting.

Riparian forest buffers and tree planting may also be carried out voluntarily by a farmer at his own expense. To date, such projects are a small fraction of the total projects credited in the Chesapeake Bay Program, but there is a current initiative under the 2010 Chesapeake Executive Order Strategy to develop a program for recognizing and giving credit to voluntary agricultural BMPs, including forestry BMPs. The voluntary riparian buffer plantings reported to date have generally been orchestrated by large non-governmental organizations that regularly do this type of work with volunteers.

Riparian Forest Buffer Description: Agricultural riparian forest buffers are linear wooded areas along rivers, streams, and shorelines with at least 2 types of woody vegetation. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as groundwater. The recommended buffer width for agricultural riparian forest buffers is 100 feet, with acceptable widths from 35-300 feet.

Tree Planting BMP Description: Agricultural tree planting includes any tree planting on agricultural land, except those used to establish riparian buffers. Lands that are highly erodible or identified as critical resource areas are good targets for tree planting.

Current Procedures:

The vast majority of forest practices on agriculture land are cost-shared conservation practices on agricultural land that are long-term in nature (once established, the practice often continues in perpetuity needing relatively little maintenance), and originate with a Conservation Reserve Enhancement Program (CREP) or Environmental Quality Improvement Practice (EQIP) contract. Procedures for approving contracted practices are established by USDA. Often, more than one agency has oversight of these agricultural tree planting practices, including the federal USDA's Farm Services Agency (FSA) and Natural Resources Conservation Service (NRCS), state forestry, Conservation Districts, etc. For simplicity, and because roles vary from state-to-state, all those providing oversight of tree planting activities are referred to as CREP partners. For instance, FSA will keep contracts for CREP, a forestry agency will write a planting plan and check for compliance, and a technical service providing agency may make multiple site visits and have landowner contact. Sometimes multiple databases track the same practice.

Until now, agricultural tree planting has not been a commonly-reported practice to the Bay Program. However, there are new and expanding opportunities through agroforestry to plant trees on agricultural land. Agroforestry is the intentional mixing of trees and shrubs into crop

and animal production systems for environmental, economic, and social benefits, and includes practices such as windbreaks, silvopasture, and alley cropping.

Procedures on how to establish a riparian forest successfully are well-documented (for example, MD DNR 2005). It starts with a planting plan designed by a forester. Aspects of a good plan include: species selection, site preparation, and spacing of trees, among other factors. Forest buffer plantings almost always use tree shelters (e.g. 98% of the time in VA) to protect against herbivory. Shelters increase survival from 12% (no shelter) to 74% (with 4-foot shelter). Herbicide treatment is also highly recommended. Some of the trees planted are expected to perish but most must survive or be replanted to comply with contractual specifications. Repeated visits are made during establishment.

After establishment, a buffer planting may need additional maintenance to be fully functional. Adverse impacts include excessive traffic, livestock or wildlife damage, fire, pest or invasive plant infestations, and concentrated or channelized flows. The NRCS standard for this practice (Code 391) says the buffer will be inspected periodically and protected from these impacts. Maintenance is the responsibility of the landowner, and a portion of the public funding provided to the landowner is designated for maintenance expenses.

Below is the current protocol for verifying contractual agreements in CREP:

A. Verify Planting Establishment

   i. In practice, NRCS or another technical assistance partner (e.g., CREP partner) confirms proper establishment on every site at the 1 or 2-year point, and every year thereafter until the planting is determined to be established. "Established" means that the buffer meets the NRCS forest buffer practice standards and any additional state requirements (required stocking/survival rates vary by state).

   ii. If the site visit determines that the practice has not yet been established, replanting is usually required to get the buffer up to standard, and further site visits may be needed until the replanting is established. If the buffer never becomes established, it is taken out of contract.

   iii. Some states include detailed monitoring of plantings as well. Virginia CREP partners - VA Department of Forestry is the primary forestry technical expert - visit every planting site 3 times and have routine documentation about species planted, survival rate, and other issues.

B. Spot Check Plantings

   i. After the practice has been reported as established, USDA has a standard program of compliance checks on a portion of all contracts; the requirement is for a minimum of 10% of the buffer contracts to be spot-checked each year.

   ii. State agriculture conservation programs that provide a portion of CREP cost-share may have additional verification requirements, for example, VA

DCR requires spot checks on 5% of practices under contract each year throughout their lifespan.

C. Tracking

Currently, USDA data are used by most states to report accomplishments to the CBP model. These data include acres of practice, but do not currently include width of practice. Because of the CBP agreements and directives emphasizing the need for riparian forest buffer restoration, and to assure consistent, good reporting by jurisdictions, a second complimentary process was developed by the Forestry Workgroup. Since 1997, the Workgroup has been tracking buffers installed on agricultural lands. Each fall, the Workgroup requests geo-spatial data from the Bay states. The following 10 fields are requested from the state contacts and every year CBP maps the point data for analysis:

Field 1: Unique identifier (parcel ID, etc.)
Field 2: State
Field 3: Latitude
Field 4: Longitude
Field 5: Miles of forest buffer
Field 6: Width of forest buffer
Field 7: Planting date
Field 8: Ownership type (public/private: Federal, state, other public, private)
Field 9: Notes/Comments field
Field 10: Watershed name or HUC

The Forestry Workgroup's specialized tracking has been a means of cross-checking what is reported to the National Environmental Information Exchange Network (NEIEN)/Chesapeake Bay (CB) model--- it helps prevent double-counting and it establishes an average width of practice. As improvements are made to riparian forest buffer information coming through the USDA agreement with EPA and USGS, and confidence in the information improves, the Forestry Workgroup will evaluate whether to continue its complementary tracking procedures.

IV. Verification Guidance for Agricultural Riparian Buffers

1. *Verification methods for cost-shared agricultural riparian forest buffers will utilize and build upon the verification programs already implemented for cost-share contracts.*

- Continue following the current protocol for verifying contractual agreements in CREP and verifying the buffer has been installed according to plan. In the plan, it is suggested to note likely site impacts that need to be addressed with maintenance. After installation, a buffer site should be visited at least twice during the time it is becoming established to assure the buffer will meet practice standards and any problems are corrected. The minority of buffers that are cost-shared using other programs (e.g., EQIP) should follow the same protocol used for CREP buffers.

- A buffer can be credited when its installation according to plan is confirmed. When reporting the buffer for CBP credit, the reporting agency should capture width of the buffer in the NEIEN in addition to acres of practice.

2. Inspection and maintenance are critical: a) to insure riparian forest buffers become established effectively; and b) to verify that the buffer is being maintained throughout the contract.

- After establishment is verified per contractual procedures, proceed with periodic inspections (spot checks) to see how well maintenance issues are being addressed by the landowner. Currently, a minimum of 10% of contracted practices are spot-checked. But additional spot checks are needed to ensure that impacts do not threaten the performance of the buffer.

- States should be 80% confident that water quality impacts are being avoided in the most likely places. Statistical sampling is recommended as a targeted and cost-effective means to have confidence that maintenance is happening effectively. Sampling design should focus on common and specific maintenance issues that have the most potential to impact water quality, such as channelization/concentrated flows. For instance, to protect from concentrated flows, a stratified sampling design could look at all buffer sites that are on slopes of 7% or greater –i.e., where the impact is most likely to occur.

- States should describe in detail how they plan to conduct follow-up checks that go beyond the 10% spot-checking that is the current practice.

- Plantings to be spot-checked for maintenance should be between 5 and 10 years old because this is the period between establishment and re-enrollment when the least number of inspections occur. Most maintenance issues are easily detected, and state protocols should describe typical maintenance violations that need to be checked. If statistical sampling design help is not available, states can recommend other means of spot-checking to reach an 80% confidence level.

3. Special attention is needed at the end of contract life (10 or 15 years), to determine if a new contract will ensure continuation of the buffer or if the buffer will be maintained voluntarily without a contract. In lieu of confirmation that the buffer will still be on the landscape, it will need to be removed from NEIEN after the contract expires.

- This action is recommended to encourage the conservation of existing buffers. CREP contracts expire after 10 or 15 years, and a record amount of sign-ups in 2001-2007 are due to expire in the next few years. There are three likely scenarios when a contract is ending: 1) the landowner re-enrolls the buffer into another 10 or 15-year contract; 2) the landowner does not re-enroll, but plans to keep the buffer; or 3) the landowner does not re-enroll and plans to get rid of the buffer. Actions taken now by CREP partners can lead to more landowners being in the re-enrollment category (#1), and to knowing what to expect for those lands coming out of contract (#2 or #3). To re-enroll, CREP partners must determine that the buffer still meets the practice standards (survival/stocking rate). To facilitate the re-enrollment process (and thus retain functioning buffers), the following actions are recommended:

a. CREP partners conduct outreach/technical assistance to landowners with expiring contracts.

b. CREP partners field check buffer sites in the last 2-3 years of contract to assess whether buffers meet standards and will be continuing after contract expiration, either through re-enrollment in CREP or voluntary retention of buffer.

c. Acres of buffer that do not meet the practice standard or will not be retained should be removed from NEIEN/CB model. FSA will assign a unique identifier to each project in the future so it can be tracked better and doesn't become double-counted when re-enrollment occurs.

*4. Any new acreage of riparian forest buffer reported represents **a net gain** in overall buffer for a county or land-river segment. The following examples support this point:*

a) Laws or ordinances that encourage conservation of existing buffers are in place.

b) Monitoring and maintenance occurs on both newly planted buffers and also on existing buffers.

c) Periodic sampling of total buffer area to indicate that overall riparian buffer canopy in the county or watershed segment is increasing (Part 3 below).

- CREP partners should establish a baseline for total riparian forest buffer acreage in a given county using high resolution aerial imagery, Land Image Analyst, or another tool. Every 10 years, the reporting agency will re-sample the three counties in each state that have experienced the most development or increase in agriculture (per agriculture census) to show there has not been a loss in total buffer cover. If a loss in overall riparian forest buffer coverage in these counties is detected, it will result in county-wide removal of buffers reported as a "net gain" for those years. The theory is that if a state can show that it is maintaining buffers in the counties with the most threat, then it is assumed that buffers are being protected in less critical counties.

5. *Where agricultural riparian forest buffers are being planted voluntarily and reported by farmers or non-governmental organizations, jurisdictions may give them credit for an initial four years without inspection, if such plantings are a small percentage (less than 10%) of the total acreage of buffer plantings reported in a given year.*

- To credit riparian forest buffers installed voluntarily by a landowner or non-governmental organization, the reporting agency must obtain information (e.g. description of the project plan and photographs) to verify that the buffer has been installed, and has the characteristics of an effective buffer (at least two tree species and a minimum width of 35 feet). In addition, credit requires the same tracking information as described for cost-shared practices.

- When voluntary riparian forest buffers account for only 10% or less of a state's reported buffer acreage, initial verification does not necessarily require a site-inspection. If the voluntary practice is done in cooperation with a CREP partner, the state can receive credit for four years without inspection. All practices that are inspected at the 4-5 year

mark can remain in the NEIEN record if the site visit by a CREP partner shows that the buffers are established, and they are included in the spot check protocol (similar to cost-share practice) outlined in Part 2.

V. Verification Guidance for Agricultural Tree Planting

1. *Verification methods for cost-shared agricultural tree planting will utilize the verification programs already implemented for cost-share contracts.*

    - For purposes of verification, this practice will follow the BMP Verification Guidance put forth by the Agriculture Workgroup.

    - For tracking and crediting purposes, 100 trees planted equals one acre of practice (the same as for expanded urban canopy).

    - For plantings over an acre, a forester-developed planting plan is recommended.

VI. Background on Forestry Practices on Urban Lands

Bay jurisdictions have had urban forestry programs for the past ~30 years, having been established after the 1978 Cooperative Forestry Assistance Act and other means. These programs provide assistance to improve the health of urban trees including tree planting and maintenance to ultimately expand the urban tree canopy. There are multiple grant opportunities in the Bay watershed to encourage the development of urban forestry programs and urban tree canopy expansion. In many cases, grassroots urban forest programs have developed because individuals and organizations realize the many benefits (water quality being one) that urban trees bring people and because the investment by the programs in planning and maintenance of trees has been shown to pay back in multiples.

Increasing tree cover in communities is one of the most sustainable and cost-effective practices to improve both societal well-being and the environment.

Tree planting can be a cost-effective way to meet regional air quality goals and is increasingly included in air quality improvement plans as a voluntary measure. In 2007, the Chesapeake Bay Executive Council committed to having 120 communities develop urban tree canopy expansion goals by 2020. The Chesapeake Bay Agreement of 2014 will have a goal to plant 2,400 acres of urban forest by 2025. Urban forest buffer restoration is another practice that is increasing in importance: i.e., it has not been reported regularly in the past, but is expected to be a significant part of certain states WIPs.

Many localities in the watershed have had assessments done of their tree canopy and set goals to increase their urban tree canopy (Figure 2). In recent years, the number of tools available for assessing and monitoring an urban canopy has soared, especially those using aerial imagery and software technology. In 2004, the Science and Technology Advisory Committee (STAC) held a workshop introducing these tools (STAC 2004). One leading program, the iTree suite of tools, is a free, peer-reviewed software suite from the USDA Forest Service that provides urban forestry analysis and benefits assessment tools (www.itree.com). Even more basic is the use of Google Earth® imagery to view tree canopy.

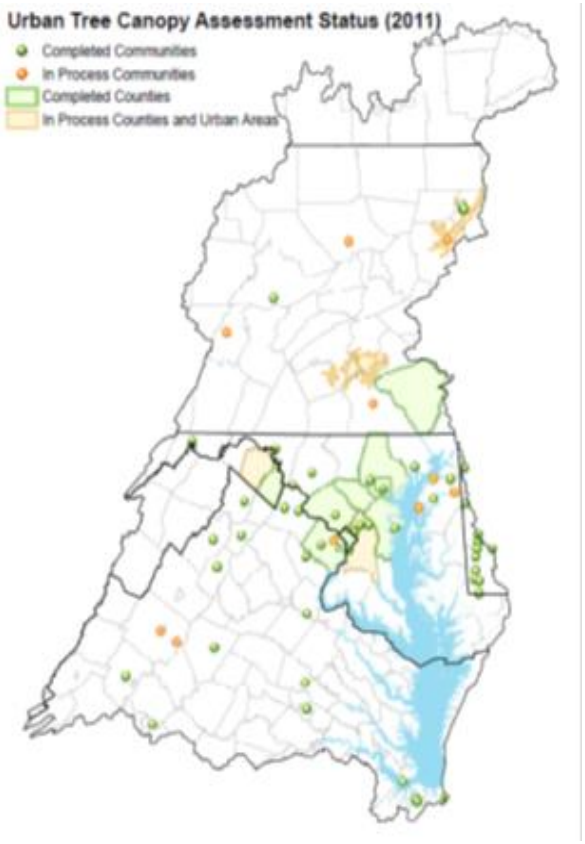


Figure 2. Urban tree canopy assessment status (2011) in the Chesapeake watershed.

The two urban forestry practices, Expanded Tree Canopy and Urban Riparian Forest Buffers, overlap with practices covered by the BMP Verification Guidance of the Urban Stormwater Workgroup. As noted in that guidance, the practices may be implemented as part of a program to meet regulatory requirements, such as Clean Water Act MS4 permits. Tree planting has received a boost as federal, state and local stormwater requirements have strengthened provisions for maintaining and restoring natural hydrologic conditions in developed and developing areas.

Expanded Tree Canopy Description: Expanding tree canopy is the overall percent of tree cover in a geographically defined locality on developed land. Credit is applied according to the number of new acres (net gain) of tree cover, i.e., amount of canopy expansion. If number of trees planted (not acres, non-contiguous) is reported, the following conversion factor is used:

100 trees = 1 acre of new tree cover

All tree planting data is aggregated and submitted to the state by a locality, for further aggregation to the CB model per land-river segment.

Urban Forest Buffer Description: An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. An urban riparian forest buffer is any riparian buffer not in an agriculture or forest setting-- it is on developed land.

Current Procedures: At present, reporting of urban forestry practices by jurisdictions is not well-established, and procedures have been limited. In particular, there are questions about

follow-up inspections and maintenance after initial planting. Also, there has been no means of assessing that tree planting projects are resulting in a net gain of tree cover.

VII. Verification Guidance for Expanded Tree Canopy

The Urban Stormwater Workgroup BMP verification guidance outlines a number of general principles that apply to Expanded Tree Cover when used by a locality for stormwater management. Those that pertain to Tree Canopy include: 1) verification methods will be appropriate for the level of enforcement (e.g., consent decree or voluntary homeowner practice; 2) maintenance is essential to performance; 3) BMP reporting must be consistent with the CBP standards.

The Forestry Workgroup adds the following forestry-specific guidance:

1. Establish urban forestry partner and support mechanisms

- For a decentralized practice, primarily on private land, a local urban forestry partner provides confidence in tree survival/health and accuracy in tree reporting in a defined locality. An urban forest partner may be a local government entity, or a non-governmental organization with necessary expertise who works cooperatively with the locality. The partner is endorsed by the state forestry agency, which provides oversight and support with training, tools, etc. In turn, urban forest partners provide outreach and technical assistance on urban tree planting, tree care, and other issues that arise.

2. Urban forestry partner tracks and reports new acres of tree canopy in locality

- For new plantings, collect 1) acres of planting, 2) dates of planting, and 3) anticipated stature of trees at maturity (e.g. large or small). Urban tree canopy plantings can be credited once planting is confirmed. All plantings over ½ acre should be site-checked by the urban forestry partner.

- For natural regeneration acres, two similar pieces of data should be recorded: 1) acres of treatment, and 2) date started. But because of the difficulty to establish tree canopy in this way, this information is reported for credit only after a 4-year maintenance period. Regeneration areas can be mowed, fenced or signed as deemed necessary.

- To credit new acres reported voluntarily by a landowner or other partner, the reporting partner must conduct a site visit or obtain additional information (e.g., information in the bullet above and photographs) to verify the new acres.

3. Urban forestry partner maintains new areas of canopy

- New urban plantings can have a high rate of mortality, succumbing to weed suppression, dehydration, physical damage, or other injury. Removing competing vegetation is often necessary. An individually planted tree (e.g., a tree pit or open planting; non-contiguous) that dies should be replaced, or removed from the NEIEN database.

- For natural regeneration areas, ensure desirable tree growth is not suppressed until a density of 100 trees/acre is reached and the trees are of a height where they can grow

unhampered (above competing vegetation and deer browsing level of 4 feet). Area of intended tree canopy via natural regeneration should be a minimum of 1/4 acre (or adjoin to existing forest).

4. Reported practice represents a net gain

- Every 5 years, a locality should re-assess the tree canopy in its defined boundaries to show that there has not been a decrease in overall canopy. If tree canopy decreases, the amount of decrease will be deducted from the total acres credited in that 5-year period.

Use of free aerial imagery and assessment tools such as iTree Canopy (http://itreetools.org/) or the Land Image Analyst (not yet released) can be a cost-effective means of sampling and creating a quick assessment of canopy cover.

iTree Canopy is designed to allow users to easily and accurately estimate tree cover within identified localities. This tool randomly lays points (number determined by the user) onto Google Earth imagery and the user then classifies what cover class each point falls upon. The user can define any cover classes that they like and the program will show estimation results throughout the interpretation process. The more points completed per size of the area to be sampled, the better the cover estimate. From this classification of points, a statistical estimate of the amount or percent tree canopy can be calculated along with an estimate of uncertainty of the estimate (standard error (SE)). A confidence interval of 95% should be reached to show no loss of canopy in the 5 year period.

Example Canopy Assessment from iTree Canopy

To illustrate how to use iTree Canopy to estimate canopy cover, let us assume 1,000 points have been interpreted and classified within a city as either "tree" or "non-tree" as a means to ascertain the tree cover within that city, and 330 points were classified as "tree".

To calculate the percent tree cover and Standard Error (SE), let:

N = total number of sampled points (i.e., 1,000)

n = total number of points classified as tree (i.e., 330), and

p = n/N (i.e., 330/1,000 = 0.33)

q = 1 – p (i.e., 1 - 0.33 = 0.67)

SE = $\sqrt{}$ (pq/N) (i.e., $\sqrt{}$ (0.33 x 0.67 / 1,000) = 0.0149)

Thus in this example, tree cover in the city is estimated at 33% with a SE of 1.5%.

5. State oversight of reporting localities

To provide accountability, state forestry agencies regularly spot-check a subset of a locality/urban forest partner BMP project files and/or 5-year assessments of net gain for accuracy and thoroughness. This may also entail site visits to tree planting sites on record. 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. Improvements on reporting are suggested. The state forestry agency should coordinate with the state MS4

oversight program, where local partners are implementing tree planting BMPs regulated by that program.

VIII. Verification Guidance of Urban Riparian Forest Buffers

1. *Partner maintains information at local level of each new urban riparian forest buffer.*

    - For new plantings, record: location (lat/long) and name of property, 2) acres planted (if appropriate) and width, and date(s) planted.

    - For natural regeneration acres, data to be recorded includes: location, acres of treatment, width, and date started. Naturally regenerating urban buffers are reported after 4 years of establishment if there are 100 or more live native trees per acre.

    - All new buffer areas will be visited by the local urban partner.

2. *Urban forestry partner maintains riparian buffer*

    - New buffer plantings can have a high rate of mortality, succumbing to weed suppression, dehydration, physical damage, or other injury. Removing competing vegetation is often necessary.

    - Reporting localities should be 80% confident that maintenance is occurring to avoid impacts to water quality pollution reduction efficiencies. Spot checking and/or statistical sampling is recommended. The sampling design should focus on specific maintenance issues that have the biggest potential impact on water quality such as concentrated flow. See guidance for maintenance of Agricultural Riparian Forest Buffers for more direction.

3. *Reported practice represents a net gain*

    - Assessment of total urban forest buffer cover in a locality should be done every 5 years to ascertain that there is not a net loss of urban buffer. A procedure like the one described for Expanded Tree Canopy (using iTree Canopy) is recommended. For this practice, iTree Canopy data points would be located in the riparian area of a given locality. Other software may be equally useful in demonstrating there has not been a loss of buffer. If a loss of urban buffer in a locality is detected, the credits received over that 5-year period will be deducted by the same amount.

4. *State oversight of reporting localities*

    - To provide accountability, state forestry agencies should regularly spot-check a locality/urban forest partner BMP project files on urban forest buffer establishment and/or 5-year assessments of net gain in for accuracy and thoroughness. This may also entail site visits to buffer sites on record. 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. An oversight report should be communicated with the

locality/urban forest partner to underscore what is being done well and what needs improvement.

IX. Background on Forest Harvesting BMPs

Forest Harvest BMPs Description: Forest harvesting practices are a suite of BMPs that minimize the environmental impacts of logging, including road building and site preparation. These practices can greatly reduce the suspended sediments and other pollutants that can enter waterways as a result of timber operations. The CB model currently assumes an average of 1% of forest is harvested in any given year, unless more accurate data are supplied by the state. The modeled pollution load from forest harvesting is reduced based on the annual number of acres of forest harvesting BMPs reported.

Current procedure: All States have adopted recommended BMPs for timber harvesting and forest management activities (also called Silvicultural BMPs) that have the potential to impact water quality. These water quality BMPs have common elements although they may vary from state-to-state and their use is site dependent. For the purposes of monitoring, BMPs are grouped by area of concern such as:

- Roads and timber loading areas
- Stream crossings
- Stream Management Zones or Riparian areas
- Wetlands
- Use of chemicals

Consistent and reliable data on the use and effectiveness of forest harvest BMPs are the most important evidence of a state's compliance with the Clean Water Act during timber harvest, and extensive protocols are available for monitoring (Welsh et al. 2006, Southern Group of State Foresters 2008). Such monitoring may be part of a state's nonpoint source management program, Sec. 319 of the Clean Water Act. EPA approves state harvesting guidelines which considers forest harvest BMP compliance to be voluntary when coupled with education and monitoring (West Virginia, where BMP compliance is mandatory, is an exception). On-site visits of harvesting operations are routinely made by state agency foresters in most parts of the Bay watershed.

Some forest harvesting BMPs are designed to have a short life—only for the duration of the harvest operation (e.g., temporary stream crossings), while others are intended to last several years-- until the forest grows back (e.g., erosion control plantings).

Public Land vs. Private Land: In some states, forest harvesting is closely controlled and monitored on both public and private land. Other states control harvesting on public lands and can thus monitor BMP implementation there, but have no accessible record of where private forests are being harvested or what BMPs are used during those harvests. Public forests in all states are typically models in following BMPs, and many in the watershed comply with third-party certification programs such as Forest Stewardship Council to minimize impact. Only a small percentage (~4-8%) of private forest lands ascribe to third-party certification (through American Tree Farm membership or on their own).

