

# Maryland's DRAFT Best Management Practice BMP Verification Protocol Summary

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## Overview

In October 2014, the Chesapeake Bay Program (CBP) Water Quality Goal Implementation Team’s BMP Verification Committee released its guidance for best management practice (BMP) verification: *Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework*. The document lays out CBP’s approach to BMP verification, including the reasoning behind it, recommendations/guidance for setting up a verification program, and information from individual sectors. The guidance document states that “(e)ach jurisdiction will describe, using specific references to specific adopted verification guidance, procedures, and processes, how its overall BMP verification program achieves the five BMP verification principles.”

The Maryland Department of the Environment (MDE), in conjunction with the Maryland Department of Agriculture (MDA) and the Maryland Department of Natural Resources (DNR) have assembled a set of BMP verification practices and procedures to comply with the new CB Partnership BMP Verification protocols.

Maryland’s policies and practices included in this document reflect the heightened requirements of the various agencies collecting BMP information, and the methods used to ensure that data reported to the CBPO for modeling are compliant with the 5 Chesapeake Bay BMP verification principals 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 Bay Program. This principle also outlines general expectations for BMP verification protocols.
Scientific Rigor	Asserts that BMP verification should assure effective implementation through scientifically rigorous, defensible and professionally established and accepted sampling, inspection and certification protocols. Recognizes that BMP verification shall allow for varying methods of data collection that balance scientific rigor with cost effectiveness and the priority placed upon the practice in achieving pollution reduction.
Public Confidence	Calls for BMP verification protocols to incorporate transparency in both the processes of verification and of tracking and reporting 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 BMP 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 BMP verification program to strive to achieve equity in the measurement of functionality and effectiveness of implemented BMPs among and across the source sectors.

This document is not an Urban Quality Assurance Project Plan (QAPP), however it provides the background for the specific verification methods used in the Urban sector while the existing QAPP plan is being revised. It also includes references to the location of verification protocols for the Agriculture and Forestry sectors based on groups of BMPs based on: BMPs that share similar verification methods.

A list of individual Urban BMPs and how they relate to each verification method are provided in **Appendix B**. Agriculture and Forestry BMPs can be found in their respective QAPPs included as links in **Appendix C**.

Additional information by source sector will be updated in revised QAPP that are being drafted for the final verification submission. Current versions of those plans will be included, but the urban sector QAPP does not include the revised verification information included in this document.

The State’s assessment of verification and links to documentation can be found in **Table 1**.

**Table 1.** Jurisdiction BMP Verification Protocol Components Checklist

	<b>State: Maryland</b>			
	<b>Sector: All</b>			
	<b>BMP Verification</b>	<b>Present</b>	<b>N/A</b>	<b>Sector Comments</b>
<b>1</b>	<b>BMPs Collected</b>			All sectors
	Type (structural, management, annual, etc.)			
	BMP funding/cost shared (federal, state, NGO, non-cost shared)	<b>Y</b>		<b>Ag</b> - QAPP ( <a href="#">Appendix C</a> ) <b>Forestry</b> - See Verification Tables in <a href="#">Appendix D</a> . <b>Urban</b> – See Verification Tables in <a href="#">Appendix D</a> . <b>WWTP</b> -
	Distinct state standards/specifications	<b>Y</b>		<b>Ag</b> – Same as above <b>Forestry</b> - QAPP ( <a href="#">Link in Appendix C</a> ) <b>Urban</b> – MDE <a href="#">Stormwater Construction Manual</a> <b>WWTP</b> -
	Matching CBP BMP definition/efficiencies	<b>Y</b>		<b>Ag</b> - QAPP ( <a href="#">Appendix C</a> ) <b>Forestry</b> – QAPP <b>Urban</b> – <a href="#">Appendix B</a> <b>WWTP</b> - NA
<b>2</b>	<b>Method/System of Verification/Assessment</b>			
	Description of methods/systems to be used	<b>Y</b>		<b>Ag</b> - QAPP <b>Forestry</b> - QAPP <b>Urban</b> – MDE Standard Operating Procedures ( <a href="#">Appendix C</a> ) <b>WWTP</b> -

	Documentation of procedures used to verify BMPs	Y	<b>Ag - QAPP (<a href="#">Appendix C</a>)</b> <b>Forestry - QAPP</b> <b>Urban - MDE Standard Operating Procedures (<a href="#">Appendix C</a>)</b> <b>WWTP – ICIS QAPP (<a href="#">Appendix C</a>)</b>
	Instruction manual for system users	Y	<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban - See Existing Verification Urban for SW Manual hyperlink</b> <b>WWTP – ICIS QAPP</b>
<b>3</b>	<b>Who will Complete the Verification</b>		
	Qualification requirements	Y	<b>Ag - MDA QAPP (<a href="#">Link in App. D</a>)</b> <b>Forestry -</b> <b>Urban - See Verification Tables (<a href="#">Appendix D</a>)</b> <b>WWTP – ICIS QAPP</b>
	Training requirements	Y	<b>Ag - QAPP</b> <b>Forestry – QAPP</b> <b>Urban – Same as above</b> <b>WWTP – ICIS QAPP</b>
	Certification requirements	Y	<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban – Same as above</b> <b>WWTP – ICIS QAPP</b>
	CEU follow-up training requirements in the future	N	
<b>4</b>	<b>Documentation of Verification Finding</b>		
	Date of installation	Y	<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban - Appendix D</b> <b>WWTP - NA</b>
	Location (lat/long if applicable)	Y	<b>Ag - NA</b> <b>Forestry – QAPP (Different for Urban – Appendix D)</b> <b>WWTP - NA</b>
	Level of reporting (watershed, HUC, county, site specific, etc.)	Y	<b>Ag – QAPP</b> <b>Forestry -</b> <b>Urban - See Existing Verification Urban for SW Manual hyperlink</b> <b>WWTP - NA</b>