As roughly 95% of harvesting is on private lands, it is important to apply the following verification guidelines to those lands. In some states, there is no authority for state forestry agents to access private lands after harvest. If states are not able to obtain permission to check enough randomly selected privately-owned harvesting sites, no forest harvesting BMP credit can be sought for those lands.

X. Verification Guidance on Forest Harvesting BMPs

1. *Track total acres of forest harvest BMP implementation, or rate of implementation on private land, and conduct site visits after harvest to ensure proper installation. There are several options for tracking BMP implementation:*

    - State forestry agency documents that the project sites were visited and evaluated for forest harvest BMP establishment within 6 months of harvest and submits actual acres to NEIEN annually.

    OR

    - State forestry agency determines average rate of BMP implementation by on-site sampling (spot-checking) private land harvest sites within 6 months of harvest activity. A rate of implementation is determined and can be used for up to 5 years. Derived, assumed, or anecdotal information on implementation is insufficient. A good source of information on designing a statistically valid sampling procedure for implementation monitoring and analyzing the results can be found in "*Sampling and Estimating Compliance with BMPs*" produced by the Southern Group of State Foresters.

    OR

    - State forestry agency will determine an average rate of implementation by conducting a review of forest harvest records every 5 years. If using a sampling regime to determine rate of BMP implementation, use a confidence level of 80% (+/-5%).

        - Forestry staff or Cooperative Extension Offices can assess the overall rate of BMP implementation by using data collected from local forest district offices or county environmental protection offices. Harvest plan reviews and harvest permits are examples. BMP implementation rates can be credited after the first such review has been completed.

        - To complement a review of forest harvesting records, it is also recommended to interview local timber operators and forestry field staff to document consistency of practice implementation. Photographs of BMPs and some site visits are highly encouraged to further complement the analysis of harvest records.

2. *States should describe their existing and planned inspection programs for Forest Harvest BMPs in Verification Protocols.*

3. *Monitor use of forest harvest BMPs for Process Improvement*
   Assessing forest harvesting BMP implementation and function, and looking at specific categories of BMP practices, will address issues such as training needs for forestry personnel and forestry practitioners. It can also provide insights about whether BMPs themselves are adequate or need improvement. States should describe how they plan to analyze their verification of forest harvest BMPs—e.g., how inspections and data records could more accurately capture what is happening with forest harvest BMP's during the most vulnerable periods (i.e., during a storm event soon after harvest).

Urban Stormwater Verification Guidance

Version: Final, May 9th, 2014

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

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

The guidance 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 guidance 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 section 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 3, 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 7. 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 7: Existing Review and Inspection Procedures for Select Urban BMPs *

Urban BMP Type	*Key Procedures*
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.

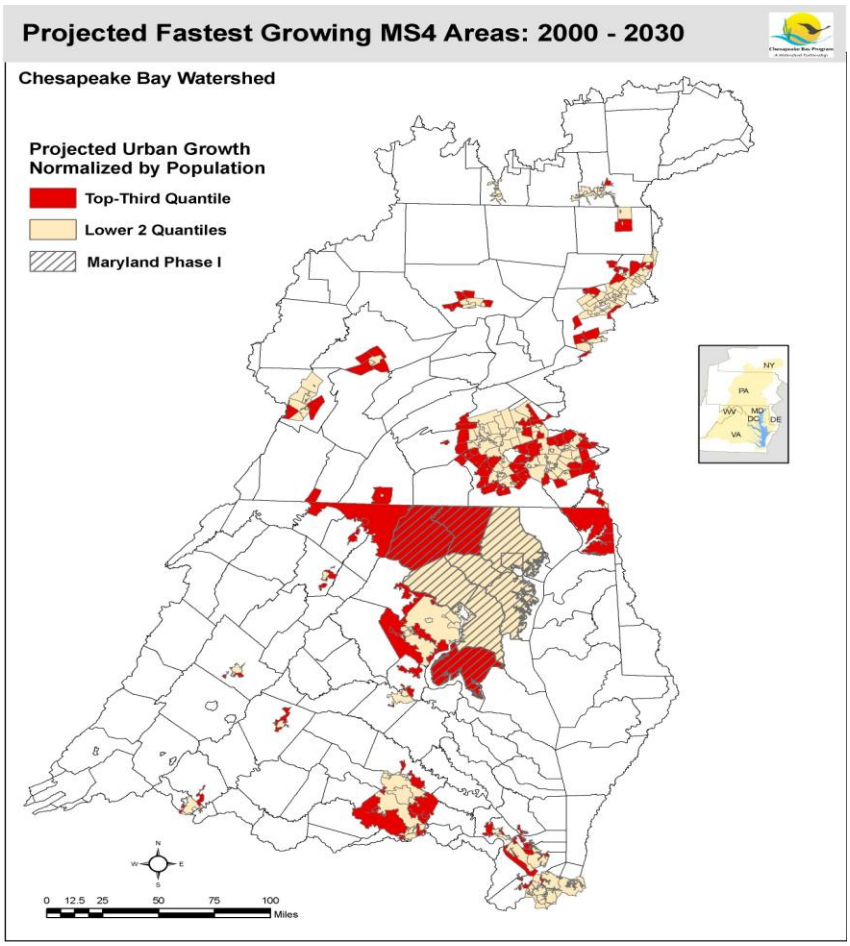


Figure 3: Distribution of MS4 Communities in the Bay Watershed

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 18 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 BMP 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 4.

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. *Verification to 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.

6. *Applying BMP Data to Inform Adaptive Management.* 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 (Williams and Brown, 2012). 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.

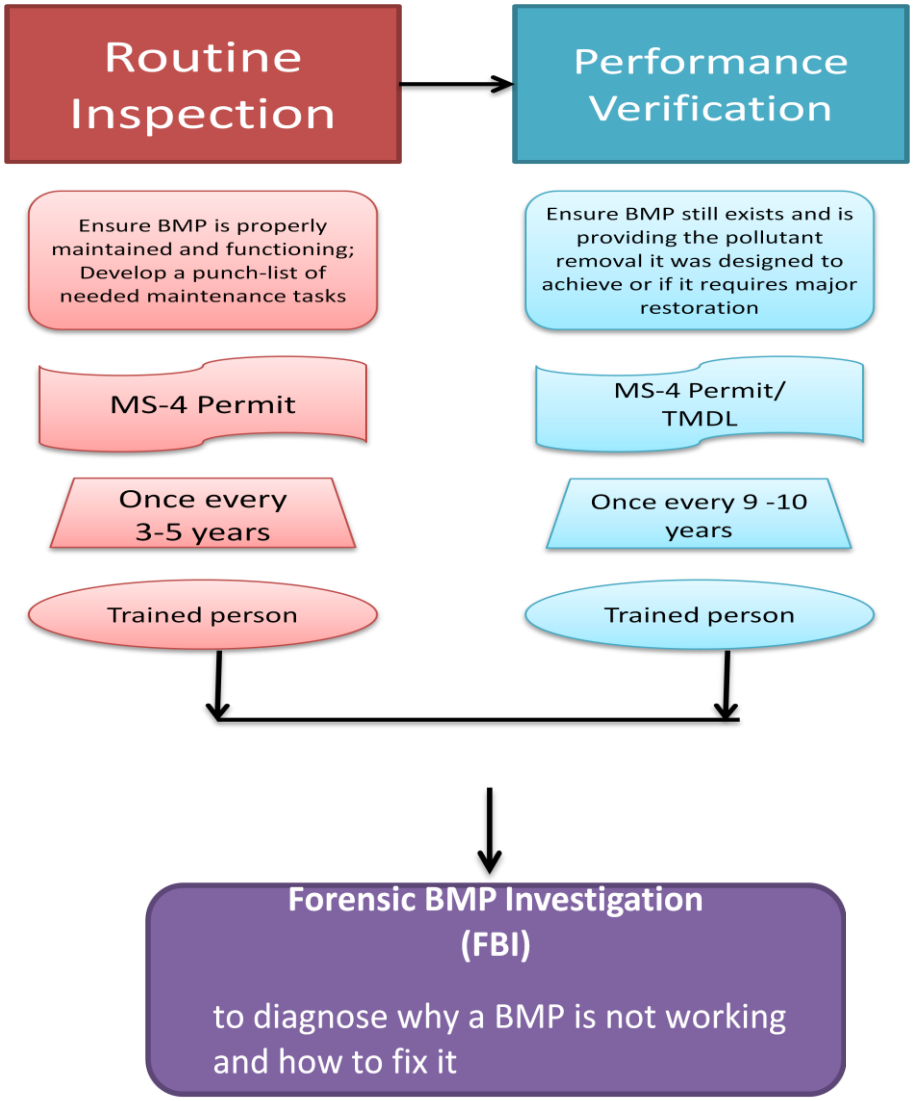


Figure 4: Relationship of Routine MS4 BMP Inspections to Verification Inspections

7. *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.

8. *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.

9. *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.

10. *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.

11. *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.

12. *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.

13. *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.

14. *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.

15. *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.

16. *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.

17. 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

18. 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 several non-MS4 communities, and applies the results to reported BMP data in other comparable 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 the clean up their BMP inventory since it is likely they will discover BMPs that were installed in the past but was 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 outline 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 8. Additional verification protocols for other urban BMPs will be developed as new expert panels are formed.

Table 8: 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 in 2014
	Illicit Discharge Elimination	Expert Panel	Projected in 2014
	Erosion and Sediment Control	Expert Panel	Approved by WQGIT
Restoration BMPs	Stormwater Retrofits	Expert Panel	Approved by WQGIT
	Stream Restoration	Expert Panel	Approved by WQGIT
	Reforestation/Tree Planting	Expert Panel	Projected in 2014
	Shoreline Management	Expert Panel	Projected in 2014

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Verification for Wastewater Treatment Facilities

Final May 8th, 2014 version

Need for Verification and the CBP Process to define it

Over 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 focused on their 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.

In response to these calls for improved BMP verification, the Water Quality Goal Implementation Team formed a BMP Verification Committee, which tasked the six sector workgroups to develop narrative principles and guidance for the jurisdictions as they build and improve upon their existing verification programs. As a part of its purview, the Wastewater

Treatment Workgroup (WWTWG) was instructed to address wastewater treatment facilities, combined sewer overflow areas, and advanced on-site treatment systems.

Key Verification Definitions

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

The National Pollutant Discharge Elimination System (NPDES) permit program, as authorized by the Clean Water Act (Section 402), controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states.[27]

Wastewater Treatment Facilities are municipal sewage treatment facilities and industrial facilities with direct discharges to waters of the United States. These facilities can be classified as *significant* or *non-significant* based on their treatment volume.

Significant facilities are dischargers that are subject to NPDES permits for nutrient pollutants and meet one of the following criteria.

- District of Columbia - Blue Plains Wastewater Treatment Plant
- West Virginia, Delaware and New York - Facility treating domestic wastewater and the design flow is greater than or equal to 0.4 million gallons per day (MGD).
- Pennsylvania - Facility treating domestic wastewater and discharging greater than or equal to 0.4 MGD.
- Maryland - Facility treating domestic wastewater and the design flow is greater than or equal to 0.5 MGD.
- Virginia - Facility treating domestic wastewater with a design capacity of greater than or equal to 0.5 MGD west of the fall line or 0.1 MGD east of the fall line or an industrial facility discharging an equivalent load in either location.
- Industrial facilities with a nutrient load equivalent to 3,800 total phosphorus (TP) lbs/year or 27,000 total nitrogen (TN) lbs/year.
- Any other municipal and industrial wastewater treatment plants identified as significant facilities within a jurisdictional Watershed Implementation Plan (WIP).

Non-significant facilities are municipal or industrial dischargers that do not meet the above criteria for significant facilities.

[27] http://cfpub.epa.gov/npdes/

Combined Sewer Overflow (CSO) areas are communities or portions of communities with combined sewer systems that convey both stormwater and wastewater in the same underground system of drains and pipes. Combined sewer systems are designed to overflow occasionally and discharge excess untreated wastewater directly to nearby streams, rivers, or other water bodies.

A *Long Term Control Plan* is a phased approach for control of combined sewer overflows that will ultimately result in compliance with the Clean Water Act requirements.

Septic systems are on-site systems that provide basic storage and treatment to a household's or a development's sewage and discharge into ground. Some septic systems are *Advanced On-Site Wastewater Treatment Systems* that provide additional nitrogen reduction beyond that of a conventional septic system.

Advanced On-Site Wastewater Treatment Systems can be a range of technologies that provide denitrification treatment and reduce nitrogen discharges from the systems.

Background on Verification in the Wastewater Sector

Wastewater treatment facilities, including municipal sewage treatment facilities and industrial facilities, contributed 17.4 percent of the total nitrogen (TN) and 16.3 percent of the total phosphorus (TP) loads delivered to Chesapeake Bay tidal waters in 2011. Of these total nutrient loads from wastewater dischargers, the 468 *significant* facilities contributed 90 percent of nitrogen and 72 percent of phosphorus. The remaining 10 and 28 percent of the TN and TP loads, respectively, came from the estimated 5,215 *non-significant* facilities. In 1985, wastewater facilities accounted for 27.6 and 38 percent of the respective TN and TP loads to the Bay. By 2011, the total wastewater loads to the Bay were reduced 51% for TN and 70% for TP from 1985 levels. This significant decline in point source loads is one of the major success stories of Bay restoration and is the result of many factors, including the rigorous implementation of new technologies, the accountability of the NPDES permitting program, and reliable sources of funding.

In the Chesapeake Bay watershed, there are currently 50 reported active reported *combined sewer overflow* (CSO) communities. A total of 64 CSO areas have been tracked by the Chesapeake Bay Program Partnership, with 14 of them currently documented as eliminated. In 2011, based on modeling estimates, the remaining 50 CSO areas contributed 0.57 percent of the total nitrogen (TN) and 0.87 percent of the total phosphorus (TP) loads delivered to Chesapeake Bay tidal waters.

The Chesapeake Bay Program Partnership estimates that about 25 percent of the homes in the Chesapeake Bay watershed have *on-site treatment/septic systems* that provide basic treatment to household wastewater. Based on the Partnership's Phase 5.3.2 Chesapeake Bay Watershed Model, these on-site treatment systems contributed approximately 8.3 million pounds or 3.4% of the total nitrogen load to the Bay in 2011.

The existing national and state regulatory systems for wastewater treatment facilities and CSOs meet or exceed the Chesapeake Bay Program Partnership's BMP Verification Principles through a rigorous system of permits, inspections, and monitoring requirements that ensure accountability, proper design, implementation, operation and maintenance. For on-site treatment systems, the workgroup's recommended verification guidance is based on the best existing

regulations and programs. Verification through existing regulatory programs will confirm if the upgraded wastewater facilities, CSOs, or on-site treatment systems are designed, installed, and maintained over time and meeting their assigned load reduction targets.

The workgroup's process to develop these verification principles and guidance was as follows:

1. Evaluate the existing verification/inspection programs among the seven Chesapeake Bay watershed jurisdictions;

2. Determine what needed to be improved to meet the Partnership's BMP Verification Principles; and

3. Develop principles and guidance based on the best existing BMP verification/inspection programs that met or exceeded the BMP Verification Principles for the jurisdictions' use as they build upon their existing verification elements.

At multiple points throughout the process, the workgroup has received and considered feedback from its members and interested parties, together with substantive input from the BMP Verification Committee, BMP Verification Review Panel, and CBPO staff.

Verification Guidance for Wastewater Treatment Facilities

All significant facilities have or will have nutrient permit limits and specific nutrient monitoring requirements in place under the Chesapeake Bay TMDL. These numeric nutrient limits will ensure that significant wastewater treatment facilities continue to provide the most reliably verified load reductions in the restoration effort.

The NPDES compliance system and monitoring requirements provides the most stringent verification for implementation of a facility upgrade. Some Chesapeake Bay watershed jurisdictions also have or will have individual nutrient permit limits or monitoring requirements on some of their non-significant facilities.

The wastewater load reduction goals in the Chesapeake Bay TMDL and jurisdictions' WIPs for the most part are applied to significant facilities. With the exception of Maryland, there are currently no load reduction goals for non-significant facilities in the remaining six Chesapeake Bay watershed jurisdictions; there are only aggregate waste load allocations set at existing loads. Maryland and Virginia NPDES permits for new, expanding, and certain upgraded non-significant facilities include nutrient wasteload allocations and DMR reporting requirements.

For non-significant wastewater facilities, the existing federal and state NPDES regulations and the discharge monitoring report (DMR) reporting system will provide sufficient verification. The DMRs will be used to report the load reductions from a non-significant facility that undergoes any upgrades or offsets new or expanding flows. Jurisdictions will annually track the universe of nutrient- and sediment-contributing non-significant wastewater discharging facilities against established inventories for aggregated wasteload allocations, reporting on loads using the various mechanisms described in jurisdictions' WIPs. Jurisdictions will document and report any allocation redistribution or changes that result from trading or offsets.

The existing national regulations and delegated state NPDES permitting programs have very specific verification and inspection requirements for wastewater treatment facilities, which meet or exceed the Chesapeake Bay Program Partnership's BMP Verification Principles. The verification/inspection programs for all non-significant wastewater treatment facility upgrades will rely on the existing NPDES regulations and DMR reporting system.

Table 9 below provides a summary of the workgroup's recommended approach for the jurisdictions' wastewater treatment facilities.

Table 9 – Summary of recommended verification principles and guidance for wastewater treatment facilities

	Significant Wastewater Treatment Facilities	***Non-Significant Wastewater Treatment Facilities***
Principles and guidance for the jurisdictions	Monitoring and monthly reporting of flows and loads via DMRs. In addition, (a) annual loading reports are also submitted where trading or general permit conditions apply to a facility, and; (b) annual WIP reporting also applies**.**	• The existing NPDES DMRs will be used to report the load reductions due to BMPs for non-significant wastewater treatment facilities that include upgrades and offsets of new or expanding non-significant facilities. • Track the universe of nutrient- and sediment-contributing non-significant facilities against established aggregate wasteload allocations, annually report loads using various mechanisms including those described in the jurisdictions' WIPs and document any allocation redistribution or changes in reporting structure that result from trading, offsetting, or assimilation by other facilities.
Applicable jurisdictions	All seven jurisdictions.	All seven jurisdictions.
How to apply the principles and guidance	Use existing NPDES DMR and state-defined procedures. Document those procedures in the jurisdictions' quality assurance project plans (QAPPs) submitted to EPA.	Use existing NPDES DMR and state defined procedures. Document those procedures in the jurisdictions' QAPPs submitted to EPA.

Verification Guidance for Combined Sewer Overflows (CSOs)

CSO Long Term Control Plans

Long-term Control Plans are required by the national CSO control policy to reduce overflows from CSO outfalls (59 FR 18688, April 19, 1994). The existing national regulations and delegated state NPDES permitting programs have very specific verification/inspection

requirements for CSOs, which meet or exceed the Chesapeake Bay Program Partnership's BMP Verification Principles.

Table 10 – Summary of recommended verification principles and guidance for Combined Sewer Overflow Areas	
	Combined Sewer Overflows
Principles and guidance for the jurisdictions	• Construction Verification: properly designed, installed, and maintained by the certified service providers. • Post construction monitoring and inspection. • Existing compliance and enforcement procedures. • Tracking and reporting.
Applicable jurisdictions	All seven jurisdictions.
How to apply the principles and guidance	Use the existing CSO regulatory process.

Verification Guidance for Advanced On-site Treatment Systems

There is no national regulation for on-site treatment systems. Existing state regulations or programs vary dramatically among the six Chesapeake Bay states[28], ranging from construction permits to more complex regulation through operating permits with inspection and monitoring requirements. The recommended verification principles and guidance were developed based on the best existing state regulations for on-site treatment system that meet or exceed the Chesapeake Bay Program Partnership's BMP Verification Principles.

Verification of on-site treatment systems only applies to nitrogen-reducing treatment systems, or *advanced on-site treatment systems* that are reported by a state for load reduction credit, and not other septic systems that do not receive credit as a BMP. The jurisdictions that intend to seek nitrogen load reduction credit for installation, operation and maintenance of on-site treatment systems will need to adopt and implement the recommended protocols through their regulations (existing or upcoming) or management programs required for advanced on-site treatment systems. These on-site treatment system regulations or programs should have specific maintenance and inspection requirements tailored to specific on-site treatment systems.

Currently, Delaware[29], Maryland[30], and Virginia[31] have advanced on-site treatment system regulations in place (see Appendices A, B, and C, respectively, for detailed descriptions). The

[28] The District of Columbia has no on-site treatment systems within its jurisdictional boundaries.
[29] Delaware Department of Natural Resources and Environmental Control, Division of Water, Groundwater Discharges Section, 7Del.C.Ch. 60, Delaware Regulations Governing the Design, Installation, Operation of On-Site Wastewater Treatment and Disposal System (amended January 11, 2014) http://www.dnrec.delaware.gov/wr/information/gwdinfo/documents/delawarefinalonsiteregulations_01112014.pdf

District of Columbia has no on-site treatment systems within its jurisdictional boundaries. West Virginia is committed to meeting the workgroup's minimum verification guidance described in this section if they seek credit for advanced on-site treatment systems. Pennsylvania and New York currently do not plan to seek nitrogen load reduction credit for installation, operation, and maintenance of on-site treatment systems, so they will not need to document verification for these systems unless they wish to seek credit in the future.

Verification of advanced on-site systems will ensure proper installation and continued operation and maintenance of the systems. **Specific requirements (e.g., inspection or sampling frequency) will be based on existing state regulations or will follow the below set of minimum elements for verification based on existing state programs**:

- State or local authorities will verify, track and report proper installation and operation and maintenance of new advanced on-site treatment systems. Verification may also occur through inspections performed by a certified design professional.

- The design and installation of on-site BMP systems will be done and reported by certified service providers and verified in the permitting processes.

- The maintenance and inspection of on-site BMP systems will be conducted and reported annually, or more frequently, by certified service providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual.[32]

- Tracking and reporting through databases managed by state agencies.

Maryland and Virginia already have comprehensive regulations for advanced on-site systems; Delaware amended its regulations, effective January 11, 2014. Key verification elements of these three states' regulations are summarized in Table 11 below, along with management recommendations from the On-Site Wastewater Treatment Systems (OWTS) Expert Panel. Table 11 relates the three states' program elements with the verification principles and guidance described in the above section. For full details on the Delaware, Maryland, and Virginia programs, please see Appendices A, B, and C, respectively.

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[30] Maryland Regulation of Water Supply, Sewage Disposal, and Solid Waste. Chapter 02 Sewage Disposal and Certain Water Systems for Homes and Other Establishments in the Counties of Maryland Where a Public Sewage System is Not Available Authority
http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=26.04.02

[31] Virginia Regulations for Alternative On-Site Sewage Systems
http://lis.virginia.gov/000/reg/TOC12005.HTM#C0613

[32] The Chesapeake Bay Program Partnership's on-site treatment systems BMP expert panel recommended O&M inspection frequencies by practice. Upon approval by the Partnership's Wastewater Treatment Workgroup (WWTG) and the Water Quality Goal Implementation Team (WQGIT), the recommended inspection frequency will be ready for adoption by the states into their written verification procedures. However, states may stipulate different requirements in their own regulations or programs for on-site BMP systems. For example, Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.

Table 11 –Summary of recommended verification principles and guidance for advanced on-site treatment systems	
State or local authorities will verify, track and report proper installation and operation and maintenance (O&M) of on-site BMP systems. Verification may also occur through inspections performed by a certified design professional.	*Reference* **Maryland**: COMAR 26.04.02.07 Best Available Technology (BAT) Systems **Virginia**: Sewage Handling and Disposal Regulations (SHDR), 12VAC5-610, and Regulations for Alternative Onsite Sewage Systems (AOSS Regulations),12VAC5-613 **Delaware:** Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Water, Groundwater Discharges, Section 7 Delaware Code Chapter 60, Delaware Regulations Governing the Design, Installation, Operation of On-Site Wastewater Treatment and Disposal System (amended Jan. 11, 2014)
The design and installation of on-site BMP systems will be performed and reported by certified service providers and verified in the permitting process.	**Maryland**: See COMAR 26.04.02.07E-F **Virginia**: Confirmation of installation based on inspections by design professional. **Delaware**: All on-site BMP systems inspected by DNREC and system designer. Certificate of Satisfactory Completion is not issued until specific conditions and requirements are met.
The maintenance and inspection of on-site BMP systems will be conducted and reported annually by certified providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual.	*Inspection and O&M frequencies* **Maryland:** COMAR 26.04.02.07D. Once per year. **Virginia**: Once per year for advanced systems <1,000GPD. Retroactive and applies to all systems. **Delaware**: I/A systems less than or equal to 2,500 GPD. Systems permitted after 2/1/2007 inspected every 6 mos. by certified service provider. Systems installed prior to 2/1/2007 do not have to follow O&M requirements, and are inspected by DNREC every three years. On-site systems must also be inspected when a property is sold.
Tracking and reporting through databases managed by state agencies.	Delaware, Maryland, and Virginia each maintain their own database.
OWTS Expert Panel recommended O&M frequency, by technology[33]	
Secondary treatment systems certified under NSF Standard 40 Class I or equivalent	Annual inspection may be needed

[33] See previous footnote. Actual O&M or inspection frequency for specific technologies may vary according to states' regulations or requirements.

Intermittent (Single Pass) Media Filters	Annual
Subsurface constructed wetlands/ vegetated submerged beds (VSB)	Annual, with monthly visual inspections of the VSB media, screens, berms, etc. to assess damage from muskrats or similar animals.
Recirculating media filters	Semiannual (twice/year)
Anne Arundel County integrated fixed-film activated sludge (IFAS)	Semiannual
Shallow placed, pressure dosed dispersal	Annual. Additional O&M visits might be necessary. Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.
Elevated sand mounds	Annual. Additional O&M visits might be necessary. Delaware does not require annual inspections for shallow placed pressure dosed, or elevated sand mound systems because they are confident in the performance of these technologies based on decades of experience. Additionally, there are other requirements in place, such as an inspection of any on-site system when a property is sold, that act as sufficient verification mechanisms for these technologies.
Permeable reactive barriers	Annual

Verification of Septic Pumping BMP

OWTS Expert Panel recommended keeping septic pumping as a BMP with a 5% TN reduction rate for conventional septic systems that have no other BMPs, since other BMPs include a requirement for routine septic tank pumping. For any given system, this 5% credit should not be given more frequently than every 5 years, even though more frequent pumping for some systems may be appropriate for other reasons. Verification principles and guidance for advanced on-site treatment systems also apply to septic pumping BMP. Septic pumping should be performed by licensed service providers. Reported septic pumping events should be tracked and documented by the State or local authorities.

Table 12. Summary of recommended verification guidance for wastewater treatment facilities, CSOs and on-site treatment systems

	Significant Wastewater Treatment Facilities	***Non-Significant Wastewater Treatment Facilities***	***Combined Sewer Overflows***	***On-Site BMP Treatment Systems***
Principles and guidance for jurisdictions	Monitoring and monthly reporting of flows and loads via DMRs. In addition, (a) annual loading reports are also submitted where trading or general permit conditions apply to a facility, and; (b) annual WIP reporting also applies**.**	• The existing NPDES DMR will be used to report the load reductions due to non-significant wastewater treatment facilities' BMPs that include upgrades and offsets of new or expanding non-significant facilities. • Track the universe of nutrient- and sediment-contributing non-significant facilities against aggregate wasteload allocations, annually report loads using various mechanisms including those described in the jurisdictions' WIPs and document any allocation redistribution or changes in reporting structure that result from trading, offsetting or assimilation by other facilities.	• Construction Verification: properly designed, installed, and maintained by the certified service providers. • Post construction monitoring and Inspection. • Existing compliance and enforcement procedures. • Tracking and reporting	Verification of advanced on-site treatment systems will ensure proper installation and continued operation and maintenance of the systems. Specific requirements (e.g., inspection or sampling frequency) will be based on existing state regulations or will follow the below set of minimum elements for verification based on existing state programs in Delaware (DE), Maryland (MD), and Virginia (VA). • State or local authorities will verify, track and report proper installation and O&M of on-site BMP systems. • The design and installation on-site BMP systems will be done and reported by certified service providers and verified in the permitting processes. • The maintenance and inspection of on-site BMP systems will be conducted and reported annually by certified providers and tracked by the authorities. For some technologies, state or local authorities may stipulate an inspection frequency that is less than annual. The OWTS Expert Panel recommended the O&M inspection frequencies by practice, summarized in Table 11. Upon approval from the WWTWG and WQGIT, the final recommended inspection frequency may be adopted by the states. • Tracking and reporting through the databases managed by state agencies.
Applicable jurisdictions	All seven jurisdictions	All seven jurisdictions	All seven jurisdictions	DE, MD, VA, and WV
How to apply the principles and guidance	Use existing NPDES DMR and state-defined procedures	Use existing NPDES DMR and state-defined procedures	Use the existing CSO regulatory process	• DE, MD, VA, and WV agreed to verify on-site BMP systems. PA and NY do not currently plan to seek credit for on-site BMP systems so do not have plans for verification. • Use existing state regulations for on-site treatment systems. • The expert panel recommended septic BMP inspection frequencies, but inspection frequency may vary by technology and state.

Summary of Delaware's regulatory program for onsite systems

Delaware has language in the on-site regulations allowing guidelines to be developed for Innovative/Alternative (I/A) systems by the Delaware Department of Natural Resources & Environmental Control which permittee must follow. Because of this language, the Department developed Operation and Maintenance (O&M) Guidelines for all I/A systems permitted after February 1st, 2007 (attached). Onsite BMP systems are part of the I/A system category. This guideline has been incorporated into DE regulation update that became effective January 11, 2014.

Systems permitted and installed prior to Feb 1st, 2007 do not have to follow the O&M requirement and are inspected by the Department every three years. This is tracked by an Access database at DNREC.

Systems permitted after Feb 1st 2007 fall under the O&M guidelines. BMP systems are inspected every 6 months by the service provider. Tracking of systems with O&M requirements is also done through an Access database.

All Innovative/Alternative Onsite systems are inspected by the Department and system designer when installation is complete and before the system has been covered and backfilled. A "Certificate of Satisfactory Completion" (COC) is not granted until: the installation has been found to be satisfactory by the Department and system designer (a DNREC licensed PE), a service contract for a minimum for two years has been submitted for the system, the manufacturer representative submits in writing, if not present at the time of inspection, that the installation has been performed correctly. A system cannot be put into use until a COC has been issued. The construction phase of all I/A system is tracked with a database accessible by the Ground Water Discharge Section.

Innovative and Alternative On-Site Wastewater Treatment and Disposal Systems

Operation & Maintenance

Guideline issued February 1, 2007; amended to 7 Del. C., Chapter 60, January 11, 2014

Applicability:

For all Innovative and Alternative On-Site Wastewater Treatment and Disposal Systems ≤ 2,500 gallons per day.

Overview:

Innovative and Alternative (IA) on-site wastewater treatment and disposal systems are classified as anything other than conventional systems. These systems include but are not limited to advanced treatment units, peat biofilters, drip dispersal or a combination thereof. In order to ensure the proper operation and maintenance of IA systems, the Department of Natural Resources and Environmental Control (DNREC) requires the permittee, through permit conditions and Regulation, to maintain service contracts with certified service providers for the life of the system.

Definition:

For the purpose of this guideline, a **certified service provider** shall be defined as the following:

1. An individual representative of a manufacturer/supplier who holds a DNREC Class E System Contractor or Class H System Inspector license; or,

2. A Class E System Contractor who is certified, through DNREC approved training, on the operation and maintenance of the advanced treatment unit or system; or,

3. A Class H System Inspector who has become certified through DNREC approved training on the operation and maintenance of the advanced treatment unit or system; or,

4. A Homeowner who has obtained DNREC individual homeowner service provider certification and has been certified through DNREC approved training on the operation and maintenance of the advanced treatment unit or system. The DNREC homeowner certification allows the homeowner to operate and maintain their IA system at their primary place of residence only.

Operation and Maintenance with Permit Conditions

1. Prior to the Ground Water Discharges Section (GWDS) of DNREC granting a Certificate of Completion, the permittee must enter into a service contract with a certified service provider initially, for a minimum of two (2) years starting at the onset of initial system operation. Specifically the service contract shall prescribe an Inspection Program and Homeowner Training Program as outlined below:

5.5.5 The Department may impose specific operation and maintenance requirements for on-site wastewater treatment and disposal systems to assure continuity of performance. All innovative/alternative systems have operation and maintenance requirements. These requirements follow;

5.5.5.1 For new construction, **prior to the Department granting a Certificate of Completion, the permittee, unless certified by the homeowner training program, must enter into a service contract with a certified service provider initially, for a minimum of two (2) years starting at the onset of initial system operation.** For replacement systems, this service contract must be submitted with the permit application. Specifically, the service contract shall prescribe an Inspection Program and Homeowner Training Program as outlined below:

5.5.5.1.1 Inspection Program

The inspection program shall include the following: a schedule indicating inspection frequency, inspection objective(s), inspection details, necessary operation and maintenance activities, additional sampling if required, and record keeping requirements.

5.5.5.1.1.1 Inspection Frequency/Objective: The service contract must outline that the certified service provider is to inspect the system once every six (6) months or otherwise as approved by the Department.

5.5.5.1.1.2 Inspection Reports: The contract must outline that the certified service provider must document all inspections. Operation inspection reports shall indicate the following: date and time of the inspection, sampling and laboratory analysis results, operation and

maintenance performed, repairs, an assessment indicating the current performance status of the entire treatment and disposal system, and any corrective actions that must be taken prior to the next inspection. All inspection reports shall be on forms approved by the Department.

5.5.5.1.2 Homeowner Training Program

The service contract must state that the certified service provider is required to meet with the homeowner during the first sixth month inspection. The certified service provider is to educate the homeowner on the components of the system and on the proper operation and maintenance requirements. At this time, the certified service provider shall provide the homeowner with an operation and maintenance manual.

5.5.5.2 Following the initial two (2) year period, the permittee is required to maintain a service contract for the system by: renewing the existing contract annually, at a minimum, contracting with another certified service provider or being certified by the homeowner training program. The service contract must contain the inspection program requirements from Section 5.5.5.1.1.

5.5.5.3 All reports and contract renewals from the previous year shall be submitted by February 1st of each year to the Department. The certified service provider must submit all inspection reports to the Department and permittee. The permittee shall submit any contract renewals as necessary to the Department.

5.5.5.4 The Department reserves the right to collect and analyze samples to ensure proper treatment levels and system performance.

5.5.5.5 The Department may increase inspection frequencies as warranted. A notice outlining new frequencies and cause will be provided to the permittee prior to initiation.

5.5.5.6 Transferability

Within 90 days after the transfer of the real property which utilizes an innovative/alternative system, the owner shall notify the Department. Transfer of the maintenance agreement must also be completed within this 90 day period.

5.5.6 Innovative/Alternative systems without permit conditions requiring a certified service provider shall be inspected by the Department or its designee once every three (3) years and a fee may be required.

All BMP conventional systems such as shallow pressure dosed systems and Elevated Sand mounds have construction inspections inspected system designer when installation is complete and before the system has been covered and backfilled. A "Certificate of Satisfactory Completion" (COC) is not granted until: the installation has been found to be satisfactory by the Department and system designer (a DNREC licensed PE).

<u>Operation and Maintenance for conventional systems:</u>

5.5 Operation and Maintenance

5.5.1 The owner shall be responsible for operating and maintaining their on-site wastewater treatment and disposal systems.

5.5.2 Each on-site wastewater treatment and disposal system shall be pumped by a licensed Class F liquid waste hauler once every three (3) years and innovative/alternative treatment systems shall be pumped according to manufacturer recommendations unless determined that the tank is less than one-third ($^1/_3$) full of solids. The schedule shall be prescribed in accordance with current Department guidelines based on the size of the

treatment unit and anticipated number of residents. The owner of the on-site wastewater treatment and disposal system shall maintain a record indicating the system has been pumped and provide such documentation to the Department upon request.

5.5.2.1 Effluent filters shall be cleaned as per manufacturer's recommendations, at a minimum, or as necessary to prevent backing up into the dwelling. Cleaning is accomplished by hosing off the filter over the open inlet cover riser.

5.5.3 Grease traps shall be cleaned when 75% of the grease retention capacity has been reached.

5.5.4 The sites of the initial and replacement absorption facilities shall not be covered by asphalt or concrete or subject to vehicular traffic or other activity which would adversely affect the soils. These sites shall be maintained so that they are free from encroachments by accessory buildings and additions to the main building.

5.5.4.1 There shall be no lawn irrigating systems installed over the absorption facility when the absorption facility is active.

Inspections for sale of a property using on-site wastewater treatment and disposal systems:

5.4.6.3 Class H

5.4.6.3.1 For all properties utilizing an OWTDS that are sold or otherwise transferred to other ownership, the persons must have the system pumped out and inspected by a Class F and Class H licensee, respectively, prior to the completion of sale. An extension will be given to sheriff sales, short sales, cash sales and auctions for a period not to exceed 90 days from date of sale. All inspections of on-site wastewater treatment and disposal systems shall be submitted to the Department on forms approved by the Department (see Exhibit A). These forms shall be submitted within 72 hours of inspection completion.

5.4.6.3.2 Must be performed by a Class H system inspector.

NOTE: If an inspection has occurred within the previous 36 months and the property owner can provide documentation of such pump out and inspection, then such documentation will fulfill the requirements of 5.4.6.3.

5.4.6.3.3 For transfers of new property, the certificate of completion will fulfill the requirements of this section if issued within the previous 24 months.

5.4.6.3.4 If the owner of an individual OWTDS provides proof of a licensed operator or has an annual service contract with a certified service provider then such documentation will fulfill the requirements of 5.4.6.3.

Overview of Maryland's processes and regulation in regards to best available technologies for removal of nitrogen (BAT)

- WWTWG protocol: State or local authorities should verify, track and report proper installation and O&M of on-site BMP systems.
- COMAR 26.04.02.07F. "Within 1 month of the completion of an installation, a person installing a BAT system shall report to the Department, or the Department's designee, in a manner acceptable to the Department, the address and date of completion of the BAT installation and the type of BAT installed."
- WWTWG protocol: The design and installation on-site BMP systems should be done and reported by the certified service providers and verified in the permitting processes.
- COMAR 26.04.02.07E "A person who has completed a course of study approved by the Department for the installation of BAT, and has a certification of qualification for installing BAT systems from the manufacturer, must be present on the property while a BAT unit is installed." The design of the BAT must be approved by MDE."
- WWTWG protocol: The maintenance and inspection of on-site BMP systems should be conducted and reported annually by certified providers and tracked by the authorities. For some low maintenance systems, such as the enhanced conventional systems, the inspection frequency could be lower. The CBP on-site BMP expert panel will recommend the inspection frequency by practice, which will be available in April 2013. Upon approval from the WWTWG, the final recommended inspection frequency may be adopted by the states.

COMAR 26.04.02.07D

D. Operation and Maintenance of BAT Systems.

(8) A BAT system shall be operated by and maintained by a certified service provider.

(2) The owner shall ensure that each BAT system is inspected and has necessary operation and maintenance performed by a certified service provider at a minimum of once per year.

(3) The Department shall maintain a list of certified service providers.

(4) Individuals may become certified upon completion of a course of study on operation and maintenance of BAT systems approved by the Department. The course of study must include instruction on how BAT systems function as well as elements on operation, maintenance, and repair of BAT systems.

(5) Certification as a service provider for BAT systems may be revoked at any time by the Department for violation of these regulations.

(6) The certified service provider shall report on inspection, operation, and maintenance activities to the Department, or the Department's designee, in a manner acceptable to the Department on a yearly basis prior to the yearly anniversary of the date of installation.

(7) The certified service provider must have a certificate of qualification from the manufacturer of the BAT system being serviced.

(8) A property owner may obtain certification as a service provider to maintain the property owner's system, subject to all the requirements of this regulation pertaining to operating and maintaining BAT systems."

- WWTWG protocol: Tracking and reporting through the databases managed by state agencies.

26.04.02.07D (6) "The certified service provider shall report on inspection, operation, and maintenance activities to the Department, or the Department's designee, in a manner acceptable to the Department on a yearly basis prior to the yearly anniversary of the date of installation."

COMAR 26.04.02.07F. "Within 1 month of the completion of an installation, a person installing a BAT system shall report to the Department, or the Department's designee, in a manner acceptable to the Department, the address and date of completion of the BAT installation and the type of BAT installed."

Summary of Virginia's regulatory program for onsite systems

The onsite program is regulated by two different regulations. The *Sewage Handling and Disposal Regulations* (SHDR), 12 VAC 5-610, and the *Regulations for Alternative Onsite Sewage Systems* (AOSS Regulations), 12 VAC 5-613. The regulations can be found at http://lis.virginia.gov/000/reg/TOC12005.HTM#C0610 and

http://lis.virginia.gov/000/reg/TOC12005.HTM#C0613 respectively.

The SHDR provide the administrative and procedural regulations along with prescriptive design criteria for conventional and some alternative systems. Mechanisms to ensure that systems are designed and constructed properly are found here. Those mechanisms include:

1. Submittal of a construction application with supporting soils work; site layout; verification of horizontal separation to wells, surface waters, shellfish, etc.; supporting calculations; and other pertinent design information.

2. Review of the application by environmental health specialists and, as needed, by staff engineers.

3. Confirmation of installation according to plans through completion statements based on inspections by the design professional.

The AOSS Regulations expand upon the design options for alternative systems using performance standards and require monitoring and operation and maintenance to verify compliance. All onsite BMPs are expected to be alternative systems and would be subject to the requirements of this regulation. For small systems (≤1,000 gpd), the following requirements apply:

1. The procedural requirements of the SHDR apply as described above.

2. An operation and maintenance manual is required.

3. At a minimum all AOSSs must be visited by a licensed operator at least once a year and a report submitted to VDH. Additional operator visits may be needed as described by the O&M manual.

4. Generally Approved treatment units (systems that have gone through 3rd party testing) have an initial sample collected within 180 days of startup and then every 5 years. Sampling is for BOD_5 and, if disinfection is in place, for total residual chlorine (TRC) or fecal coliform.

5. Non-generally Approved treatment units (systems that have not gone through 3rd party testing) have an initial sample collected within 180 days of startup and then semi annually for two years. If the mean of the samples complies with the given effluent limit, then the sampling is reduced to annually. Sample parameters are as in 4 above.

6. The annual inspection frequency is retroactive and applies to all AOSSs in Virginia. The sampling requirement only applies to systems constructed under the new regulation.

For large AOSSs, the requirements increase as the design flow increases. For large AOSSs, the following requirements apply:

1. The procedural requirements of the SHDR apply.

2. An operation and maintenance manual is required.

3. A renewable operating permit is required.

4. Sampling required in accordance with Table 13 below.

5. Operator attendance in accordance with Table 14 below for facilities over 1,000 gpd and up to 40,000 gpd.

6. For facilities with design flows >40,000 gpd, the frequency reverts to the same frequency for systems under the VPDES discharging permit program as found in 9 VAC 5-790. http://lis.virginia.gov/cgi-bin/legp604.exe?000+reg+9VAC25-790-300.

7. Reports required by 15th of month.

Table 13. Sampling and Monitoring for Large AOSSs

PLANT SIZE	>2.0 MGD	>1.0 - to 2.0 MGD	> 100,000 GPD to 1.0 MGD	> 40,000 GPD to 100,000 GPD	>10,000 GPD to 40,000 GPD	>1,000 GPD to 10,000 GPD
Flow	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Totalizing, Indicating, & Recording	Measured	Measured or Estimate

BOD_5, TSS	24-HC* 1/day	24-HC 5 days/wk	8-HC 3 days/wk	4-HC 1 day/wk	Grab quarterly	Grab 1/yr
Total Nitrogen	24-HC weekly	24-HC weekly	8-HC monthly	4-HC quarterly	Grab quarterly	Grab 1/yr
TRC, End of Contact Tank**	Grab daily	Grab daily	Grab weekly	Grab weekly	Grab weekly	Grab 1/yr
Fecal Coliform***	Grab weekly	Grab weekly	Grab monthly	Grab monthly	Grab quarterly	Grab 1/yr

*HC – hourly, flow weighted composite samples

**if disinfection required and chlorine used

***if disinfection required and a disinfectant other than chlorine used

Table 14. Minimum Operator Visit Frequency for AOSSs up to 40,000 GPD

Avg. Daily Flow	Initial Visit	Regular visits following initial visit
≤1,000 GPD	Within 180 calendar days of the issuance of the operation permit	Every 12 months
>1,000 GPD to 10,000 GPD	First week of actual operation	Quarterly
>10,000 GPD to 40,000 GPD	First week of actual operation	Monthly

Therefore, the annual inspections for the small systems will verify that the system is operating according to its intended design and the BMP is functioning as designed. For the larger systems, monitoring will verify compliance with the required effluent limit.

Nitrogen limits became effective December 7, 2013, for all new AOSS construction applications received after that date. For small systems, the requirement is for a 50% reduction in TN as compared to a conventional system. The AOSS Regulations reference approved BMPs as suitable for compliance, but the detail on acceptable BMPs is in development. Larger systems have more stringent TN limits and will utilize end of pipe (prior to application to soil) sampling for TN. Those limits are 20 mg/l TN for systems 10,000 gpd or less and 8 mg/l TN for larger systems. Additional removal through the soil dispersal field and then attenuation rates from the edge of drainfield to edge of stream will effectively reduce the input of TN from large systems to negligible amounts.

Wetlands Verification Guidance

Version: Draft, May 12th, 2014, subject to further review by the Wetlands Action Team

I. The need for wetlands BMP verification

Restoration, creation, and enhancement of wetlands provide a range of benefits for wildlife, fish, and other aquatic species. Wetlands also filter nitrogen, phosphorus, and sediment from overland flow, thereby providing quantifiable water quality benefits. As such, wetland restoration and creation are recognized best management practices (BMPs) in the Chesapeake Bay Program's (CBP) Watershed Model. This document provides guidance on verifying wetland projects to ensure that their pollutant removal performance is appropriately credited toward Chesapeake Bay watershed jurisdictions' two year milestone commitments and their Watershed Implementation Plans.

The Wetlands Workgroup (WWG) was charged with developing principles/guidance for verifying wetland BMP projects in order for such projects to continue receiving nutrient and sediment load reduction credit. Workgroup members first received a background document and were asked to describe their monitoring efforts, what level of project verification would be reasonable given existing resources, and what could be accomplished if more resources were available. Personal solicitation by the WWG co-chair was also made to certain practitioners. Responses were received from the Maryland Department of the Environment (MDE), Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service (USFWS), Ducks Unlimited, U.S. Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation, Maryland Department of Natural Resources (MD DNR), the National Association of Home Builders, and U.S. Army Corps of Engineers (USACE).

The draft principles were revised and further developed based on feedback received from the CBP Partnership's BMP Verification Review Panel on December 6, 2012 and the Comparison Matrix of source sector and habitat workgroup BMP verification protocols. The wetland principles were then reformatted and enhanced based on comments received in May 2013 during the Habitat GIT's review and comment process. Based on feedback received from the BMP Verification Review Panel in November 2013 and additional verbal feedback from practitioners in December 2013 and January 2014, the wetlands BMP verification principles were restructured into guidance to support the seven watershed jurisdictions in developing their own jurisdiction-specific protocols for wetland BMP verification.

Wetland restoration, creation, and enhancement projects are primarily driven by either: (1) financial assistance incentive programs (Federal and/or state or (2) regulatory requirements for mitigation of impacts to existing wetlands.

Financial assistance programs (Voluntary)

Implementation of wetland projects is incentivized by a variety of federal and state financial assistance programs. Some of these programs may be more focused on water quality benefits while others may be more focused on wildlife habitat conservation. Wetland projects implemented under these programs have differing goals that are very site specific and dependent on what is appropriate for the landowner's situation and objectives.

The major federal financial assistance programs for wetland projects include:

- **Wetland Reserve Easements** (WRE: formerly the Wetlands Reserve Program, to be implemented under the 2014 Farm Bill under the Agricultural Conservation Easement Program): Under WRE, the NRCS provides technical and financial assistance to landowners for voluntary wetland protection, restoration, and enhancement projects on privately owned property. WRE projects require a specific monitoring regime throughout the lifespan of the project, as discussed in more detail in a later section. WRE projects are either maintained in perpetuity or under a thirty-year easement contract depending on the selected enrollment option.

- **Conservation Reserve Program** (CRP): The CRP is administered by the Farm Service Agency (FSA) and is a private lands conservation program. Under the CRP, farmers who enroll in the program agree to take environmentally sensitive land out of agricultural production and plant species that support improvement of environmental health and quality. The contracts for agricultural land enrolled in CRP are ten to fifteen years in length with the long-term goal of re-establishing valuable land cover to assist in water quality improvement, soil erosion prevention, and reduction of wildlife habitat loss. Wetland buffers and wetland restoration are practices included in the CRP.

- **Conservation Reserve Enhancement Program** (CREP): CREP is also administered by the FSA and is a state-federal partnership implemented under the authority of the CRP. As such, the CREP serves a similar purpose and contract length as described for CRP above. Under CREP, high-priority conservation issues identified by state, local, or tribal governments are targeted with incentive payments and participation by landowners is voluntary.

- **Environmental Quality Incentives Program** (EQIP): EQIP is a voluntary program providing technical and financial assistance to agricultural producers for planning and implementing conservation practices. This assistance is administered via contracts with a maximum ten year term. The purpose of EQIP differs from other financial assistance programs in that it is typically focused on wildlife habitat benefits.

Jurisdictional partners within the watershed provide additional financial assistance incentives for wetland projects in each state. Specific state financial assistance programs are listed below:

- Virginia's Agricultural Cost-Share program - provides a 25 percent state tax credit of costs up to $17,500 per year for constructed wetland and wetland restoration BMPs. http://www.dcr.virginia.gov/water_quality/costshar.shtml

- The Maryland Agricultural Water Quality Cost-Share (MACS) Program administered by the Maryland Department of Agriculture provides grants covering up to 87.5 percent of BMP installation costs for various practices implemented on agricultural land, which include wetland restoration BMPs. Wetland restoration projects implemented via the MACS program must be maintained for a minimum of fifteen years. http://mda.maryland.gov/resource_conservation/Pages/macs.aspx

Mitigation

Some wetland restoration projects are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. This includes projects implemented in accordance with the compensatory mitigation regulations under Section 404 of the Clean Water Act, as amended, as well as applicable state wetland mitigation regulations. States reporting wetland acreage gains to the Chesapeake Bay Program are asked to distinguish between wetland increases due to voluntary projects versus those constructed as compensation from regulated losses.

Department of Army permits include:

- Nationwide Permit (NWP): The NWP provides federal authorization on a nationwide basis for commonly recurring activities that have minimal individual and cumulative adverse impacts to the environment. Many NWPs are suspended in MD since they are duplicated by the Maryland State Programmatic General Permit-4 (MDSPGP-4) and some NWPs are retained.

- Individual Permit (IP): The IP applies to large/complex projects exceeding thresholds and conditions of nationwide and general permits. This applies to projects with the potential for more than minimal impacts.

- MSPGP-4: The MSPGP-4 is issued by the USACE Baltimore District, providing federal authorization and expedited permitting for activities with minimal impacts. The majority of projects authorized are verified by MDE without the need for USACE's review of the application.

II. Definitions

Restoration, creation, and enhancement

Wetland restoration, creation, and enhancement projects, while having differing definitions, will undergo similar verification processes. These projects are defined as follows (STAC, 2008):

- **Created wetlands** - manipulation of the physical, chemical, or biological characteristics present to develop a wetland that did not previously exist on an upland or deepwater site; results in a gain of wetland acres.

- **Restored wetlands** - manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland; results in a gain of wetland acres.

- **Enhanced/rehabilitated wetlands** - manipulation of the physical, chemical, or biological characteristics of an existing wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or for a purpose such as water quality improvement, flood water retention, or wildlife habitat; results in gain of wetland function, not acres. The significant difference between rehabilitate and enhance is rehabilitation usually refers to a site that currently has hydrology degradation, while enhancement is usually more about invasive species control.

Projects authorized under a permitting authority as well as those implemented under WRE are subject to specific monitoring requirements, which constitute a built-in level of verification. When performed, it is generally a review of whether or not the project was built as designed, but it is not performed on a set schedule or for great detail. Vegetation or water levels are not necessarily considered. Any consideration of how the regulatory and compliance process might fit with CBP verification must be discussed with regulatory authorities, and not presumed.

The existing wetland restoration BMP efficiencies for nutrient and sediment removal apply to restoration and creation projects; wetland enhancement projects do not yet have approved BMP efficiencies. However, enhancements are accepted in the model under CAST, and aggregated with "restoration." The same efficiency is used in this case.

Stream restoration (floodplain reconnections)

Some overlap exists with regard to stream restoration projects and wetland projects, specifically in hydrologically reconnecting a stream to its floodplain as part of a stream restoration project. In this scenario, the floodplain reconnection allows overflow from the stream during storm events to spread out onto the floodplain, which may include wetland areas. In addition, these floodplain reconnection projects may increase groundwater levels also influencing floodplain wetlands.

Areas of the floodplain may include existing wetlands, or agricultural wetlands, or wetlands that have been converted as a result of stream channelization and drainage. In many cases where the floodplain is currently forested, the reconnection to the stream results in a rehabilitation of the wetlands, but not an acreage gain. This particular rehabilitation may be more significant in terms of water quality than some wetland re-establishment projects, because of the potential to receive and treat high levels of nutrient and sediment loadings. Stream restoration including floodplain reconnection where the floodplain is currently in agricultural use may include wetland restoration, which would result in acreage gains and significant increases in function, including water quality functions, baseflow support, flood storage, and fish and wildlife habitat.

Under the stream restoration BMP, a floodplain is defined as follows: "For flood hazard management purposes, floodplains have traditionally been defined as the extent of inundation associated with the 100-year flood, which is a flooding event that has a one-percent probability of being equaled or exceeded in any one year. However, in the context of this document, floodplains are defined as relatively flat areas of land between the stream channel and the valley wall that will receive excess storm flows when the channel capacity is exceeded. Therefore, water access to the floodplain is defined much more frequently than what is typically considered a flooding event." (Schueler and Stack, 2013)

Stream restoration can consist of stabilizing eroded banks with vegetation, raising channel bed grade in incised channels, reintroducing meanders in channelized streams, and complete realignment of a stream channel to circumvent a blockage or provide capacity for current flows. Floodplain reconnection is typically combined with all of these stream restoration activities, except perhaps when only stabilizing eroded banks.

In regard to wetland projects as part of the floodplain reconnection, the following are defined:

- **Stream restoration BMP** – under Protocol 3 of the stream restoration BMP, efficiencies are provided for nutrient and sediment load reductions as a result of floodplain reconnection implemented as part of a stream restoration project (Schueler and Stack, 2013); this includes reconnection to floodplain wetlands.

- **Floodplain reconnection** – Restoring the hydrologic connection between the stream channel and its floodplain to allow overflow from the stream to contact the adjacent floodplain area, including floodplain wetlands. This usually involves one or more of the following: removal of historical spoil levees created by the placement of dredge spoil on stream banks; raising of the channel bed grade on incised stream channels to promote overbank flow; or creation of floodplains within channelized streams when the channel grade cannot be raised.

III. Project design and siting

Project information obtained prior to and immediately after implementation provides a baseline level of data. This baseline information can then be used for comparison against monitoring/inspection data to determine if the project is still in existence and functioning as intended. Enabling this comparison is a key part of verification so that the project can continue receiving credit for nutrient and sediment load reductions. Thus the baseline information needed is discussed here in order to set up the project to succeed and to elucidate what initial information is required to enable comparison to monitoring/inspection data, thus facilitating the verification process.

Pre-construction

A wetland project, if designed properly, will continue to function indefinitely, so it is important to focus on the quality of design as well as the siting of the project. Planning and site selection criteria have a great influence on the success of projects. Projects should be located in areas suitable for wetland creation or restoration and to meet clear project objectives. This includes siting projects at locations capable of supporting suitable hydrology, hydrophytic vegetation, and hydric soils.

Hydrology. Hydrology is the most critical factor in most wetland restoration projects. Hydrology analysis can be simple or complicated. In farm fields that have been ditched and contain hydric soils (which is usually where there are ditches), hydrologic analysis is usually minimal because we know the ditch is there to allow crop production. The typical commodity crops planted in Maryland cannot grow well in areas with wetland hydrology. Ditches were often designed and installed based on rating curves that are based on providing sufficient drainage to allow crop production for corn and soybeans. In many cases, in implementation, the ditches were constructed to larger dimensions than were recommended by the rating curves.

For many wetland projects in agricultural fields, in addition to restoration of baseline hydrology, the water levels are increased somewhat from what it may have been historically. This is done to enhance functions for wildlife habitat, as well as to overcome the limits of effects on drainage of adjacent lands. Usually this involves installing a berm adjacent to or across a ditch to prevent drainage. A control structure is installed at a specific elevation, which only allows water to drain off the site when that elevation is reached.

Topographic information informs practitioners as to the areal extent of the water surface at the control elevation. In Maryland, maximum water levels in wetlands usually occur in late winter and early spring when precipitation is high and evapotranspiration is low, which is concurrent with the start of the growing season. Unlike with a deep water pond, the shallow water surface of a wetland does not require a large contributing drainage area to maintain ponded conditions into the growing season. In fact, in the humid east climate, precipitation alone can provide sufficient water to create an inundated wetland so long as the water is prevented from draining off the surface. Practitioners therefore can safely assume that the areal extent of the water surface at the control elevation is the minimum wetland acreage that will be achieved. In most cases, the full wetland area is not limited to the areal extent of the water surface, or normal pool, because saturation of the soil extends some distance beyond the extent of the water surface.

Hydric soils. The soils on these sites, in addition to being hydric, typically are silt loams or clay loams. These soils contain sufficient silt and clay content to severely restrict water infiltration and subsequent losses through shallow subsurface flow and groundwater to drainage features. In some cases, sandy soils may be present at the surface, but a clayey horizon exists within a couple feet of the soil surface. Water may also be impounded on these soils by installing a cut-off trench below the berm. The cut-off trench is excavated down to the clayey horizon and filled with a clayey soil to inhibit seepage under the berm.

Success of wetland rehabilitation projects can be slightly more difficult to evaluate because they typically occur in areas that are currently wetlands. However, the same concepts that apply to the examples described above also apply to most wetland rehabilitation: where ditches were installed, they were installed and maintained for a reason – to provide sufficient drainage to support production of food and/or fiber. On heavy soils, they often result in the reduction of surface ponding or the reduction in the duration of surface ponding. This occurs because the drainage features, when in sufficient quantity, significantly reduce the travel time of water moving across the surface, thus reducing the effects of the high precipitation to evapotranspiration ratio in the winter and early growing season.

Thus the keys to site assessment for many wetland rehabilitation projects are the presence of drainage features and hydric soils. Manmade drainage features in hydric soils equals a loss of wetland functions. Mitigation of the drainage features equals rehabilitation of those functions. On heavy soils, the area of influence can be determined by the topography, from which acreage can be easily calculated. On sandy soils, the area of influence is more difficult to determine, because much of the effects may be occurring just below or at the surface. The primary available and legally recognized methods are the groundwater flow equations (e.g. ellipse equation), from which the distance of influence perpendicular to drainage ditches can be calculated. Normally, a combination of groundwater flow equations and site visits to look for changes in surface ponding are used to determine the areal extent of rehabilitation. However, the NRCS and USFWS in cooperation with the Agricultural Research Service, the U.S. Forest Service, and the EPA, are evaluating methods using remote sensing technologies to more accurately determine the area of effect.

For rehabilitation projects where the primary form of rehabilitation is reconnection of a stream to its floodplain, hydraulic models of stream flow (e.g. HEC-RAS) are used in combination with topographic data for design and to determine the area of effect. Validation of the model is

conducted through site visits during storm flows for visual confirmation of water movement into the floodplain from the stream.

Field indicators providing evidence of the periodic occurrence of inundation or soil saturation can include (per USACE):

- Standing or flowing water
- Waterlogged soil
- Water marks on trees
- Drift lines (piles of debris oriented in direction of water movement
- Debris lodged in trees
- Thin layers of sediment deposited on leaves or other objects

Presence of hydric indicators can be determined by examining the soil for:

- Predominance of decomposed plant material (e.g. peat, muck)
- Bluish gray or gray in color at 10 to 12 inches below the ground surface
- Dark and dull (brownish black or black) soil and hydrogen sulfide odor
- could be sandy with dark stains or streaks of organic material in the upper layer, which is 3 to 12 inches below the ground surface

Post-construction

Sites should be visited after construction and planting to ensure that the project was completed as designed; that structures (e.g. berms, water control structures) are operating properly; that there is a predominance of native wetland vegetation; and hydrology is as planned. For wetland restoration projects, it will also be noted that the project is on hydric soil. Invasive species should be managed to maintain desired plant species composition and abundance. However, the WWG does believe that presence of certain invasive species (e.g., cattail, Phragmites) should not disqualify a project from receiving credit as a BMP. The installing agency should provide a post-construction certification that the wetland restoration project was installed properly, prior to submitting the project for credit in the state tracking database. Wetland practices reported by the various agencies and organizations are compiled by a state-designated data steward and cross-checked for duplication.

IV. Existing inspection, maintenance, monitoring frameworks

Inspection and maintenance frameworks routinely performed as part of state and federal agricultural financial assistance programs in the Bay watershed should serve as the foundation of each of the jurisdictions' wetland restoration verification protocols. If a state designs its wetland BMP verification protocols around existing inspection and monitoring frameworks associated with a financial assistance program , then those protocols or procedures are fully consistent with this guidance. Protocols or procedures associated with permits may or may not be consistent with this guidance.

The monitoring requirements for financial assistance programs are possible options for verification and are as follows:

- WRE projects are monitored annually for three years, followed by an ownership review in the fourth year, and then three years of remote sensing review. Onsite monitoring should occur every five years after that. Monitoring may be more frequent if there are violations or if compatible uses of the wetland (e.g. prescribed grazing, habitat management) have been approved. However, many WRE projects occur in existing wetlands and count as rehabilitation, which does not have BMP efficiencies for nutrient and sediment removal.

- CRP/CREP projects are verified for correct installation. Annual monitoring is required for 10% of contracts. A fully implemented project is not subject to further status reviews, but a project that is not successful or has a problem may be monitored for two more years. All of these projects are implemented on private lands where landowners typically inspect the sites a few times throughout the year. Landowners contact NRCS regarding any problems noted during these inspections (e.g., structural failure or invasive species).

- Except for WRE, all other projects implemented under U.S. Department of Agriculture and Maryland Department of Agriculture financial assistance programs would be monitored the same as CRP/CREP projects.

- In West Virginia, verification practices for projects reported by NRCS/FSA fall under spot checking in the NRCS/FSA protocols, while grant funded projects follow guidance similar to those listed in this guidance document.

Monitoring requirements under federal/state permits are as follows:

- Permits issued by USACE require background information as part of the permit application process including: location, waterway, detailed project description, wetland delineation, impacts, baseline data on resource, proposed improvements, concept plans, onsite and aerial photos, description/documentation for net increases in aquatic resources functions and services, maintenance plan, monitoring plan. Projects requiring a Department of the Army authorization may have additional monitoring and maintenance requirements.

- MDE has specific requirements for nontidal wetland creation, restoration, and enhancement projects implemented for mitigation of development and agricultural activities. These requirements include project monitoring for five years, submission of annual monitoring reports, and performance of maintenance activities. The mitigation site must also be protected in perpetuity.

- West Virginia has strict follow up requirements for mitigation projects.

V. Verification guidance

Field assessments are used to identify which projects are still in place and functioning as intended and which ones require preventative or corrective maintenance. In addition, field verification enables local governments to analyze their historical inventory of private and public wetland restoration projects to identify which individual projects present the best opportunities to retrofit for additional sediment and nutrient reduction. The assessment tools used in verification

may also be adapted to allow local governments to determine if other wetland restoration objectives (e.g., habitat) are being achieved. States can also use the Wetland BMP Matrix (Figure 5) to address the 'overlapping' BMP verification guidance on riparian forest buffers, wetlands, shoreline erosion control, and stream restoration that are cross-referenced in other (Agriculture, Urban Stormwater) sets of guidance.

The verification process must be simple, preferably following a short checklist that can be completed with minimal examination. The WWG recommends the following checklist for verifying wetland BMP projects; these criteria match the requirements for onsite monitoring of WRE easements, which has also been accepted by the Corps for monitoring projects authorized through NWP27. On small project sites, verification should take no more than twenty minutes and on larger sites, no longer than one to two hours.

- Estimated acreage of restored, created, or enhanced wetland(s)
- Wetland hydrology
- Predominance of hydrophytic vegetation
- Is vegetation primarily herbaceous, trees, or shrubs
- Presence of wetland wildlife; note species observed
- Water control structures and/or berms or ditch plugs functioning properly (note if repairs are needed)
- Planned buffers being maintained
- Meets plan objectives
- Presence of invasive or non-native plants (if so, briefly note species, density, and acreage covered)
- Measures to address threatened and endangered species functioning are being implemented
- Stability/instability/erosive areas
- Compatible uses, if authorized, being implemented in compliance with management plan (Any authorized uses that remove vegetation, other than maintenance of trails as identified in the plan, will be monitored annually for all years for which they are authorized.)
- Conflicting uses (e.g., ATVs, livestock)
- Encroachment of unauthorized activities (e.g. cropping, roads, unallowed mowing, structures other than those allowed)
- Land ownership changes (if so, has new landowner been provided copy of management plan)
- Document areas of concern, required maintenance, recommendations for enhancement

The WWG feels that it would not be appropriate to consider the project's success or failure in meeting other functional objectives through the BMP process since the verification is about properly crediting the project as a water quality BMP. Wetland projects should not be rejected as water quality BMPs due to a failure to meet standards not related to the water quality objective (i.e. habitat-based objectives).

State oversight of local wetland restoration reporting

The installing agency should submit basic documentation to the appropriate state agency for each individual wetland restoration/creation project installed. Localities should check with their state agency on the specific data to report for individual projects. In addition, it is recommended that the installing agency maintain a project file for each wetland restoration project installed (i.e., construction drawings, as-build survey, digital photos, post construction monitoring, inspection records, and maintenance agreement). This file should be maintained for the lifetime for which the load reduction will be claimed. This information would be used as a basis for comparison to long-term monitoring/verification information per the above checklist to determine if the project is still functioning as designed.

Inspection, maintenance, monitoring

Monitoring is the actual part of verification which can be used to determine if the project is functioning as designed. Field experience has shown that if a wetland project is functioning adequately approximately three years following completion of construction, then it will likely continue to function indefinitely. Therefore, onsite monitoring within the three years following construction is recommended. For any long-term monitoring, use of aerial imagery for remote observations is highly recommended for verification of wetland BMPs; remote observations can indicate encroachment of agricultural activities, clearing, and tree removal. Any issues or concerns with projects implemented on private lands are typically reported by the landowner to the installing agency and addressed as needed.

Most wetland projects are designed to minimize long-term maintenance and, therefore, should remain effective indefinitely. Wetland restoration practices implemented under CRP/CREP have a fifteen year contract; however, in most cases, the wetland continues to exist and function beyond the contract period. Wetland projects enrolled in the WRE must be maintained in perpetuity.

Appropriate Verification Guidance to Follow for Multi-BMP Projects

Tracking, reporting, and verification of wetland projects presents a challenge for the partnership in that these projects cross various pollutant source sector and habitat restoration and protection groups. Verification for wetlands falls under different sets of guidance developed by the CBP Partnership's workgroups including those for wetland restoration projects, stream restoration projects (as related to floodplain reconnection), the agriculture sector (as a structural BMP), and the urban stormwater sector. In addition, various types of wetlands are covered under different BMPs approved by the Partnership and ongoing/upcoming BMP expert review panels convened by different workgroups.

Urban wet ponds/wetlands are not equivalent to a wetland project implemented in an agricultural setting. Therefore, jurisdictions should verify any urban wet pond projects following the Urban Stormwater Workgroup's BMP verification guidance. In the case of wetland restoration, creation, and enhancement projects, the jurisdictions should follow the guidance provided in this document by the Wetlands Workgroup.

Any wetland projects that are defined as reconnecting a stream to the floodplain are credited according to the revised stream restoration BMP efficiencies adopted by the Partnership (Schueler and Stack, 2013). Therefore, projects of this nature should be verified for their

continued existence and proper functioning by jurisdictions following the Streams Workgroup's stream restoration BMP verification guidance. In cases where floodplain reconnection also involves wetland restoration within the floodplain, the wetland BMP verification guidance should be followed for verifying the wetland portion of the project.

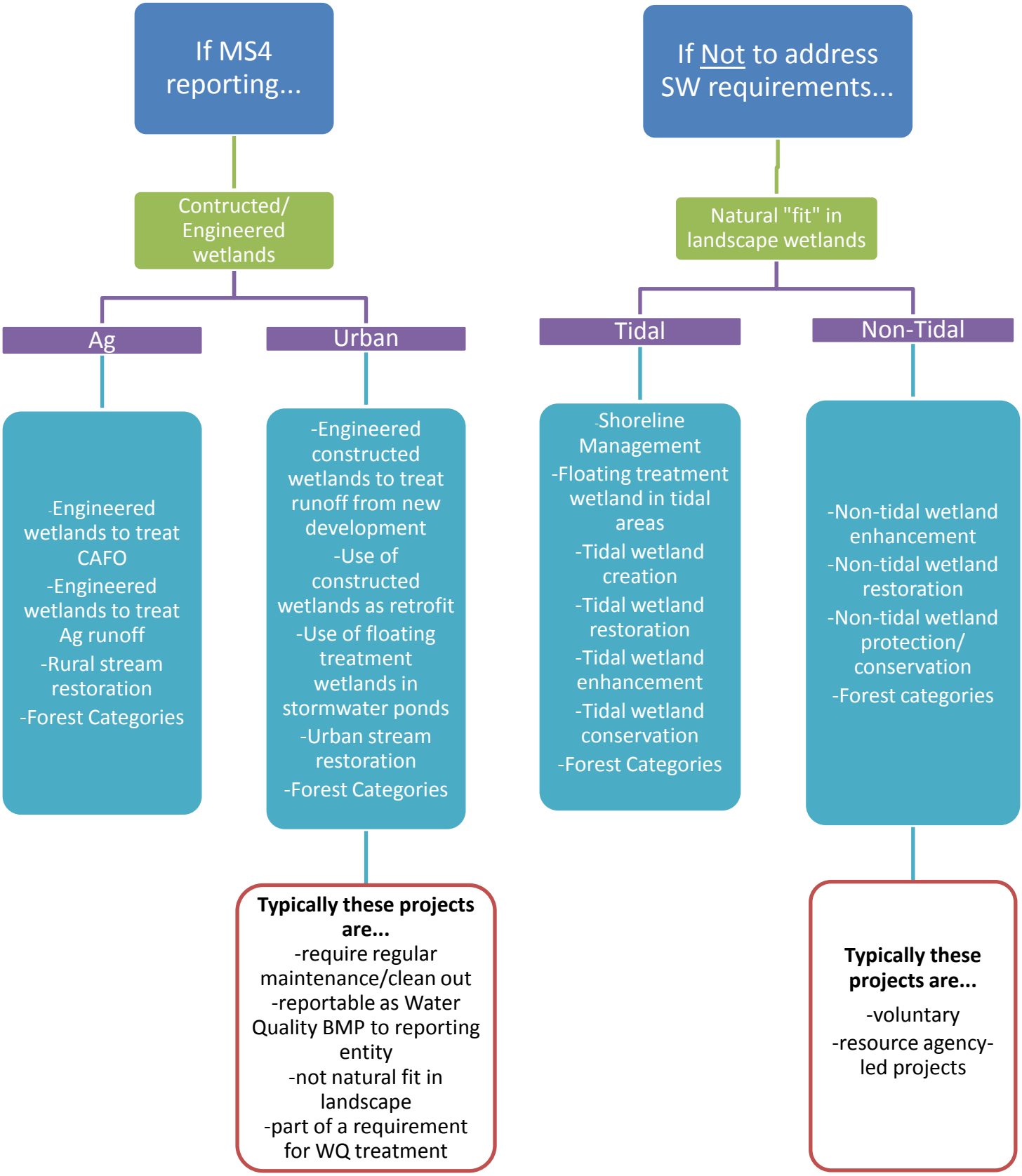
Figure 5 below provides visual guidance to address the overlapping BMP verification guidance on riparian forest buffers, wetlands, shoreline erosion control, and stream restoration that are cross-referenced in other sets of guidance. This matrix could potentially be used as a reference document by states when addressing verification practices for these BMPs.

References

Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) (November, 2008). Quantifying the role of wetlands in achieving nutrient and sediment reductions in Chesapeake Bay. *Chesapeake Bay Program STAC Responsive Workshop.* STAC publication 08-006. Retrieved from http://www.chesapeake.org/pubs/238_2008.pdf

Schueler, T. and B. Stack (May, 13, 2013). Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects. http://www.chesapeakebay.net/documents/Final_CBP_Approved_Expert_Panel_Report_on_Stream_Restoration_revised102813_LONG.pdf

Figure 5. Wetland BMP Matrix



Stream Restoration Verification Guidance

Version: Final, February 6th, 2014

The guidance is revised to incorporate comments provided by the Chesapeake Bay Program Verification Review Panel (CBP Water Quality GIT Verification Committee, 2013a and b). Additional changes were not needed following the Panel's April 2014 meeting.

Part 1: The Need for Verification

Verification of the initial and long term performance of urban and non-urban stream restoration projects is critical to ensure that nutrient and sediment pollutant load reductions are achieved and sustained across the Chesapeake Bay watershed and provides a means by which state agencies/regulators can also measure functional loss or gain related to these projects. The need for verification is underscored by the estimated 700 miles of planned stream restoration projects by the six Bay watershed states and the District of Columbia in their respective Watershed Implementation Plans and the need to address biological impairments identified as part of local TMDLs across the Bay watershed. While this guidance focuses on individual stream restoration projects, it is recognized that stream restoration is part of watershed-wide efforts to restore the health of the Chesapeake Bay.

The Center for Watershed Protection (Center) in their role as the Chesapeake Bay Program's Sediment Reduction and Stream Corridor Restoration Coordinator, developed guidance with input from the Chesapeake Bay Program (CBP) Partnership's Habitat Goal Implementation Team (GIT). The guidance is adapted from the 2013 Urban Stormwater Workgroup Memo, *Final Recommended Principles and Protocols for Urban Stormwater BMP Verification* (Goulet and Schueler, 2013) and *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (Schueler and Stack, 2013). Additional guidance for stream restoration projects, specific to riparian wetlands, should also refer to verification guidance on wetlands prepared by the Habitat GIT's Wetlands Workgroup as indicated in Part 4 of this report.

The guidance included in this document is based on the premise that the most important step to assure a project is performing correctly is to first determine that the project is designed correctly and supports clearly articulated goals and objectives. Tools, such as checklists, that standardized information on stream restoration projects may facilitate implementation of this guidance by the Bay jurisdictions. Forthcoming tools as a result of efforts by the Maryland Department of the Environment (MDE) and U.S. Fish and Wildlife Service (USFWS) may provide additional guidance for verification methods that may assist in these efforts.

The Habitat GIT has asked the Center to help coordinate the work of the Stream Health Workgroup (SHWG) with the USFWS, who will be charged with promoting and coordinating the adoption of the Stream Restoration Verification Guidance among the seven Bay watershed jurisdictions.

Part 2: Key Definitions for Stream Restoration Project Verification

The following terms are defined to clarify the application of this guidance to stream restoration project verification.

Stream Restoration Projects*:* Refers to any natural channel design, baseflow channel design, or legacy sediment removal, or other restoration project that meets the qualifying conditions for credits as described in Schueler and Stack (2013), including environmental limitations and stream functional improvements. The types of stream restoration projects are defined as:

1. ***Legacy Sediment Removal*** *(LSR)* - A class of aquatic resource restoration that seeks to remove legacy sediments and restore the natural potential of aquatic resources including a combination of streams, floodplains, and palustrine wetlands.

2. ***Natural Channel Design*** *(NCD*) - Application of fluvial geomorphology to create stable channels that maintain a state of dynamic equilibrium among water, sediment, and vegetation such that the channel does not aggrade or degrade over time. This class of stream restoration utilizes data on current channel morphology, including stream cross section, plan form, pattern, profile, and sediment characteristics for a stream classified according to the Rosgen (1996) classification scheme, but which may be modified to meet the unique constraints of urban streams.

3. ***Wet Channel Regenerative Stormwater Conveyance*** *(RSC)* - Also known as baseflow channel design, these practices are located further down the perennial stream network and use instream weirs to spread storm flows across the floodplain at minor increases in the stream stage for events much smaller than the 1.5-year storm event, which has been traditionally been assumed to govern stream geomorphology and channel capacity. Wet channel RSC may also include sand seepage wetlands or other wetland types in the floodplain that increase floodplain connection or interactions with the stream.

Legacy Stream Restoration Projects*:* Refers to the population of stream restoration projects 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.

Non-Conforming Stream Restoration Project*:* Projects that do not conform to the reporting requirements of the stream restoration protocols outlined in Schueler and Stack (2013) and instead receive credit using the interim rate.

Part 3: Background on Verification of Stream Restoration Projects

Stream restoration projects are subject to a series of permits, including National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits, U.S. Army Corps of Engineers permits, and state-specific permits. These permits are summarized in Table 15. Each permit has its own requirements for monitoring and reporting. However, the current post construction and maintenance inspections are not oriented toward verifying the actual pollutant removal performance of the stream restoration projects. Instead, local inspections primarily focus on whether the project was installed per design, and that its future condition will not cause harm to public safety and/or cause nuisance problems in the community. For verification purposes related to the Chesapeake Bay TMDL requirements, it will be necessary to develop improved inspection guidelines that utilize visual indicators to verify that the performance of the project is adequate to still achieve the intended nutrient and sediment pollutant load removal rate.

Table 15. Permits Required for Stream Restoration Projects

Permit	**Description**
All States	
Nationwide Permits (NWPs)	Nationwide permits are general permits implemented by the U.S. Army Corps of Engineers (ACE) for commonly recurring activities that have minimal individual and cumulative adverse impacts to the environment. Most NWPs have been suspended in Maryland and Pennsylvania since they are duplicated by State Programmatic General Permits already in place. However, NWP 27 (Aquatic Habitat Restoration, Establishment, & Enhancement Activities) is still in place and states that activities must result in net increase in aquatic resource functions and services over the existing conditions.
State Programmatic General Permits (SPGPs)	SPGSs authorize work in Waters of the United States within individual states for activities that would cause no more than minimal adverse environmental effects. They are administered by the U.S. Army Corps of Engineers in conjunction with state agencies. Individual states have specific enforcement thresholds on the size of the area impacted that are included under the general permits. In most cases, projects authorized by the state agencies do not need ACE review of the application.
Individual Permits (IPs)	Individual permits, also known as a standard permits, are implemented by the ACEand are generally reserved for projects with potential for substantial environmental impacts. An individual permit (IP) requires a full public interest review, including public notices and coordination with involved agencies, interested parties and the general public. IPs involve large/complex projects exceeding thresholds and conditions of nationwide and state general permits (highways on new alignment, subdivisions, dredging).
NPDES MS4 Permits	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.
State-Specific	
Virginia Marine Resources Commission Subaqueous Permit	The subaqueous permit program enforced by the Virginia Marine Resources Commission applies to activities impacting perennial streams with drainage areas that exceed 5 mi^2 or with a mean annual instream flow of 5 cubic feet per second. A joint local/state/federal permit application is required and is subject to a public interest review. The permit may include restrictions on the time of year for construction activities and specific construction methodologies. Monitoring reports are required every year for 5 years, the 7^{th} and 10^{th} years, and every year thereafter until the project is demonstrated to be stable for 2 successive years.
Virginia Water Protection (VWP)	The Virginia Water Protection (VWP) permit program is administered by the Virginia Department of Environmental Quality's Office of Wetland and

Permit	Description
Permits	Stream Protection and involves the regulation of water withdrawal projects, excavation, filling, or activities that affect the biological, chemical or physical properties of surface waters (including streams, lakes and wetlands). Generally, activities requiring a permit include dredging, filling, or discharging any pollutant into or adjacent to surface waters, or otherwise altering the physical, chemical or biological properties of surface waters. The VWP general permits include separate permits for impacts less than ½ acre, utility projects, linear transportation projects, and development activities. A joint local/state/federal permit application is required.

The *Final Recommended Principles and Protocols for Urban Stormwater BMP Verification* (Goulet and Schueler, 2013) documents several challenges that still need to be addressed to develop an effective verification system for urban stormwater BMPs in the Chesapeake Bay watershed. Most of these challenges also apply to stream restoration projects. This guidance identifies additional challenges specific to stream restoration projects.

- There are a variety of stream restoration techniques, such as natural channel design, baseflow channel design and valley/floodplain restoration, which regulators may not necessarily have experience reviewing.

- Stream restoration projects often do not follow a consistent design process where the project's goals and objectives are established through an analysis of the restoration potential which in turn is determined through a systematic assessment of stream functions.

- Post construction monitoring is typically required for 3-5 years to satisfy permits. However, stream restoration projects are subject to catastrophic damage from extreme flood events. To ensure that the projects still exist and are operating as designed, monitoring is needed on an indefinite basis. The Stream Restoration Expert Panel recommended the maximum duration for removal credits as 5 years, with indefinite renewal of the credit pending field performance inspections.

Part 4. Guidance for Verifying Stream Restoration Projects

The following guidance is recommended to verify stream restoration projects are implemented and operating correctly in each of the seven Chesapeake Bay watershed jurisdictions.

1. *Methods to Verify Individual Stream Restoration Projects.* The level of detail needed for verification will be based on the type of project (natural channel design, baseflow channel design, and removal of legacy sediments), as well as the size, complexity, and landscape position of the proposed project. It is important that the method used to verify stream restoration projects identifies key features that relate to stream function and project goals and objectives. The USFWS and EPA have developed a function-based framework for stream restoration projects and is presented in the "*A Function-Based Framework for Stream Assessment and Restoration Projects.*"

(http://www.fws.gov/chesapeakebay/stream/protocols.html, http://water.epa.gov/lawsregs/guidance/wetlands/upload/12-natural_channel_design.pdf) This framework provides an excellent example of how the assessment, design and project goals can be an integral part of the verification process. The USFWS has also developed the *Function-based Stream Restoration Project Process* that illustrates how the framework can be applied to stream restoration projects (http://www.fws.gov/chesapeakebay/stream/demoprojects.html). Using the framework will greatly benefit non-conforming projects that use the interim rate for estimating nutrient and sediment load reduction. These projects may lack the detail necessary to use the protocols developed by the expert panel, however, a post construction checklist can establish a baseline that can verify that the project is meeting minimum performance standards to warrant the interim rate reductions.

2. *Maintenance and Monitoring tied to Performance.* Regular inspections and maintenance of stream restoration projects are critical to ensure their benefits in preventing sediment and nutrient pollution are maintained and extended over time, as well as to maintain other local design objectives (e.g., habitat improvement, channel stability, and landscape amenity). Therefore, the verification process should ensure that stream restoration projects are installed and maintained properly over their design life to qualify for their sediment and nutrient reduction credits. This will require verification protocols to define: (1) the frequency for field verification of stream restoration practices; and (2) the process for downgrades if maintenance is not performed. All qualifying projects must have a designated authority responsible for development of a project maintenance program that includes routine maintenance and long-term repairs. Monitoring is the actual part of verification which can be used to determine if the project is functioning as designed. If it is not functioning as designed, then the monitoring data may be used to identify factors responsible such as improper construction or the need for maintenance. The USWS is in the process of developing a *Rapid Function-based Stream Restoration Monitoring Protocol* that will be available in April 2014 and can be obtained at http://www.fws.gov/chesapeakebay/stream/protocols.html.

3. *Utilize Existing Maintenance and Monitoring Inspection Frameworks.* The existing MS4 and 404 Permit/401 Certification inspection and maintenance framework and local sediment control regulations for hundreds of communities in the Chesapeake Bay watershed should be the foundation of any stream restoration verification system. Routine maintenance data collected under these frameworks will ultimately inform the verification process described in #8 below. In addition, maintenance and inspection requirements included in state and federal agricultural cost-share programs should be incorporated into verification of non-urban stream restoration projects. Many of the monitoring and inspection requirements under Nationwide 27 and local permits are limited to 3 - 10 years. It is therefore important for the installing agency to continue inspections throughout the project life. The Habitat GIT will work with the state and federal regulatory agencies to determine how their existing maintenance and inspection programs can be used to support implementation the Chesapeake Bay Program Partnership's basin-wide BMP verification framework.

4. *Removal Rate Tied to Field-based Measurement Methods that verify stream design criteria*. The verification of nutrient and sediment removal rates using the *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* should be based on design criteria that can be field verified using measurement methods. Design criteria should be established after a stream function-based assessment determines what restoration potential (goals and objectives) is achievable. Instructions for how to develop function-based assessment, design criteria and measurement methods can be found in Harman and Starr (2011). The maximum duration for which the stream restoration pollutant removal rate applies is 5 years, which can be renewed based on a field performance inspection that verifies the project still exists, is adequately maintained, and is operating as designed. The protocols being developed by USFWS for MDE may be helpful in defining performance indicators to assess project performance.

5. *Stream Restoration Verification as Adaptive Management.* It is recommended that field assessments provide the information needed to verify which projects are functioning as designed to achieve their defined goals and objectives and those projects that require preventative or corrective maintenance to maintain their function(s). Such assessments may also identify factors contributing to the project's success or failure that may be used to inform changes, as needed to existing designs or future monitoring.

Until recently, post-project monitoring has been rarely conducted to assess how well stream restoration projects meet their intended design objectives over time. Real world data collected on actual stream restoration performance enables local and state agencies to improve the next generation of projects in an adaptive management process. This process can isolate the specific site conditions, design features and maintenance tasks that influence stream restoration longevity and performance, and incorporate these into improved design specifications, review and inspection procedures and maintenance requirements. It is recommended that future stream restoration expert panels would review such data to determine if these improved projects would qualify for a higher removal rate, and refine restoration methods and practices that ultimately ensure greater project success.

Bay jurisdictions are encouraged to keep informed of the development of guidance and tools that may assist in these efforts. For example, workshop findings from an upcoming STAC workshop *Designing Sustainable Stream Restoration Projects within the Chesapeake Bay Watershed* may help to identify methods to evaluate projects, in addition to the guidelines for a detailed function-based stream assessment method, a rapid function-based stream assessment method, and a stream restoration design review method under development by Maryland Department of the Environment (MDE) and U.S. Fish and Wildlife Service (USFWS), along with input from stream restoration professionals.

6. *Stream Restoration Reporting Must be Consistent with CBP Approved Practices and Definitions.* Each state has a unique system to report stream restoration projects as part of their MS4 and 404/401 permits. In some cases, states are still developing and refining their reporting systems. Consequently, it may not be possible or even desirable to implement a basin-wide stream restoration reporting format. However, to get credit in the implementation of nutrient and sediment pollutant load reducing practices, stream restoration implementation data using CBP-approved rates or methods, reporting units and geographic location (consistent with NEIEN standards), and periodically updated data

based on the local verification of projects in the field is needed. The Habitat GIT will initiate discussions with regulatory agencies to determine how their operations may support this data reporting, with a goal of not increasing the burden on regulatory agencies.

7. *Initial Verification of Stream Restoration Installation.* The installing agency will need to provide a post-construction certification that the stream restoration project was installed properly, meets or exceeds its functional restoration objectives, and is hydraulically and vegetatively stable, prior to submitting the project for credit in the state tracking database. This includes non-conforming projects as well. To receive sediment and nutrient reduction credit for stream restoration projects that involve the restoration of riparian wetlands, the installing agency will need to verify that the riparian area associated with the project meets the state's legal definition of a wetland (e.g., hydrophytic vegetation, hydric soils) as well as the guidance for wetland verification (Habitat GIT, 2014)

8. *Recommended Cycle for Field Verification of Stream Restoration Projects.* The installing agency needs to conduct inspections two years after initial construction, as this is the most critical period, especially for assurance that vegetative practices are surviving. After this initial three year period, the frequency of inspections should be once every 5 years to ensure that individual projects are still capable of removing nutrients and sediments. The installing agency should consider more frequent inspections after large flood producing storms as defined by local or state agencies. The routine maintenance and inspection frameworks referenced in #3 are a critical component to assure that stream restoration projects are functioning between the verification periods.

9. *Suggested Process for Stream Restoration Project Downgrades.* If a field inspection indicates that a project is not performing to its original design criteria, the locality would have up to one year to take corrective maintenance or rehabilitation actions to bring it back into compliance. If a project is not fixed after one year, the pollutant reduction rate for the project would be eliminated, and the locality would report this to the state in its annual MS4 report. Non-permitted municipalities would be expected to submit annual progress reports. The load reduction can be renewed, however, if evidence is provided that corrective maintenance actions have restored its performance.

10. *Special Procedures for Stream Restoration Projects Used for Offsets, Mitigation and Trading.* Some stream restoration projects are built to offset, compensate or otherwise mitigate for impacts caused by development elsewhere in the watershed. In other cases, stream restoration projects 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 practices.

11. *State Oversight of Local Stream Restoration Reporting.* The installing agency must submit basic documentation to the appropriate state agency to document the nutrient and sediment reduction claimed for each individual stream restoration project installed. Localities should check with their state agency on the specific data to report for individual projects. Some typical reporting information includes:

    a. Type, length and width of stream restoration project
    b. Location coordinates

c. Year of installation and maximum duration of credit
d. 12 digit watershed in which it is located
e. Protocol(s) used
f. Projected sediment, nitrogen, and phosphorus load reduction

For non-conforming projects that use the interim rate to estimate nutrient and sediment load reduction, only a – d would apply. Projects that involve the restoration of riparian wetlands will need to provide basic information, such as wetland area and drainage area and will also need to address guidance for riparian wetlands as developed by the Habitat GIT. In addition, the installing agency should maintain an extensive project file for each stream restoration project installed (i.e., construction drawings, as-build survey, credit calculations, digital photos, post construction monitoring, inspection records, and maintenance agreement). The file should be maintained for the lifetime for which the load reduction will be claimed.

To provide accountability, Bay states will be asked to use their existing MS4 regulatory authority that could include periodic field inspections review of local maintenance inspection records, to verify performance of local stream restoration practices. The state oversight process should be transparent and publicly accessible so that NGOs, watershed groups, and other stakeholders can be confident that BMP implementation is real.

12. *EPA Review of State Verification Oversight.* So as to not create an additional regulatory burden, the Habitat GIT will discuss with EPA Region 3 the feasibility of using its existing NPDES MS4 permit review process to provide periodic reviews the implementation of state BMP verification protocols to ensure they are being effectively implemented.

13. *Review and Verification of CBP BMP Accounting.* The accounting methods and verification procedures used by the Bay Program for stream restoration projects must be clear and transparent so that local governments and the states can readily understand how the projects they report are being used to calculate pollutant reductions in the Chesapeake Bay Watershed Model. Better communication among the Bay Program and its state and local government partners will help to improve BMP reporting and ensure a fair representation of state and local program implementation.

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Section 3. Basinwide Verification Framework Elements

The Chesapeake Bay Basinwide BMP Verification Framework contains twelve specific elements addressed in the sections of this report and the separate supporting documentation provided as appendices. Please see Table 16 for a complete listing of the twelve framework elements and where their documentation is located.

Table 16. The 12 Components of the Chesapeake Bay Basinwide BMP Verification Framework

Framework Element	*Documentation Location*
BMP Verification Principles	Sections 1, 6, Appendix B
BMP Verification Review Panel	Sections 1, 5, Appendix C
Source sector and habitat specific BMP verification guidance	Sections 1, 2, 6
Practice life spans	Sections 1, 3, 4, 6
Ensuring full access to federal cost-shared agricultural conservation practice data	Sections 1, 3, 6, Appendices E, O
Enhance data collection and reporting of federally cost-shared practices	Sections 1, 3, 6 Appendices F, O
Accounting for non-cost-shared practices	Sections 1, 2, 3, 6
Preventing double counting	Sections 1, 3, 6, Appendix O
Clean-up of historic BMP databases	Sections 1, 3, 6
Development and documentation of jurisdictional BMP verification programs	Sections 1, 3, 4, 6
Partnership processes for evaluation and oversight	Sections 1, 5, 6
Communications and outreach	Section 1, Appendix G

The CBP Partnership developed the basinwide framework building directly from a number of existing and ongoing programs and efforts (Appendix L) and using the Partnership's full management organizational structure (Appendix M). A record of the Partnership's sponsored meetings and conference calls within which BMP verification was a topic on the agenda is provided in Appendix N.

Practice Life Spans

The BMP Verification Review Panel recommended that the Partnership establish practice life spans for all Partnership approved BMPs and apply these life spans with within the workgroups' verification guidance and the jurisdictions' verification programs and underlying protocols[34]. The Panel recommended that the Partnership support continued crediting of a practice after its recorded lifespan as long as the proper level of re-verification occurs confirming the practice is still present and functioning. The Panel recommended the following specific steps be taken in

[34] *Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions*. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

factoring practice life spans into the workgroup's BMP verification guidance, the Committee's basinwide framework, and the jurisdictions' BMP verification programs:

- For the existing Partnership approved BMPs, the **respective source sector workgroup** needs to assign a life span/expiration date for each approved BMP. In doing so, the workgroups need to consider contract/permit life span, engineering design life span, and actual life span.

- For all future BMP expert panels convened by the Partnership, the **workgroups** need to ensure each panel they convene is charged with establishing a recommended life span/expiration date for each of the practices at which time them must be re-verified or be removed from the data submitted for crediting.

- **Workgroups** need to develop specific guidance for how to sunset specific reported practices which have gone beyond their lifespan and have not received the level of required re-verification after the designated lifespan and the jurisdictions need to build systems for carrying this out this process within the larger verification programs.

- The **Watershed Technical Workgroup**[35] needs to develop specific guidance that ensures the Partnership's (National Environmental Information Exchange Network, or NEIEN-based, BMP reporting system specifically addresses the issue of practice life span. This includes building in a system for flagging reported practices which are past their established life spans, and confirmation there was follow up re-verification of their continued presence and functionality or removal from the data submitted for crediting.

The Partnership recognizes practice life spans can take the form of contractual or regulatory life spans as well as physical or functional life spans. Within a BMP verification context, the Partnership is focused on the functional life span of a given practice.

The BMP Verification Committee and BMP Verification Panel members agreed that in verifying practices are "still there and functioning" over the course of a practice's established life span, the jurisdictions can rely on statistically valid sub-sampling of the entire population of practices. Within their BMP verification program documentation, each jurisdiction will need to carefully spell out not only the design of their statistically valid sub-sampling methodologies, but exactly how the jurisdiction will apply the results from the sub-sampling to determine what portion of the entire population of practices are considered "still there" through time.

Ensuring Full Access to Federal Conservation Practice Data

The conservation assistance that is provided to farmers by the USDA is authorized under Section 1619 of the 2008 Farm Bill which states that, "USDA, or any contractor or cooperator of USDA, shall not disclose information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in the programs of the Department . . ," except to agencies and individuals

[35] The BMP Verification Review Panel's original recommendation charged the BMP Verification Committee with this responsibility. Given the Watershed Technical Workgroup has responsibility for oversight of the Partnership's NEIEN-based BMP reporting system, the responsibility was switched from the Committee to the Workgroup.

that have been established as USDA 1619 Conservation Cooperators. This means that information that is used by a farmer to enroll in Federal agricultural programs is defined as confidential between the farmer and the Federal Government.

Organizations can be established as 1619 Conservation Cooperators if they agree to maintain data confidentiality and if their use of the data provides technical or financial assistance to USDA conservation programs. Signing a 1619 Conservation Cooperator Agreement provides the cooperator with confidential access to the USDA's datasets of conservation practice information. The data can be released to the public if they are aggregated so that farmer privacy is protected, as discussed below. These 1619 aggregation requirements are regularly followed by USDA agencies such as the National Agricultural Statistics Service when they are publishing county statistics. Farmers can also release their site-specific data on an individual basis.

Four watershed states—Maryland, New York, Virginia, and West Virginia—currently have established USDA 1619 Conservation Cooperator Agreements between the NRCS and one or more of their state conservation agencies.[36] The remaining two states—Delaware and Pennsylvania—have not yet established conservation cooperator status for any of their state conservation agencies (see Appendix E for more details). The agreements state that "those individuals or organizations (governmental or nongovernmental) that assist the NRCS with providing conservation related services are known as NRCS Conservation Cooperators."

Each of the six states has identified a key state agency with responsibility for submitting aggregated agricultural conservation practice data to the Partnership's Annual Progress Review, through their respective state's NEIEN data transfer node and those state agencies with responsibility for providing conservation services (e.g., technical assistance, cost share program administration) (Table 17). These state agencies work in partnership with additional jurisdictional, regional, local, and Federal agencies and non-governmental organizations to collect and compile the necessary conservation practice implementation data, often funded in the process by the EPA's Chesapeake Bay Regulatory and Accountability Program Grants to the jurisdictions.

[36] In addition, USGS has signed 1619 Conservation Cooperator Agreements with both NRCS and FSA.

The bottom line objective is ensuring that all six states have full access to all federally cost

Table 17. State jurisdictional agencies that have been approved by the USDA for participation in 1619 data-sharing agreements to support the objectives of the NRCS Chesapeake Bay Watershed Initiative and increase the capacity for consistent, integrated analysis, and reporting of conservation practice implementation data for the Chesapeake Bay watershed. Source: Hively et al 2013

Jurisdiction	Agency	Role	1619 agreement in place?
Delaware	DE-DNREC	Responsible for NEIEN submission.	No
	DE-DA	Provides conservation services.	No
	DE-FS	Provides conservation services.	No
Maryland	MDA	Provides conservation services.	Yes
	MDE	Responsible for NEIEN submission.	No
New York	USC	Provides conservation services.	Yes
	NY-DEC	Responsible for 2013 NEIEN submission	No
Pennsylvania	PA-DEP	Responsible for NEIEN submission.	No
	PA-DA	Provides conservation services.	No
Virginia	VA-DCR	Provides conservation services.	Yes
	VA-DEQ	Responsible for NEIEN submission.	No
West Virginia	WV-DEP	Responsible for NEIEN submission	No
	WV-DA	Provides conservation services	Yes
	WV-CA	Provides conservation services	Yes

shared conservation practice data to be used to give the six watershed states a greater capacity for analysis and understanding of agricultural conservation practice implementation across the landscape, to support the adaptive management and targeting of conservation programs, fully credit producers for their implemented conservation practices, to eliminate any double counting, and promote success in attaining water-quality goals. To ensure that all six Chesapeake Bay watershed jurisdictions obtain full and complete access to all Federal cost-shared agricultural conservation practice data, the BMP Verification Committee recommends that the six Chesapeake Bay watershed states:

1) Adopt the broadest, most consistent language in the existing Maryland, New York, Virginia, West Virginia, and USGS 1619 agreements as described in Appendix O;

2) Institute 1619 data sharing agreements in Delaware and Pennsylvania and for all jurisdictional agencies in Maryland, New York, Virginia, West Virginia listed in Table 17 which have direct responsibilities for planning, funding, delivery, reporting, and/or submission of agricultural conservation practice data; and

3) Establish an annual data handling protocol that will ensure routine, thorough, and consistent data access for all USDA Farm Bill agricultural conservation programs. This uniform data access can be tailored to formats that integrate effectively within each state's respective conservation tracking and reporting system.

Enhance Collection and Reporting of Cost-Shared Practices

The Partnership's Agriculture Workgroup has identified opportunities to enhance the recordkeeping associated with USDA conservation practices, in order to capture specific information that can be used to more efficiently integrate the data with jurisdictional datasets and to more accurately represent the practices in the Partnership's Scenario Builder tool, and in the various Partnership's Chesapeake Bay watershed and water quality models. A number of USDA conservation practices were identified in Table 18 and described below as having substantial limitation in the amount of data available for translating between USDA conservation practice codes and Partnership approved practice definitions. These practices are described in more detail in Appendix F. Other conservation practices not represented here may also have data limitations depending on their use and reporting. In many cases, these limitations could be addressed through simple techniques such as the use of modifying letter codes to distinguish among the various conservation techniques that fall within each practice code definition. The Partnership's protocols generally assume the lowest available estimated load reductions for conservation practices whenever there is not detailed information available to support a higher conservation effectiveness estimate.

Table 18: Possibilities for improved recordkeeping for USDA conservation practices.

Category	USDA code	Possibility		Relation to currently collected data
Land Use	Many	Record land use and land use change "from" and "to," and integrate datasets to make land use information consistently available in the National Conservation Planning (NCP) dataset.		NRCS has a data field for land use ID, but it is generally not populated in the NCP database. The change "from" and "to" are not available in any NRCS business tool.
Livestock Animal Type	Many	Record livestock animal type (for example, beef, dairy, poultry) for relevant conservation practices.		NRCS has a data field for livestock_ID in ProTracts, but in the 2012 dataset it was only sparsely populated in the NCP database.
Cover Crops	340	Record cover crop management details including species, planting date, planting method, commodity vs. regular, and if manure was applied (for example., commodity early drilled rye-aerial-no manure).		Cover crop is defined broadly in NRCS data, whereas the CBP applies nitrogen conservation effectiveness values that range from 5% to 45%, depending on management. This information is currently not available in any NRCS business tool, so Scenario Builder assigns conservative estimates for NRCS cover crops.

Fencing	382	Identify the location and use of the fencing, or the associated components of the management system.		NRCS currently defines, tracks, and reports livestock fencing under a single Conservation Practice Code (382). The practice Access Control could show where animals are excluded from stream corridor, but this currently is not in any current NRCS business tool.
Nutrient Management	590, 104/105	Differentiate various nutrient management planning and implementation strategies to match CBP Partnership definitions.		NRCS currently defines, tracks, and reports nutrient management under a single Conservation Practice code (590), and nutrient management plans are contracted as practice 104 (written) and 105 (applied).
Feed Management	592	Record the animal type, management strategy, and differentiate between nitrogen- vs. phosphorus-based feed management.		NRCS currently tracks and reports feed management under a single Conservation Practice code (592) for multiple livestock species and does not typically track the type and amount of manure nutrient reductions resulting from changes in feed management.
Forestry Practices	CP-22	Record length and width of the buffer rather than acreage. Indicate consistently and accurately if a buffer is re-enrolled vs. newly installed.		Forest buffers are currently tracked by FSA in units of acres. Including length and width would take into account different load reductions for narrower vs. wider buffers. Double counting could be avoided if FSA indicates consistently and accurately whether a buffer is re-enrolled vs. newly installed.
Tillage Practices	324, 329, 345, 346, 761, 778	Include the residue cover amount in the practice standard to indicate minimum percent of cover remaining after harvest.		Current NRCS practice standards for tillage do not include a minimum amount of residue remaining after harvest. CBP Partnership Expert Panels have found that water quality benefits for tillage practices vary greatly depending on the amount of cover, and jurisdictions can more accurately show improvement if they have this information.

Source: Hively et al. 2013

The NRCS is currently undertaking a Conservation Delivery Streamlining Initiative (CDSI) and has plans to integrate the NCP and IDEA data systems. Similarly, the FSA is reengineering its conservation practice database under the Modernize and Innovate the Delivery of Agricultural Systems (MIDAS). It will be important to maintain the level of discussion and collaboration

achieved in 2012 and 2013 to smoothly integrate these expected changes with jurisdictional datasets and facilitate data transfer between State and Federal agencies.

The BMP Verification Committee recommends continued close collaboration with NRCS and FSA on working to enhance data collection and reporting in the areas identified in detail in Appendix F and summarized in Table 18. NRCS has committed to taking advantage of the opportunities afforded the Partnership through the Conservation Data Streamlining Initiative to work to address the needs identified by the Partnership's Agriculture Workgroup.

Accounting for Non-Cost-Shared Practices

There are three principal categories of implemented practices:

1) those implemented under regulatory programs;

2) those installed through cost-share programs; and

3) those implemented without cost share and not under the guise of a regulatory program.

For those practices implemented under a Clean Water Act regulatory programs—NPDES permitted wastewater discharge, stormwater, or concentrated animal feeding operations—the underlying permitting and inspection programs provide clear legal requirements for verification and public access to the data. Through federal cost-share programs (e.g., USDA) and their state counterparts (e.g., Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia), there are privacy restrictions in place which lead to data aggregation but there are established mechanisms for ensuring verification of implementation and practice functionally on the ground. Contracts, explicit documentation of the practices, and inspections by certified professionals can provide a trustworthy, generally transparent system of BMP verification.

For practices installed outside of a regulatory program and without the assistance of a federal or state cost-shared program, there is no permit or contractual vehicle to ensure adherence to specific practice standards, specific planning requirements, and project performance. There is no established mechanism for requiring reporting or monitoring through time or for ensuring public access to the practice data. These are the challenges facing the Partnership and its shared desire to ensure the accurate and transparent accounting for and crediting of *all* nutrient and sediment pollutant load reducing practices which are in place and operating correctly.

[Editor's Note: Based on the decision by the BMP Verification Committee at its January 28, 2014 meeting, a complete set of text for this section of the framework document will be drafted in July 2014 after: 1) the existing Agriculture Workgroup's expert panel completes its review of the Maryland's functional equivalents report; and 2) the CBP WQGIT chair and CBP BMP Verification Committee chairs determine where and how to best address the verification and non-verification related component of this topic.]

Preventing Double-Counting

There are many situations where a jurisdiction tracks an implemented conservation practice and the USDA also tracks the identical practice. Typically, both the jurisdiction and the USDA are tracking the same practice because they both provided financial assistance to the farmer for the

practice implementation. In these cases, there must be a clear protocol in place to choose which data to report in order to avoid double counting. In 2012, the six watershed states employed various techniques to address this issue. The solutions, which are documented in the Hively et al. 2013 report included here as Appendix O, were tailored to address specific practices that could potentially receive financial assistance from both State and Federal programs, based on the range of conservation programs available to farmers within each jurisdiction. Each jurisdiction has developed their own combination of methods to remove duplicate record and prevent double counting. Appendix O (see pages 20-23) documents the jurisdiction-specific methods which apply to cost-shared and non-cost shared practice data.

The most general approach for removing double counting was to compare practice codes and definitions, identify which practice types could potentially be duplicated on the basis of knowledge of program structure, and exclude all records for those particular practice codes from either the USDA dataset or the jurisdictional dataset, generally retaining the records that contain a greater level of detail. For example, a cover crop practice might be funded at 40 percent of cost by State programs and 60 percent by the NRCS. Double counting of practices that could be co-cost-shared can be avoided by excluding records for those practices from either the State or NRCS dataset. For example, in Virginia, nutrient management plans were reported from the jurisdictional dataset and removed from the USDA dataset. Once the patterns of possible double counting are identified and the choices of which practice codes to remove from which dataset are made, this broad-brush approach is relatively simple to implement and can be applied to aggregated datasets. The only drawback is that the method may perhaps remove some records in error, in the cases where similar practices can be either co-funded or separately funded by the USDA and jurisdictional programs (for example, cover crops in Lancaster County, Pennsylvania). In those cases the separately funded instances would be removed as potential duplicates when they were in fact valid records.

Alternatively, a record-by-record comparison was employed to examine record details and determine which records were an exact match between USDA and jurisdictional datasets (the same practice applied to the same field location and acreage within the same implementation year). In those cases, all but one of the practices would be removed. This method is fairly accurate but is time consuming and requires access to the unaggregated USDA dataset (available only to 1619 Conservation Cooperators).

A third approach, available to jurisdictions that are 1619 Conservation Cooperators, was to maintain an integrated database that tracks all implemented conservation practices, whether funded by Federal or State governments or not financially assisted. In these data systems, when the Soil Conservation District staff work with farmers to implement conservation practices that receive financial assistance from both the State and Federal programs, the various funding sources are recorded as associated with a single data record, and it becomes straightforward to query the database and report implementation progress without risk of record duplication. Each jurisdiction arrived at its own combination of methods to remove duplicate records, with generally good results. However, the process is not perfect, and continued attention to detail is required to successfully manage the complex task of obtaining and integrating implementation data for each specific type of conservation practice that is promoted by the various jurisdictional and Federal conservation agencies.

Within their enhanced BMP tracking, verification, and reporting programs, jurisdictions are required to also document their procedures for preventing double-counting of non-agricultural BMPs. For non-agriculture conservation practice data, the jurisdictions will be increasingly encountering situations where there may be two or more entities funding a single practice. As the watershed's counties, municipalities, and nongovernmental organizations step up their efforts to finance, fund, and directly support on the ground implementation with technical assistance, implementers will have opportunities to combine funds from multiple sources to support their restoration and protection work. The jurisdictions will need to describe their protocols and procedures for preventing double counting of all practices, regardless of the sector or the original source of the data.

Historical Data Clean-up

The Partnership's Watershed Technical Workgroup is responsible for organizing the Partnership-wide efforts to create more accurate BMP records from 1985 through the present. The clean-up of the jurisdictions' historical BMP databases is being done in response to both the need for re-calibration of the Partnership's Chesapeake Bay Watershed Model as part of the 2017 Chesapeake Bay TMDL Mid-point Assessment and to better support the basinwide and baywide efforts underway to explain observed water quality trends in the hundreds of monitoring stations across the watershed and tidal waters.

Improving Watershed Model Accuracy

The re-calibration of the Partnership's Chesapeake Bay Watershed Model will attempt to match simulated nutrient and sediment loads to monitored nutrient loads throughout the watershed's streams and rivers given a certain set of land uses, animals, septic systems, wastewater treatment facilities, and implemented BMPs for each year of the calibration period. The most successful re-calibration will only result based on the most accurate information for all of these base conditions when including the actual reported BMPs over time which had not exceeded their life spans.

Explained observed Water Quality Trends

The work being coordinated by the Partnership's Scientific, Technical, Assessment, and Reporting (STAR) Team focused on understanding and explaining trends in observed water quality conditions depends heavily on an accurate history of implemented pollutant load reduction practices, treatments, and technologies. The objective is to use the Partnership's collective understanding of management actions taken, along with corresponding time series of land use, human and agricultural animal populations, hydrology, and other factors to tease out the effect of the reported implementation practices, treatments, and technologies on observed watershed and tidal water quality conditions since the mid-1980s and explain the observed trends through time.

Historical Data Clean-up Guidance

The seven watershed jurisdictions received the following guidance from the BMP Verification Committee at its March 13, 2013 meeting:

- Jurisdictions should focus efforts to clean up historical BMPs on those practices in place during the proposed calibration years for the next phase of the Partnership's Chesapeake Bay Watershed Model. These calibration years have yet to be determined by the Partnership[37].

- It will be up to each jurisdiction to determine which BMPs will receive a higher priority in the clean-up process. Some jurisdictions may place emphasis on cleaning up a subset of practices with high implementation levels and/or practices in specific geographic areas.

- As much as possible, jurisdictions should follow the verification guidance developed by the source sector and habitat workgroups in an effort to verify practices in place for any given year (see Section 2).

- Jurisdictions should focus on those geographic areas and BMPs which are currently being 'cut off' in the Partnership's Scenario Builder tool.

[37] Until a decision is made on the watershed model calibration period, the BMP Verification Committee recommends the six watershed states and the District focus on the key years of data that were provided to them from the Partnership's Scenario Builder tool's history. These years include key calibration year from the Partnership's Phase 5.3.2 Chesapeake Bay Watershed Model calibration, including years with an Agricultural Census: 1985, 1987, 1992, 1997, 2002, 2005, and 2009.

Section 4. Development and Documentation of the Jurisdictional BMP Verification Programs

Panel's Recommendations to the Jurisdictions

Within the BMP Verification Review Panel's (the Panel) November 19, 2013 recommendations document (see Appendix D)[38], there were nine recommendations directed towards the jurisdictions, each of which is described below.

Use the Verification Program Design Matrix in Developing Your Program. The Panel envisions the jurisdictions using the BMP Verification Program Design Matrix (Table 19) to structure their BMP verification programs, using the series of program elements as a series of prompts to ensure they have fully considered everything needed to be documented in their individual BMP verification protocols.

Consider the 14 Development Decisions steps when Creating Your Verification Program. The Panel recommends each jurisdiction walk through the 14 steps and questions in Table 20 prompting specific decisions along the way as they work to enhance their current BMP tracking and reporting programs to include verification.

Use the State Protocol Components Checklist. The Panel plans to evaluate the jurisdictions' BMP verification programs and their underlying BMP verification protocols using the state protocol components checklist provided in Table 21. The Panel recommends the jurisdictions use this checklist to ensure their individual verification protocols include all the necessary components as appropriate. The final state protocols should be reviewed to make sure they meet the intent of the Partnership's five verification principles.

Address Certification/Training of Verifiers in Your Programs. The Panel recommends each jurisdiction clearly document the certification and training requirements for those personnel involved in all the steps of the verification program. The Panel specifically recommends each of the jurisdictions:

- Describe the required qualifications/certification for the personnel who are carrying out the various elements of the jurisdiction's verification program; and

- Ensure certification/training programs are in place for those individuals involved in verification and data entry to assure individuals are qualified to do either task.

Aim High or Explain Why. The Panel asks jurisdictions to adopt the "robust" levels of verification over time described in the respective workgroups' BMP verification guidance (see Section 2) or explain in their quality assurance plan why they cannot, recognizing the legal as

[38] *Chesapeake Bay Program Partnership BMP Verification Review Panel's Guidance and Recommendations to the Six Source Sector Workgroups, the CBP BMP Verification Committee, and the Seven Watershed Jurisdictions*. Distributed November 19, 2013. http://www.chesapeakebay.net/channel_files/21511/cbp_bmp_verif_review_panel_recommendations_11_19_2013.pdf

well as funding issues that may impede the levels of BMP verification recommended by the Partnership's six workgroups.

Prioritize Verification Towards Priority Practices. Jurisdictions should feel empowered to target their verification programs and their most robust verification protocols towards those practices on which the jurisdictions' are depending on the most to achieve the nutrient and sediment pollutant loads reductions through their Watershed Implementation Plans (WIPs) (Appendix P). For verification of lower priority practices, jurisdictions can rely on less intensive methods of verification. Specifically, statistical sampling methods can be considered if there is a large BMP population and the jurisdiction is able to reliably extrapolate findings rather than visit every site. Several workgroups—e.g., Urban Stormwater, Forestry, and Agriculture workgroups—provide specific guidance for the jurisdictions to consider in prioritizing application of their verification program and protocols (see Section 2).

Robust Upfront Verification Yields Less Intensive Follow up Reviews. The more intense the initial review of a specific practice (i.e., in person review vs. a paper review), the less intense the required follow up spot-checking will be after the fact. For example, if a BMP has been visually reviewed in the field, a less rigorous sample may be needed for evaluating continued BMP presence and functionality into the future.

Understand the Basis on which the Panel will Evaluate each Jurisdiction's Draft Verification Program. The Panel intends to refer to following source materials during its review of the seven jurisdictions' proposed BMP verification programs:

- The Chesapeake Bay Program Partnership's five BMP verification principles (see Section 1 and Appendix B);
- The six source sector workgroups' sets of BMP verification guidance (see Section 2);
- The matrix, list of steps/questions, protocol table, and checklist provided in the Panel's November 2013 guidance and recommendations (see Tables 19, 20, and 21, respectively);
- The *Jurisdictional Verification Design Table* provided by the Panel to the jurisdictions in April 2014 (see Table 22); and
- The Chesapeake Bay Program Partnership's final published basinwide BMP verification framework document.

The Panel strongly encourages jurisdictions to ensure their proposed BMP verification programs are consistent with the principles and guidance agreed to and adopted by the Partnership through the Principals' Staff Committee.

Build in time for Continuous Improvement Early. The Panel recommends more intensive review of new verification systems early in their initial implementation to adjust for unforeseen outcomes of the selected system design. It is not unusual to have to make adjustments to the

protocols, personnel, and documentation tools/electronic systems during actual implementation and use. The more a BMP verification system is tested prior to full scale implementation, the better the protocol implementation outcomes and protocol accuracy will be.

Panel's Overall Recommendations to the Jurisdictions

In addition to the above elements, which can be considered as improving the state of the art of verification procedures, there is a strategic element: targeting the most robust verification programs toward those BMPs on which the jurisdiction is depending most strongly to achieve the nutrient-sediment reductions in their WIPs. Just as BMP choices differ among the states' WIPs, the robust level of verification may be applied differently in different jurisdictions. "Equity" here must be defined as all jurisdictions addressing the highest priority BMPs, not all jurisdictions doing the same thing with a given set of BMPs. Therefore, the best answer for why a jurisdiction has proposed a less than robust verification program is that the BMPs in question are lower priority for meeting the jurisdiction's WIP and that more resources must be applied to maintaining and improving verification protocols and programs for the highest priority BMPs.

In their review of each of the jurisdictions' BMP verification programs, the Panel will be looking for evidence that the jurisdictions have actually given deep thought to what they are doing now, its shortcomings, and proposed improvements—a solid example is the Urban Stormwater Workgroup's BMP verification guidance narrative (see Section 2).

Verification Program Documentation Expectations

The documentation of each jurisdiction's BMP verification program will build directly upon their existing quality assurance (QA) plans already drafted, approved by EPA, and in place supporting their Chesapeake Bay Implementation Grant and Chesapeake Bay Regulatory and Accountability Grant. Given the seven jurisdictions' existing QA plans are principally focused on documentation of their extensive BMP tracking and reporting programs and procedures for submitting the collected data to EPA through their state's NEIEN node, the additional BMP verification program documentation expectations are summarized below and provided in Appendix Q.

[Editor's Note: This summary description of Verification Program Documentation Expectations is subject to further change as a team of Chesapeake Bay Program Office staff work with the BMP Verification Committee to develop clear QA Plan guidance based on the extensive recommendations from the BMP Verification Review Panel.]

BMP Verification Principles

Each jurisdiction will describe, using specific references to specific adopted verification guidance, procedures, and processes, how its overall BMP verification program achieves the CBP Partnership's five BMP verification principles.

BMP Groups

By logical groupings of BMPs determined by the jurisdiction, each jurisdiction will provide the following detailed documentation within their QA plans:

- Provide copies of or cite specific references (with URL links) to the documentation of existing BMP verification programs in operation and overseen by all partners—e.g.,

NRCS, FSA, other federal agencies, federal facilities, conservation districts, municipalities—which are actively verifying practices implemented within the jurisdiction and which will be reported by the jurisdiction for nutrient and sediment pollutant load reduction credit.

- Provide copies of or cite specific references (with URL links) to the BMP verification guidance and procedures adopted by the Partnership.

- Describe and fully document any jurisdiction-specific modifications to/variations from the Partnership adopted guidance and procedures.

- Document any jurisdictional decisions for focusing verification programs/protocols on a subset of nutrient and sediment pollutant load reduction practices, treatment, or technologies or geographic areas.

- Document how each respective set of grouped BMP verification protocols will be implemented by whom, how, and through what programs/mechanisms.

- Document what/which set of grouped BMP verification protocols/procedures are already in place, fully operational, and being routinely carried out.

- Document what/which set of grouped BMP verification protocols/procedures are planned for future implementation, by when, by whom, how and through what programs/mechanisms.

- Describe what further programmatic changes are necessary to be carried out by whom in order to make the each set of grouped BMP verification protocols/procedures fully operational and routinely carried out.

- Document the agency, departmental, and organizational responsibilities for carrying out each set of grouped BMP verification protocols/procedures cross walked with existing or planned regulatory programs, cost share programs, and programs providing technical services.

Access to Federal Cost Share Practices

Each jurisdiction will address assurance for the jurisdiction's full access to federal cost share practices by:

- Providing as an appendix or providing URL links to the existing 1619 data sharing agreement(s) with USDA.

- Documenting plans to enhance existing or sign new 1619 data sharing agreements with USDA.

- Documenting procedures in place for handling the federal cost share practice data in adherence to the agreement(s).

Preventing Double Counting

Each jurisdiction will address preventing double counting by:

- Providing documentation on the jurisdiction specific procedures that are either being carried out or will be carried out to eliminate double (or more) counting of a single reported practice receiving funds from two or more sources which, in turn, are independently tracking and reporting the same practice.

Historical BMP Database Clean-up

Each jurisdiction will address historical BMP database clean up by providing documentation on how the jurisdiction plans to carry out the clean up their historical BMP implementation data base and over what time period.

Developing the Jurisdictions' BMP Verification Protocols and Programs

The Panel's Design Matrix, Decision Steps, and Checklist

In the process of developing new and revising existing BMP verification protocols and programs, the jurisdictions are strongly encouraged to consult the following four products developed by the Partnership's BMP Verification Review Panel.

The *Chesapeake Bay Program BMP Verification Program Design Matrix* (Table 19) was envisioned by the Panel as helping each jurisdiction ensure they were addressing all the needed program elements within each jurisdiction's BMP verification program. The matrix should be viewed by the jurisdictions as a guide, not a set of requirements, to be used in structuring their verification programs.

The *Jurisdictional BMP Verification Program Development Decision Steps for Implementation* (Table 20) spells out the 14 steps for each Chesapeake Bay watershed jurisdiction to consider when developing their jurisdiction's BMP verification program. Under each step are questions for consideration which will prompt decisions that may be needed to develop jurisdiction's verification protocols. The Panel envisioned the jurisdictions using the 14 steps as prompts to ensure their verification protocols and programs were adequately structured to answer the questions under each step. There are no expectations that each jurisdiction address every single step or answer every one of the questions posed—both the 14 steps and the underlying questions are to be used by the jurisdictions as prompts, not requirements, as they develop and enhance their verification programs and protocols.

The *State Verification Protocol Components Checklist* (Table 21) is provided to the jurisdictions as a checklist to ensure each jurisdiction's verification protocols contained all the necessary elements. The BMP Verification Panel *will* use this checklist directly in their review of each of the jurisdictions' proposed verification programs.

The *Jurisdictional Verification Protocol Design Table* (Table 22) provides an example format a jurisdiction could choose for organizing the documentation of their verification protocol choices for their preferred groupings of BMPs covered by common verification protocols.

Table 19. Chesapeake Bay Program Best Management Practice Verification Program Design Matrix

A. Program Component	B. Program Elements	C. Program Element Options
i. BMP Verification	1. What was the driver for BMP Installation?	Regulation, permit, cost-share, non-cost-share
	2. How many BMPs will be inspected?	All, percentage, subsample, those targeted
	3. How is the frequency and location of inspections determined?	Workgroup guidance, statistics, targeting, law, available funding
	4. How often are BMPs/groups of BMPs inspected?	Benchmark in BMP implementation timeline, 0-<1 yr, 1yr, 1-3 yr, >5 yrs
	5. What is the method of inspection?	Field visual, aerial, paperwork review, phone/paper survey
	6. Who will conduct the BMP inspection and are the certified/trained?	Regulatory agency, non-regulatory agency, independent party, self-reported
	7. What needs to be recorded for each BMP inspection?	Meets specifications/standards, visual functioning, location
	8. Is execution of the inspection process documented in and checked against an updated quality assurance (QA) plan?	QA plan in place, program checked and amended to ensure compliance, QA plan in place but not actually applied, no QA plan

	9. Into what type of system is collected data entered?	Database, spreadsheet, written files	
	10. At what resolution are results reported out to EPA and/or the public?	Individual practice level, site-level, by sub-watershed, by county, by state	
ii. BMP Data Validation	11. What is the QA/QC process to prevent double-counting or counting of BMPs no longer in place?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Visual field check of adequate statistical sample
	12. What is the method used to validate state's ability to collect and report correct data?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Visual field check of adequate statistical sample
	13. If data is provided by external independent party or industry, what method is used to provide adequate quality assurance for acceptance by the Chesapeake Bay Program Partnership?	BASIC: Database/paper check of adequate statistical sample	PREFERRED: Analytical comparison to a know database and review of data collection procedures.
	14. Who conducts data validation?	BASIC: Non-regulatory agency	PREFERRED: Regulatory Agency, independent external party
iii. BMP Performance	15. What is the process to collect data to assess BMP performance and confirm consistency with CBP Partnership's approved BMP efficiencies?	BASIC: Visual field assessment of statistical sample (check for signs of failure)	PREFERRED: Analytical measurement of performance for a statistical sample (water quality monitoring, soils test, manure sample, etc)
	16. Who collects BMP effectiveness data?	BASIC: Non-regulatory agency, nongovernmental organization	PREFERRED: Regulatory Agency, university
Source: CBP Partnership's BMP Verification Review Panel November 19, 2013 Recommendations Document			

Table 20. Jurisdictional BMP Verification Program Development Decision Steps for Implementation

Below are the 14 steps for each Chesapeake Bay watershed jurisdiction to consider when developing their jurisdiction's BMP verification program. Under each step are questions for consideration which will prompt decisions that may be needed to develop jurisdiction's verification protocols.

1) Determine what BMP's to collect:

a) Do you want to collect all BMPs that were listed to in your jurisdiction's Phase II WIP? Additional/or some other combination of BMPs?
b) Do the listed BMPs meet NRCS standards, state standards, and/or Chesapeake Bay Program (CBP) definitions?
c) Do you want to report BMPs that are considered resource improvement practices (they do not meet NRCS standards, state standards, or CBP BMP definitions but do result in nutrient and/or sediment pollutant load reductions)?
d) When collecting the selected BMPs, do you have the year they were implemented?
e) For reported BMPs, are you collecting all the BMP elements required for the CBP Partnership model application (example: for cover crops, to do you have species, date planted, kill down date, fertilization if any) or will you take the lowest credited efficiency available?
f) Have the selected BMPs been approved by the CBP Partnership? If not, do the BMPs have CBP Partnership provisional acceptance status as an interim BMP?
g) Are the practices you plan to collect worth the cost of collection?

2) Determine where to collect BMP's:

a) Depending on the BMPs you choose to collect, at what level will you report these? (i.e., site specific scale; on a county level; on a (sub-) watershed level, etc.)?
b) Does the whole state need to be canvassed or only certain areas where there is a resource concern or particular practice implementation (i.e., Eastern Shore vs. rest of state)?

3) Protocol—How to Collect BMP's:

a) What system/method have you decided to use to collect the BMPs?
b) If the BMP is only present at a certain time of the year (i.e., cover crops, conservation tillage, etc), does your verification method and associated workload requirements take this into account?
c) What is the cost benefit ratio on the system selected (high, medium, low)?
d) Do you have current funding for the BMP collection system selected?
e) Do you plan to collect BMPs in the selected areas only during certain seasons of the year, throughout the fiscal year, or will it take several years to determine if they are properly functioning?
f) Has your selected system been accepted by the people who will be collecting the BMPs—i.e., Conservation Districts, municipalities, state agencies, farm community, special interest groups, NGO's, USDA, EPA, USFWS, or other federal entities?

4) BMP verification system development:

a) What system/method will be used for verification of collected BMPs?

b) Does it require: trained state or federal employees; other trained specialists; self-certification; or technological expertise (i.e., aerial photograph interpretation)?
c) Has your selected system been approved by the appropriate workgroup in the CBP Partnership?

5) Training on selected data collection and verification systems:
a) Do you have written guidance and documentation on the data collection and verification systems?
b) How will you train data collectors and verifiers to use the selected system/method (i.e., in person, webcast, etc.)?
c) Does your system require independent verification?
d) Is there a "certification requirement" for anyone who collects data and a follow-up CEU requirement?
e) Who do the data or verification collectors call if there is a question?

6) Use of existing electronic data collection system or update/development of new systems:
a) Does the electronic data collection and storage system exist for recording BMP implementation, or do you have to build a new one, or make adjustments to the existing system?
b) What is the cost to develop/updates or create the system and do you have funding?
c) How long will the system be viable (due to technology or other changes)?
d) What is the ease of use for the BMP verifiers and data entry personnel?
e) What is the ease of use for the landowner (if applicable in self certification)?
f) Where will the data be maintained and is the system secure?
g) Is the system mapped to provide the data required to NEIEN and to the Chesapeake Bay Program Office?
h) Who will transmit data?
i) How will you update the data in the future and remove BMPs that are not being maintained, no longer in use, no longer in existence, or expired?
j) Does the electronic system have standard reports that can be provided to leadership or others if requested or will someone have to build reports?
k) Have you taken into account BMPs that may have more than one funding source so that you do not have double counting?
l) Is the data available to the public? Do you have appropriate FOIA, Section 1619 or other protection needed for the data?

7) Training on data entry:
a) Will the training on the selected data entry system be given by: reading documentation or guidance documents; group training; net meetings; field training; or any combination?
b) Will there be a "certification" requirement to use the data entry system?
c) If you are recording initial verification determinations on paper, how do you make

sure it is accurately entered into the electronic system?
d) Will training be required for the landowners (if they are entering data)?
e) How and when is the best time to conduct the training for data entry personnel?
f) Will there be a "certification" requirement for those who enter data?

8) Pilot of collection, verification and data entry systems:
a) Where will the state pilot the data collection and verification systems?
b) How long will the pilots(s) take?
c) Who will be involved in the pilot (s)?
d) How will debriefing be conducted to determine pilot success and/or system changes needed after the pilot?

9) Reliability and validity testing of the new system:
a) Reliability assures that every time you ask the data collection question, you get the same answer. How will you test this?
b) Validity is when you compare what you collected to another system of collection, to see if you get the same or a similar answer. How will you test? (Example: looking at the same data in another system like the Chesapeake Bay Program Partnership's Chesapeake Stat web site, USDA's CEAP and NASS data systems, etc.)

10) Adjust systems and training:
a) After testing the systems, how will you implement adjustments you have to make and are there documentation changes, system changes, or re-training all involved, in making the changes?

11) Implement tested and adjusted data collection and verification systems:
a) After you have tested the system you should re-test the adjusted system to make assure you still have adequate reliability and validity of the data.
b) If the tested system changes the use of the system, documentation, output of data, timeline for collection, you may need to re-train all employees.
c) Realize that new systems are very seldom right the "first time" implemented.
d) Allow for the system to operate without continuous changes (usually one year, unless the problem is really significant) for data collection personnel to get used to the system.
b) Set up a system for users to report problems to system designers.

12) Follow-up Checking Procedures
a) What method is used to select the statistical sample for quality assurance?
b) What documentation is needed for follow-up check findings?
c) What actions will be taken if problems are found (i.e., additional training, removal or correction of data in system, etc.)

13) Communication Strategy:
a) Do you need to prepare and conduct communication strategies for: the data collection

event; landowners; local, state or federal leadership; general public?
b) How will information be provided: written, electronic, news or media public meetings or any combination?
c) Do you want feedback about what you propose to do before you start the process?
d) Will you make changes if you accept feedback?
e) Will there be communication of findings throughout the process or at a specific time in the process?
f) Who does the landowner or general public call if they have questions?
g) Will there be a published document of the findings and outcomes of the collection of BMPs?

14) Future Year Systems: Things to Think About

a) As BMP technologies or the electronic computer systems change, will you be able to change how often you collect and verify data (i.e., moving from on the ground collection to satellite imaging)?
b) Will new technology change how to determine if the practice is still in existence or needs to be re-verified?
c) How will you remove practices from the database that are not being maintained, no longer in existence, or have expired in the future?
d) If you use different systems in the future, have you gone through all of the above steps?

Source: CBP Partnership's BMP Verification Review Panel November 19, 2013 Recommendations Document

Table 21. Jurisdiction BMP Verification Protocol Components Checklist

	State:			
	Sector:			
	BMP Verification	Present	N/A	Comments
1	**BMP's Collected**			
	Type (structural, management, annual, etc.)			
	BMP Funding/Cost shared (federal, state, NGO, non-cost shared)			
	Distinct state standards/specifications			
	Matching CBP BMP definition/efficiencies			

2	**Method/System of Verification/Assessment**			
	Description of methods/systems to be used			
	Documentation of procedures used to verify BMP's			
	Instruction manual for system users			
3	**Who will Complete the Verification**			
	Qualification requirements			
	Training requirements			
	Certification requirements			
	CEU follow-up training requirements in the future			
4	**Documentation of Verification Finding**			
	Date of installation			
	Location (lat/long if applicable)			
	Level of reporting (watershed, HUC, county, site specific, etc.)			
	Units (number, acres, length, etc.) needed for NEIEN			
	Ownership (public, private)			
	Documentation:			
	Pictures			
	Worksheets			
	Electronic Tool			
	Aerial Photos			
	Maps			
	Other			
	Report Generator			
5	**How Often Reviewed (Cycle of review)**			
	1-2 years			
	5 years			
	10 years			
	Other			
6	**Independent Verification of Finding**			
	Is this a requirement?			
	Internal Independent			
	External Independent			

	BMP Data Validation			
7	**Quality Assurance/Spot Checking**			
	Who-qualifications/training/certification			
	Method to select BMP for follow-up check			
	Method to select the number of BMPs to review			
	Other			
8	**Data Entry of BMP Implementation**			
	What is the system?			
	Who enters data (training/certification)?			
	Does the system connect to NEIEN?			
	System in place prevent double counting			
9	**External Provided Data Validation Meeting CBP Partnership Guidance**			
	Method to validate data			
	Who will validate data (training/certification)?			
10	**Historic Data Verification**			
	System to re-certify or remove			
	Who will verify historic data (training/certification)?			
	Documentation of action			
	BMP Performance			
11	Does state collect data to assess BMP Performance?			
	System used to collect BMP performance data?			
	Who collects BMP performance data?			
	Who analyses collected data and report to CBP?			
12	**Additional Comments/Requests**			
13	**CBP Approval Process**			

Jurisdictional assurance that their protocols meet the five verification principles:

1) Practice Reporting

2) Scientific Rigor

3) Public Confidence

4) Adaptive Management

5) Sector Equity

Source: BMP Verification Review Panel November 19, 2013 Recommendations Document

Table 22. Jurisdictional Verification Protocol Design Table

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection *(Is the BMP there?)*				E. Follow-up Check *(Is the BMP still there?)*			F. Lifespan/ Sunset *(Is the BMP no longer there?)*	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		

A. WIP Priority: What relative priority is the BMP type in the jurisdiction's WIP in terms of contribution to needed load reductions—high, medium, or low?

B. Data Grouping: How is data grouped within each priority level? By pollution source sector, by agency, by data source, by cost-share or non-cost share, etc.?

C. BMP Type: What type of BMP does the specific protocol cover? Is it structural, management, etc.? Note that the remainder of this table keys off BMP type, but jurisdictions could key off a BMP category, WIP priority, or grouping.

D. Initial Inspection: The BMP type/category/grouping is initially inspected when made operational to confirm it is in place on the ground.

Method: What method is used to inspect the BMP type? Remote sensing, aerial photos, field visit, etc.? Is the jurisdiction following recommendations in the Sector Guidance for the BMP type? If not, provide documentation supporting the jurisdiction's method.

Frequency: How often is the BMP type inspected? Is the jurisdiction following the frequency recommended for the BMP type by Sector Guidance?

Who inspects: Who conducts the initial inspection? Is the jurisdiction following the recommended inspection personnel qualifications for the BMP type in the Sector Guidance?

Documentation: What type of documentation is recorded for the BMP? Is there specific data recommended to be collected for the BMP type by Sector Guidance?

E. Follow-up Check: Is a system in place to confirm that the BMP is still there and operational sometime after initial inspection as specified by Sector Guidance? The follow-up check may be accomplished by methods recommended in the Sector Guidance such as: a second in-person visit to the BMP; by spot checking a statistically valid sub-sample; etc.

Follow-up Inspection: Is the follow-up check conducted using the recommended Sector Guidance? Are the methods, frequency, inspector, and documentation specified?

Statistical Sub-sample: Is the follow-up check conducted by collecting a statistical sub-sample of the BMP type? Are the statistical confidence levels, qualifications of data collector, etc. specified? Are the procedures specified on how the results of the statistical sub-sampling will translated for reporting a specific number/areal coverage/linear coverage of BMPs in place for a specified geographical area?

Response if Problem: What steps will be taken by the jurisdiction if problems are found during the follow-up check—i.e., BMP is no longer present/functioning; BMP needs repair to be operational; etc.?

F. Lifespan/Sunset: What procedures are in place for the jurisdiction to prompt the need to conduct a follow-up check of the BMP type at the end of its approved lifespan? Are there sunset provisions/procedures in place for BMPs going beyond their lifespans that are not follow-up checked and should be removed from the jurisdiction's data set?

G. Data QA, Recording & Reporting: What systems/processes are used to confirm the initial inspections/follow-up checks were conducted, prevent double counting, and quality assure the reported data before it is accepted by the jurisdiction? What are there additional steps taken by the jurisdictions in properly recording the accepted data prior to its reporting through the jurisdiction's NEIEN node?

Jurisdictional Verification Protocol Design Table

The *Jurisdictional Verification Protocol Design Table* (Table 22) provides an example format a jurisdiction could choose for organizing the documentation of their verification protocol choices for their preferred groupings of BMPs covered by common verification protocols.

WIP Priority

As described previously in Section 1, jurisdictions can choose to vary to the level of verification based on the relative importance of a specific practice to achieving the jurisdiction's WIP nutrient and sediment pollutant load reduction targets. By clearly documenting the relative WIP priority for a BMP or group of related BMPs, a jurisdiction can proceed forward with documenting the verification protocols for that lower contributing BMP/group of BMPs which can be different from the verification of practices accounting for higher levels of pollutant load reductions. The different sets of sector BMP verification guidance in Section 2 provide more detailed guidance to the jurisdictions on how to identify such low contributing BMPs/groups of BMPs.

BMP Grouping

Jurisdictions do not need to develop and document detailed protocols for each individual BMP of the potentially hundreds BMP which their track, verify, and report for nutrient and sediment load reduction credit. Jurisdictions should take their complete listing of tracked and reported BMPs and organize them by the categories that best account for the jurisdiction's relative Watershed Implementation Plan (WIP) priority, any logical grouping of the data specific to the jurisdiction, and consideration of the BMP types described in the relevant sector BMP verification guidance in Section 2. Then, as presented within the Jurisdictional BMP Verification Protocol Design Table (Design Table, Table 22), the jurisdiction would document the appropriate protocols and procedures followed for each logical grouping of BMPs.

Initial Inspection and Follow-up Checks

The Design Table illustrates the CBP Partnership's BMP Verification Review Panel's recommendation to the jurisdictions for structuring their verification programs to carry out an **initial inspection** for answering the question "is the BMP there?" and then **follow-up checks** carried out at the appropriate frequency to answer the question "is the BMP still there and operating correctly" throughout the lifespan of the practice (See Figure 1 in Section 1).

Lifespans and Sunsetting Practices

The Design Table prompts jurisdictions to provide documentation on procedures in place which prompt the need for conducting a follow-up check of a BMP at the end of its approved lifespan. The Design Table calls on jurisdictions to also document procedures for removing BMPs which go beyond their lifespans and are not follow-up checked to confirm the BMP is still there and operational.

Data Quality Assuring, Recording, and Reporting

The Design Table calls on jurisdictions to clearly document the systems/processes the jurisdiction uses to confirm the initial inspections/follow-up checks were conducted, prevent double counting, and quality assure the reported data before it is accepted by the jurisdiction. Given BMP data will likely be reported to a jurisdiction from a multitude of sources outsides of the state agencies, jurisdictions need to have written procedures in place for assuring the quality

of the data for which they are now accountable for. The jurisdictions are prompted to document any additional steps taken by the jurisdictions in properly recording the accepted data prior to its reporting through the jurisdiction's NEIEN node.

Section 5. Partnership Processes for Evaluation and Oversight

Ongoing Decision-Making Roles within the CBP Partnership

The Partnership must and will continue to be the decision makers on the development, implementation, and continued refinement, of the basinwide BMP verification framework and underlying processes. The jurisdictional partners, who will be principally responsible for verifying practices implemented within their portions of the watershed, must incorporate BMP verification directly into their day to day program management and implementation efforts. EPA will continue in its Chesapeake Bay TMDL accountability role and ensure each jurisdiction's verification program meets the measure of reasonable assurance well already established during the two prior rounds of watershed implementation plan and 2-year milestone development and evaluation.

Chesapeake Bay Program BMP Verification Review Panel. The Panel has been formally charged by the Chesapeake Bay Program Partnership to use the verification principles as criteria for assessing the strengths and any possible vulnerabilities in the seven jurisdictions' verification programs. The Panel is responsible for providing its written collective feedback and recommendations to the Chesapeake Bay Program's BMP Verification Committee on each jurisdiction's program. The Panel will also evaluate whether the level of verification rigor is consistent across source sectors and across all seven watershed jurisdictions. The Chesapeake Bay Program's BMP Verification Committee will synthesize and formally transmit the Panel's feedback and recommendations up through the Management Board to the Principals' Staff Committee. The Panel will present its recommendations directly to the Principals' Staff Committee.

Chesapeake Bay Program Principals' Staff Committee. The Principals' Staff Committee will review and approve the Chesapeake Bay basinwide BMP verification framework on behalf of the larger Partnership.

Chesapeake Bay Program Advisory Committees: The Scientific and Technical, Citizens, and Local Government advisory committees will continue in their well defined advisory roles.

Chesapeake Bay Program's Technical Workgroups. The technical source sector, habitat restoration and other related workgroups under the Water Quality, Habitat, Fisheries and Healthy Watersheds goal implementation teams will continue to be responsible for convening and overseeing expert BMP panels and their development of new and revision of existing BMPs. The workgroups will decide when the new/revised BMPs are ready for Partnership approval working through the Partnership's established BMP protocol (CBP WQGIT 2010). The workgroups will continue to be responsible for developing, with input from their respective BMP expert panels, verification procedures for new Partnership approved BMPs, as needed.

Chesapeake Bay Program's Water Quality Goal Implementation Team. The Water Quality Goal Implementation Team, in coordination with the Fisheries, Habitat and Healthy Watershed goal implementation teams, will continue to review and approve new or revised BMPs, including revised, enhanced, or new BMP verification guidance and protocols for those newly approved BMPs.

Jurisdictions. The jurisdictions are ultimately responsible for providing the necessary documentation of verification of all practices implemented within their part of the Chesapeake Bay watershed and submitted through each respective state's NEIEN node for crediting of nutrient and sediment pollutant load reductions. They are responsible for documenting—in detail or by reference—the verification programs, protocols, and procedures carried by the jurisdiction, local municipalities, conservation districts, USDA, other federal agencies, federal facilities, non-governmental organizations, and all other agencies, organizations, and institutions contributing to the collective set of tracked, verified and reported practices for nutrient and sediment load reduction credit. The jurisdictions will decide what BMP verification protocols they will build into their existing BMP tracking, verification, and reporting programs in order to meet the Partnership's adopted BMP verification principles. They will make the decisions on prioritizing verification efforts based on practices, effectiveness, geography or any other considerations. Jurisdictions will be responsible for either removing a reported practice at the end of its specified life span or documenting that the practice has been re-verified and assign the new life span consistent with the respective workgroup's recommendations.

Federal Agencies and Federal Facilities. Federal agencies and their respective federal facilities are responsible for undertaking verification of their installed nutrient and sediment pollutant load reduction practices, treatments, and technologies and sharing documentation of their verification protocols with their respective state counterparts.

U. S Environmental Protection Agency. Through the review and approval of each of the seven jurisdictions' quality assurance plans, which are required for award of their Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants, EPA will approve, or provide specific requests for changes prior to approval, each of the seven jurisdictions' proposed BMP verification programs based on the feedback from and the recommendations of the Partnership's BMP Verification Review Panel. It is within these quality assurance plans where each jurisdiction will document, in detail, their verification program. As clearly described in EPA's Chesapeake Bay Program Grants Guidance[39], approval of these quality assurance plans are required for successful award and use of federal funding involving environmental data collection and evaluation activities. In the case of these grants, it's the tracking, verification, and reporting of practices, treatments, and technologies which reduce nutrient and sediment pollutant loads which triggers the requirements for a quality assurance plan. EPA's review and approval of each jurisdiction's QA Plan will focus on whether each jurisdiction has provided reasonable assurance for ensuring the implementation of the reported practices, treatments, and technologies and supporting programmatic activities funded through these grants and the states' matching fund programs.

Evaluation and Oversight Procedures and Processes

The following suite of evaluation and oversight procedures and processes are recommended to ensure the five BMP verification principles adopted by the Partnership are adhered to and effectively carried out.

[39] U.S. Environmental Protection Agency Chesapeake Bay Program Office Grant and Cooperative Agreement Guidance accessible at http://www.epa.gov/region3/chesapeake/grants.htm

Amend the Partnership's BMP Protocol to Address Verification. The Partnership will commit to develop and adopt, as needed, new verification requirements for new BMPs through the Partnership's *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model* (CBP WQGIT 2010). The existing BMP protocol will need to be formally amended to specifically address BMP verification. The future membership make-up of and charges to the BMP expert panels convened by the Partnership's technical workgroups will need to incorporate verification expertise and responsibilities, respectively. The BMP expert panels will be charged with recommending potential verification protocols as they develop their practice-specific nutrient and sediment load reduction effectiveness recommendations. The respective source sector/habitat restoration workgroup will still be responsible for development of any new verification procedures for new practices.

Amendments to the Chesapeake Bay Program Grant Guidance. As the Partnership works through its seven jurisdictional partners in the implementation of the enhanced and expanded BMP tracking, verification, and reporting programs, EPA will work with the jurisdictions in further amending the annual Chesapeake Bay Program Grant Guidance to fully document the Partnership's BMP verification expectations as contained within the basinwide framework. The CBP Grant Guidance will describe how EPA grant funding can be used directly by the jurisdictions to support development or enhancement of their BMP verification programs and their continued operation.

Annual Reviews of Progress Data Submissions. Chesapeake Bay Program Office staff will review the jurisdictions annual NEIEN-based submissions of implementation progress data for documentation of BMP verification as part of their routine evaluations of the quality and completeness of the submitted data. The progress data reviews will be conducted following the specific guidelines and protocols agreed to by the Partnership through the Water Quality Goal Implementation Team's Watershed Technical Workgroup. Any submitted progress data without the required verification documentation will be returned to the jurisdiction for incorporation of required documentation and resubmission.

Annual Reviews of Quality Assurance Plans. EPA will annually review and approve the jurisdictions' quality assurance plans submitted as part of their annual applications for their Chesapeake Bay Implementation Grants/Chesapeake Bay Regulatory and Accountability Grants. EPA will focus its annual reviews on any changes to the quality assurance plans as submitted by the jurisdictions. EPA must review and approve the quality assurance plans prior to the annual grant awards.

Periodic Audits of Jurisdictions' Verification Programs. Structured like the field collection and analytical laboratory audits conducted with the Partnership's watershed and tidal monitoring networks (with very successful outcomes for almost three decades), EPA will conduct periodic on-site audits of the jurisdictions' BMP verification programs. The audits, to be conducted by teams of recognized experts, will be carried out to ensure the BMP verification procedures and protocols documented within the jurisdictions' quality assurance plans are being effectively carried out.

Independent Evaluations. At the request of the Partnership, the Scientific and Technical Advisory Committee, working with the Citizens and Local Government advisory committees, will sponsor periodic—every 3-5 years—independent evaluations of the effectiveness of the basinwide BMP verification framework and the individual jurisdictions' BMP verification programs in achieving the five BMP verification principles adopted by the Partnership. Findings and recommendations from these periodic independent evaluations will be presented directly to the Principals' Staff Committee for consideration and follow-through actions and decisions.

Section 6. Basinwide BMP Verification Framework Implementation

Through adoption of the Chesapeake Bay basinwide BMP verification framework, the Partnership commits to carry out the following series of actions, processes, and procedures following the recommended timelines to ensure full, basinwide implementation of the BMP verification framework equitably across all jurisdictions, source sectors, and habitats.

BMP Verification Principles

Amend the CBP Grant Guidance to Reflect the Verification Principles. Starting in the 2015 *Chesapeake Bay Program Grant and Cooperative Agreement Guidance*, include a specific reference to the Partnership's adopted BMP verification principles to fully ensure the expectation is clear that all seven jurisdictions will develop, document, and submit for EPA review and approval enhanced BMP tracking, verification and reporting programs which are fully consistent with and supportive of the Partnership's adopted BMP verification principles.

Ensure Jurisdictional Verification Programs are Fully Consistent with BMP Verification Principles. During the Partnership's BMP Verification Review Panel's review of each of the seven jurisdictions' proposed enhanced BMP tracking, verification and reporting programs, the Panel will determine if the proposed verification protocols, procedures, and processes are fully consistent with and supportive of the Partnership's adopted verification principles.

EPA Approval of Jurisdictions' Program Based on Meeting BMP Verification Principles. During EPA's review of each of the seven jurisdictions' proposed enhanced BMP tracking, verification and reporting programs, EPA will only approve a jurisdiction's proposed verification protocols, procedures, and processes if they are fully consistent with and supportive of the Partnership's adopted verification principles.

BMP Verification Guidance

Amend the Partnership's BMP Protocol to Address Verification. The Partnership will formally amend, through action by the Water Quality Goal Implementation Team, its *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model* to specifically address BMP verification. The amended protocol will commit the Partnership to develop and adopt, as needed, new verification requirements for new BMPs through the Partnership's existing BMP expert panel, workgroup review, and goal implementation team decision-making process. The future membership make-up of and charges to the BMP expert panels convened by the Partnership's technical workgroups will need to incorporate verification expertise and responsibilities, respectively. The BMP expert panels will be charged with recommending potential verification protocols as they develop their practice-specific nutrient and sediment load reduction effectiveness recommendations. The respective source sector/habitat restoration workgroup will still be responsible for development of any new verification procedures for new practices.

Seek to Strengthen Ability to Verify Partnership-Defined BMPs. In order to verify practices have been implemented and are operating correctly, the verifier must have distinct BMP definitions/standards in hand so that the BMP may be reliably reported with using the approved

verification method. Therefore, in addition to relying on existing standards like NRCS conservation practice standards, the Partnership will build into its BMP protocol process requests that future BMP expert panels provide distinct practice definitions which incorporate descriptive elements which can be checked by anyone involved in the verification process and result in similar verification findings.

Provide Partners with Access to Statistical Design Expertise. The Partnership will develop, fund, and maintain a long term mechanism through which the seven watershed jurisdictions can directly access statistical survey design experts and expertise in support of continued implementation and adaptation of their BMP verification programs.

Adapt Protocols to Reflect New Verification Technologies. As new BMP implementation strategies, products, and technologies develop and evolve, workgroups and jurisdictions will actively adapt their protocols and procedures used to verify practice implementation. For example, as satellite and other remote sensing techniques continue to develop, the accuracy of their use as compared with on the ground inspection will increase, thus providing jurisdictions with a new verification technology consistent with the Partnership's BMP verification principles.

BMP Data Transparency, Privacy, and Public Access

Aggregated Data Considered Transparent Upon Validation. Aggregated data can be used, be considered validated, be provided to the public, and still be considered consistent with the Partnership's transparency principle if there is independent verification/validation of the underlying data. The Partnership will develop and formally adopt a set of data validation procedures.

Treat Cost-Shared and Non Cost-Shared Agricultural Conservation Practice Data the Same in Terms of Applying Privacy Restrictions. The Panel recommends the Partnership allow for the same privacy protections provided to cost-shared data for non-cost shared data not associated with a regulated entity. This means the partners would follow the same privacy and aggregation requirements, for example, under Section 1619 of the Farm Bill for both cost-shared and non cost-shared reported agriculture conservation practices. In order for jurisdictions to carry out this recommendation, they may need new or to amend existing state legislation to ensure their existing state privacy restrictions apply across all agricultural conservation practices data.

Public Access to All Credited Practice Data. All practice and treatment data reported for crediting of nutrient and sediment pollutant load reductions and used in some form by the Partnership in accounting for implementation progress will be made publically accessible through the Partnership's Chesapeake Stat website.[40] It is the Partnership's intent to look for opportunities to provide data at even more geographically specific levels as that data becomes available through the jurisdictions' enhanced BMP tracking, verification and reporting systems into the future.

[40] http://stat.chesapeakebay.net/

Practice lifespans

Adopt Life Spans for Existing CBP Approved BMPs. The respective source sector workgroups will develop and to assign a life span/expiration date for each CBP approved BMP. In doing so, the workgroups will consider contract/permit life span, engineering design life span, and actual life span.

Develop Life Spans for all Future CBP BMPs. All future BMP expert panels convened by the Partnership's workgroups will be charged with responsibility for establishing a recommended life span/expiration date for each of the practices at which time them must be re-verified or be removed from the data submitted for crediting.

Develop Guidance for Sunsetting Practices. The sector workgroups will develop specific guidance for how to sunset specific reported practices which have gone beyond their lifespan and have not received the level of required re-verification after the designated lifespan.

Develop NEIEN-Based Procedures for Removing Practice Data. The Partnership's Watershed Technical Workgroup will oversee the development of and approve specific procedures which ensure the Partnership's NEIEN-based BMP reporting system includes mechanisms for both flagging reported practices which are past their established life spans, and confirming there was follow up re-verification of their continued presence and functional or removal from the data submitted for crediting.

Incorporate Practice Data Removal Procedures into Verification Programs. The jurisdictions will build systems for carrying out the process of removing previously reported practices from their NEIEN-based annual progress submission data sets which have gone beyond their lifespan and have not received the level of required re-verification after the designated lifespan. These systems will be nested within their larger BMP tracking, verification, and reporting programs.

Ensuring Jurisdictions Full Access to Federal Conservation Practice Data

Ensure 1619 Agreements are in Place for All Involved State Agencies. Institute 1619 Conservation Cooperator agreements in all six states covering all state agencies both directly involved in conservation planning, funding, delivery, reporting, and submission of conservation practice data *and* with responsibility for submitting aggregated agricultural conservation practice data to the Partnership's Annual Progress Review through their respective state's NEIEN node. By jurisdiction, these state agencies include:

- Delaware:
  - Department of Agriculture
  - Department of Natural Resources and Environmental Control
  - Forest Service

- Maryland
  - Maryland Department of Agriculture
  - Maryland Department of the Environment

- New York

  - Department of Environmental Conservation
  - Upper Susquehanna Coalition

- Pennsylvania
  - Department of Agriculture
  - Department of Environmental Protection

- Virginia
  - Department of Conservation and Recreation
  - Department of Environmental Quality

- West Virginia
  - Conservation Agency
  - Department of Agriculture
  - Department of Environmental Protection

To address USDA's concerns expressed about signing agreements with state agencies with clear agricultural conservation practice delivery responsibilities—e.g., running state agricultural cost share programs, delivering technical assistance, responsibility for agricultural conservation data tracking, verification, and reporting—which also have regulatory responsibilities, 1619 Conservation Cooperator agreements can be structured so as to limit access to the non-aggregate data to the specific individual agency employees involved in data reporting. This is exactly the approach taken within the Virginia Department of Conservation and Recreation (e.g., Hively et al. 2013; see Appendix O).

Use Consistent Language in All Bay Watershed States 1619 Agreements. Ensure each of the above listed 1619 Conservation Cooperator agreements adopts the broadest, most consistent language as described in the USGS report entitled *Integrating Federal and State Data Records to Report Progress in Establishing Agricultural Conservation Practices on Chesapeake Bay Farms* (Hively et al. 2013; see Appendix O).

Partnership Agreement to Ensure Full Access to Federal Cost Share Practice Data. The six states, USDA, and other appropriate partners will sign a cover page referencing all of the six states' agency-specific 1619 agreements collectively committing to ensure all six states have full access to federal financially assisted practice data into the future.

Ensure States Credit Conservation Technical Assistance. The six states need to work directly with their NRCS and FSA state offices to ensure full access to the unaggregated, federally reported Conservation Technical Assistance or CTA and take the necessary steps to prevent any double counting prior to reporting CTA for nutrient and sediment pollutant load reduction crediting. Chesapeake Bay Program Office staff will assist the states in this effort.

Annual Update the NRCS Standards/CBP BMPs Crosswalk. Working with the Partnership's Watershed Technical Workgroup, the Agriculture Workgroup will annual review the crosswalk between NRSC standard practice codes and the CBP approved BMPs and their definitions. Any changes or additions to the crosswalk will be approved by the Partnership's Agriculture Workgroup and incorporated into the appropriate Partnership models and other decision support

tools by the Watershed Technical Workgroup. The appropriate documentation will be updated annually by the Watershed Technical Workgroup to reflect the Agriculture Workgroup's decisions.

Provide State 1619 Conservation Cooperators Access to CEAP Data. State agencies with 1619 Conservation Cooperator Agreements in place will be provided access to the Chesapeake Bay watershed CEAP data strictly for purposes of informing adaptation of their conservation delivery programs.

Establish Protocols for Annually Accessing Federal Cost Shared Practice Data. Each of the six Chesapeake Bay states should establish a well-documented data access and processing protocol that will ensure annual routine, thorough, and consistent data access for all USDA Farm Bill agricultural conservation programs within their jurisdiction.

Develop Common Federal Cost Share Practice Data Template. The Partnership will develop a common template for requesting NRCS and FSA Farm Bill Program conservation practice data for Chesapeake Bay farmland to support consistent annual reporting of Federal conservation practice implementation, facilitate consistency and transparency among the jurisdictions, and ensure a more complete, comprehensive accounting of implemented conservation practices.

Hold USDA Agencies Accountable to Commitment to Enhance Data Collection/Reporting. The Partnership will work with NRCS and FSA to fully carry out their commitment to enhance data collection and reporting in the areas identified by the Partnership's Agriculture Workgroup (see Appendices F and O).

Adhere to Common Schedule for Accessing Federal Cost Shared Practice Data. The six watershed states, NRCS, and FSA will follow the below timeline each year for ensuring comprehensive, consistent reporting of federal cost shared conservation practice data across all six states:

- July 15 – States submit their data requests to NRCS
- July 15 – States submit their data requests to FSA
- August 15 – States receive their FSA dataset
- October 1 – The Partnership's Scenario Builder tool practice definitions finalized for the year by the Watershed Technical Workgroup
- October 15 – The Partnership's Agriculture Workgroup and Watershed Technical Workgroup approve updated Partnership approved BMPs/NRCS standards crosswalk
- October 15 – States receive their NRCS dataset
- December 1 – States submit their integrated federal-state-local dataset to the Partnership's Annual Progress Review via their state's NEIEN node

Accounting for Non-Cost Shared Practices

Document Procedures for Accounting for Non-cost Shared Practices. Jurisdictions will document their procedures for tracking, verifying, and reporting practices across all sector which are implemented without cost share funding building from the guidance provided by the respective sector workgroup.

Preventing Double Counting

Adopt Preventing Double Counting Procedures. Each jurisdiction will, within their respective quality assurance plan, clearly document their specific methods employed to prevent double counting of all submitted practices.

Clean-up of Historical BMP Data Bases

Jurisdictions Must Commit to Historical Data Clean-up. An approvable jurisdictional BMP verification program must include clear commitments to and specific plans/schedules for cleaning up their historical BMP databases by a specific date, but not beyond July 2015, the deadline for providing a complete BMP implementation history for use in calibrating the Partnership's Phase 6 Chesapeake Bay Watershed Model. Jurisdictions will have opportunities for making further adjustments to their historical BMP databases during the first half of 2016, during the time period designated by the Partnership for comprehensive review of the full suite of revised and updated Partnership's modeling and other decision support tools under the Chesapeake Bay TMDL Midpoint Assessment. After that time frame, their historical databases will be considered locked in from the perspective of the Partnership's Chesapeake Bay Watershed Model calibration.

Move Forward with Historical Data Clean-up in Parallel with Reporting Non-Cost Share Practices. The process for cleaning up historical data bases must proceed in parallel with efforts to credit non-cost share practices. To both help establish a current baseline of non-cost share practices as well as to prevent double counting, the jurisdictions need to be well down the road on cleaning up their historical databases as they begin to actively expand their tracking, verification, and reporting non-cost share practices.

Jurisdictional BMP Verification Documentation

Build Upon Existing Quality Assurance Plans. Documentation of each jurisdiction's BMP verification program will build directly upon their existing quality assurance plans already drafted, approved by EPA, and in place supporting their Chesapeake Bay Implementation Grant and Chesapeake Bay Regulatory and Accountability Grant. Each jurisdiction will structure their quality assurance plan according to what makes the most sense for how their agencies and programs for carrying out BMP verification are structured, following the guidance in Appendix Q.

Jurisdictions Ultimately Responsible for Verification of All Submitted Data. Responsibility for BMP verification is assigned to the original data collector but carries all the way through to the jurisdiction ultimately submitting that BMP data for credit through their NEIEN system.

Prioritizing and Target BMP Verification

Empower Jurisdictions to Prioritize and Target BMP Verification. Jurisdictions are fully empowered to target their verification programs and their most robust verification protocols towards those practices on which the jurisdictions' are depending on the most to achieve the nutrient and sediment pollutant loads reductions through their Watershed Implementation Plans.

Annual Progress Reporting

Use the Partnership's Data Exchange Network to Document Verification Status. As described in Section 2, since early 2000s, the Partnership has been designing, implementing, and now actively using a state node-based data exchange network approach to sharing BMP data building from the National Environmental Information Exchange Network or NEIEN (see Appendix L). The Partnership has developed an agreed to set of Chesapeake NEIEN Node Codes[41] which describe all the current possible fields within NEIEN. Fields can be added at any time to the Codes list and to the NEIEN system itself—the Partnership's Watershed Technical Workgroup reviews and approved all additions and changes to the Codes list every year prior to December 1st. The Watershed Technical Workgroup is charged with the responsibility for determining which set of BMP event status codes and BMP funding source codes all seven jurisdictions will be responsible for reporting into the future to ensure full implementation of the basinwide BMP verification framework. The Chesapeake Bay Program's Grant Guidance will be amended to reflect a reference to the jurisdictional responsibilities for reporting information for the designated codes for all submitted practices.

Annually Review, Update, and Approve the NRCS Standards/CBP Approved BMPs Crosswalk. The Partnership's Agriculture Workgroup will be responsible for annually reviewing the crosswalk between NRCS standard and Partnership's approved BMPs, factoring in any new or revised NRCS standards and Partnership approved BMPs. Based on any Agriculture Workgroup approved changes to the crosswalk, the Watershed Technical Workgroup will review and approve the necessary changes to Chesapeake NEIEN Node Codes Lists as well as required changes to the rules for how these BMPs will be applied within the Partnership's Scenario Builder tool.

CBPO Review of Annual Implementation Progress Data Submissions. Chesapeake Bay Program Office (CBPO) staff will review the jurisdictions annual NEIEN-based submissions of implementation progress data for documentation of verification as part of their routine evaluations of the quality and completeness of the submitted data. The annual progress data reviews will be conducted following the specific guidelines and protocols agreed to by the Partnership through the Watershed Technical Workgroup. Any submitted implementation progress practice data without the required verification documentation will be returned to the jurisdiction for incorporation of required documentation and resubmission.

Maintain and Approve Updated Documentation on Entire Annual Progress Data Submission/Review Process. The Partnership's Watershed Technical Workgroup will be responsible for reviewing and approving any updates to documentation of the steps, processes,

[41] For the most recent version of the NEIEN codes list, contact the current staff or coordinator of the Watershed Technical Workgroup: http://www.chesapeakebay.net/groups/group/watershed_technical_workgroup

and procedures followed by the Chesapeake Bay Program Office staff in receiving, reviewing, processing, and submitting to the watershed model for crediting of each jurisdiction's annual implementation data submissions. Chesapeake Bay Program Office staff will be responsible for updating and maintaining the documentation of the annual progress data submission and review process.

Partnership Processes for Evaluation and Oversight

EPA Review of Jurisdictions' Quality Assurance Plans. EPA will annually review and formally approve the jurisdictions' quality assurance plans submitted as part of their annual applications for their Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants. EPA will focus its annual reviews on any changes to the plans description of the jurisdictions' BMP verification programs for consistency with the Partnership's BMP verification framework. EPA must review and approve the quality assurance plans prior to the annual grant awards.

Periodic EPA Audits of Jurisdictions' BMP Verification Programs. Structured like the field collection and analytical laboratory audits conducted with the Partnership's watershed and tidal monitoring networks (with very successful outcomes for almost three decades), EPA will conduct periodic on-site audits of the jurisdictions' BMP verification programs. The audits, to be conducted by teams of recognized experts, will be carried out to ensure the procedures and protocols documented within the jurisdictions' quality assurance plans are being effectively carried out consistent with the Partnership's basinwide BMP verification framework.

Independent Evaluations by the Partnership's Advisory Committees. At the request of the Partnership, the Scientific and Technical Advisory Committee, working with the Citizens and Local Government advisory committees, will sponsor periodic—every 3-5 years—independent evaluations of the effectiveness of the basinwide BMP verification framework and the individual jurisdictions' BMP verification programs in achieving the five BMP verification principles adopted by the Partnership. Findings and recommendations from these periodic independent evaluations will be presented directly to the Principals' Staff Committee for consideration and follow-through actions and decisions. The initial review will be conducted 3 years following Principals' Staff Committee approval of the seven jurisdictions' BMP verification programs.

BMP Verification Framework Implementation Timeline

Take Specific Steps to Implement the Basinwide BMP Verification Framework. Upon the Principals' Staff Committee's adoption of the basinwide BMP verification framework, the Partnership and the individual partners will undertake the following series of actions:

1. All seven jurisdictions will develop/further enhance their BMP tracking, verification and reporting programs to be consistent with BMP verification principles and all the other elements of the basinwide BMP verification framework.

2. The jurisdictions will fully document their BMP tracking, verification and reporting programs within their existing Chesapeake Bay Implementation Grant and Chesapeake Bay Regulatory and Accountability Grants required quality assurance plans.

3. The BMP Verification Review Panel will review each jurisdiction's BMP verification program documentation, assessing the strengths and any possible vulnerabilities in the state's BMP verification programs using the Partnership's BMP verification principles as criteria.

4. The BMP Verification Review Panel will then meet with each of the jurisdictions to discuss the jurisdiction's respective BMP tracking, verification and reporting programs, working to identify and address any discrepancies between the jurisdiction's proposed verification program and the Partnership's basinwide verification framework.

5. The jurisdictions will be given the opportunity to respond to the Panel's findings.

6. The BMP Verification Review Panel will provide written feedback and recommendations to the BMP Verification Committee on each jurisdiction's BMP verification program.

7. The BMP Verification Review Panel will report its findings and recommendations directly to the Partnership's Principals' Staff Committee.

8. EPA will approve each jurisdiction's BMP verification program or request specific enhancements to address the Panel's findings and recommendations prior to EPA approval.

Use First Two Years to Ramp-up Jurisdictions' Verification Programs. The Partnership will use the two years following Principals' Staff Committee adoption of the basinwide BMP verification framework as the period within which to ramp up the jurisdictions verification programs and make necessary internal adjustments and adaptations for implementation of the basinwide BMP verification framework.

Only Verified Practices will be Credited After the Initial Two Year Ramp-up Period. In the first full annual progress reporting cycle coming two years after the date of adoption of the basinwide BMP verification framework by the Principals' Staff Committee, those reported practices, treatment, or technologies for which documentation of verification has not been provided for through each jurisdictions' NEIEN-based report systems will not be credited for nitrogen, phosphorus or sediment pollutant load reductions for that year.

Verification Program Development and Implementation Funding

Take Full Advantage of EPA Funding Available to Support Verification. EPA established the Chesapeake Bay Regulatory and Accountability Program (CBRAP) Grants to provide the seven watershed jurisdictions with the funds needed to establish, strengthen and expand existing BMP tracking, verification, and reporting programs among other jurisdictional regulatory and accountability programs. Within its 2013 *Chesapeake Bay Program Grant and Cooperative Agreement Guidance*, EPA took extra steps to clearly spell out that these CBRAP grants can be used to fund BMP verification programs (please see pages 13, 30, and 31).

BMP Performance Evaluation

Undertake Collection of BMP Performance Data through the Partnership. Following the Partnership's adaptive management BMP verification principle, the partners will support a continued evolution of the understanding of the performance of practices. The Partnership will work with its Scientific and Technical Advisory Committee to develop and implement a longer term process of collecting, analyzing, and then using the resultant scientific evidence to assist in quantifying the performance of the individual and collective reported BMPs into the future. Analyses of such data would focus on evaluating the degree of consistency with the pollutant load reduction efficiency adopted by the Partnership and estimated pollutant reductions simulated by the Partnership's suite of models and other decision support tools. Applying the results of these analyses, following an adaptive management process, can help the Partnership refine BMP efficiencies, jurisdictional policy decisions, and support continued research and development into new BMPs.

This is *not* recommended as a required program component of a jurisdiction's verification program. The success of these BMP performance evaluations will be based on jurisdictional and the larger Partnership's commitment and ability to collect this data, and further integrate work by outside experts. The findings could assist in the confirming the accuracy of the existing BMP efficiencies and Partnership's Chesapeake Bay watershed model predictions. Monitoring and a certain amount of performance checks may be needed from jurisdiction to collect adequate data for determining actual BMP performance.

Looking Towards the Future

Look Out to a Point in the Future Where Outcomes will be Measured in Place of BMPs for Verification of Implementation Actions. Landscape management, particularly production agriculture is accomplished within a network of professionals. Decision making is a dynamic process on a daily, seasonal, and annual basis, replying on conservation districts, NRCS, agronomists, seed dealers, fertilizer sales, equipment, labor, weather, markets (local, regional, national and international), regulation, personal knowledge/preferences, economic conditions, etc. Reporting of individual conservation practices does not begin to fully capture all the myriad of incremental decisions that affect landscape management. We are already witnessing this shift in the management of urban stormwater, with the movement from individual best practices to performance-based management systems. The Partnership should…. [Editor's Note: Working with Tim Gieseke, BMP Verification Review Panel member, in spelling out what exactly should the Partnership do differently into the future.]

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Section 8. Abbreviations

ACE	U.S. Army Corps of Engineers
AEM	Agriculture Environmental Management
BMP	best management practice
CAC	Citizens' Advisory Committee
CAST	Chesapeake Assessment and Scenario Tool
CBEMT	Chesapeake Bay Environmental Markets Team
CBP	Chesapeake Bay Program
CBRAP	Chesapeake Bay Regulatory and Accountability Program
CBWI	Chesapeake Bay Watershed Initiative
CDSI	Conservation Delivery Streamlining Initiative
CEAP	Conservation Effects Assessment Program
CLU	common land unit
CREP	Conservation Reserve Enhancement Program
CGP	construction general permit
CRP	Conservation Reserve Program
CSO	combined sewer overflow
CTA	Conservation technical assistance
DC	District of Columbia
DC DOE	District of Columbia Department of Environment
DE	Delaware
DE DA	Delaware Department of Agriculture
DE DNREC	Delaware Department of Natural Resources and Environmental Control
DE FS	Delaware Forest Service
DMR	discharge monitoring report
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FOIA	Freedom of Information Act
FSA	Farm Service Agency
FR	Federal Register
IDEA	Integrated Data for Enterprise Analysis
IP	Individual Permit
LBS	pounds

LGAC	Local Government Advisory Committee
MB	Management Board
MD	Maryland
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MGD	million gallons per day
MIDAS	Modernize and Innovate the Delivery of Agricultural Systems
MS4	municipal separate storm sewer system
NACD	National Association of Conservation Districts
NAS	National Academy of Sciences
NEIEN	National Environmental Information Exchange Network
NGO	non-government organization
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRCS	USDA Natural Resource Conservation Service
NWP	Nationwide Permit
NY	New York
NY DAM	New York State Department of Agriculture and Markets
NY DEC	New York State Department of Environmental Conservation
OWTS	On-site wastewater treatment system
PA	Pennsylvania
PA DEP	Pennsylvania Department of Environmental Protection
PA DA	Pennsylvania Department of Agriculture
PSC	Principals' Staff Committee
QA/QC	quality assurance/quality control
SPGP	State programmatic general permit
STAC	Scientific & Technical Advisory Committee
TSP	technical service provider
USC	Upper Susquehanna Coalition
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VA	Virginia
VA DCR	Virginia Department of Conservation and Recreation
VA DEQ	Virginia Department of Environmental Quality
WIP	watershed implementation plan
WRP	Wetland Reserve Program
WQGIT	Water Quality Goal Implementation Team
WV	West Virginia
WVCA	West Virginia Conservation Agency
WVDA	West Virginia Department of Agriculture
WV DEP	West Virginia Department of Environmental Protection