	Units (number, acres, length, etc.) needed for NEIEN	Y	Ag - QAPP Forestry - QAPP Urban – Appendix B WWTP – NA not reported by NEIEN
	Ownership (public, private)	Y	Ag – QAPP Forestry - QAPP Urban - <a href="#">Appendix D</a> WWTP – ICIS QAPP
	Documentation:		
	Pictures	Y	Homeowner and NGO
	Worksheets	Y	Ag, Forestry, Urban & WWTP
	Electronic Tool		
	Aerial Photos		
	Maps		
	Other		
	Report Generator		Ag - QAPP Forestry - QAPP Urban - WWTP – ICIS QAPP
<b>5</b>	<b>How Often Reviewed (Cycle of review)</b>		
	1-2 years	Y	WWTP - Annual Review
	5 years		
	10 years		
	Other	Y	Ag – QAPP (Different by practice type) Forestry – QAPP (Different by practice type) Urban –Appendix D
<b>6</b>	<b>Independent Verification of Finding</b>		
	Is this a requirement?		
	Internal Independent	Y	
	External Independent		
	<b>BMP Data Validation</b>		
<b>7</b>	<b>Quality Assurance/Spot Checking</b>		
	Who: qualifications/training/certification		Ag - QAPP Forestry - QAPP Urban – Appendix D WWTP – ICIS QAPP
	Method to select BMP for follow-up check		Ag - MDA QAPP (Link in App. D) Forestry - Urban - Appendix D WWTP – NA

	Method to select the number of BMPs to review			<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban – Appendix D</b> <b>WWTP - NA</b>
	Other			
<b>8</b>	<b>Data Entry of BMP Implementation</b>			
	What is the system?	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban – <a href="#">GeoDatabase QAPP, MS4 Permits</a></b> <b>WWTP – ICIS QAPP</b>
	Who enters data (training/certification)?	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban - GeoDatabase QAPP, MS4 Permits</b> <b>WWTP – ICIS QAPP</b>
	Does the system connect to NEIEN?	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban - GeoDatabase QAPP, MS4 Permits</b> <b>WWTP – ENR QAPP</b>
	System in place prevent double counting?	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban – GeoDatabase QAPP, MS4 Permits</b> <b>WWTP – ICIS QAPP</b>
<b>9</b>	<b>External Provided Data Validation Meeting CBP Guidance</b>			
	Method to validate data	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban - MDE SSA – See <a href="#">Figure4</a></b> <b>WWTP - ICIS QAPP</b>
	Who will validate data (training/certification)?	Y		<b>Ag - QAPP</b> <b>Forestry - QAPP</b> <b>Urban – MDE SSA – See <a href="#">Figure4</a></b> <b>WWTP - ICIS QAPP</b>
<b>10</b>	<b>Historic Data Verification</b>			
	System to re-certify or remove	Y		<b>Ag - QAPP</b> <b>Forestry -</b> <b>Urban - MDE SSA – See <a href="#">Figure4</a></b> <b>WWTP – No QAPP, done by MDE – SSA See <a href="#">Section F.4</a></b>
	Who will verify historic data (training/certification)?	Y		<b>Ag - QAPP</b> <b>Forestry - SSA See <a href="#">Section F.2</a></b> <b>Urban – MDE SSA – See <a href="#">Figure4</a></b> <b>WWTP – No QAPP, done by MDE – SSA See <a href="#">Section F.4</a></b>

	Documentation of action	Y		<b>Section F</b>
<b>BMP Performance</b>				
<b>11</b>	Does state collect data to assess BMP performance?	Y		<b>Urban – MS4 Reports</b>
	System used to collect BMP performance data?	Y		<b>Urban – MS4 Reports</b>
	Who collects BMP performance data?	Y		<b>Urban – MS4 Reports</b>
	Who analyzes collected data and reports to CBP?	Y		<b>Urban – MS4 Reports</b>
<b>12</b>	<b>Additional Comments/Requests</b>			
<b>13</b>	<b>CBP Approval Process</b>			



## A. Maryland's Verification Principles

The State of Maryland has traditionally implemented numerous laws, standard operating procedures (SOP) generation and guidance documents on the reporting of BMPs in the Agricultural, Forestry and Urban sectors.

### **Agriculture**

The Maryland Department of Agriculture (MDA), working in collaboration with Maryland's Conservation Partnership, assists agricultural producers in conservation planning and Best Management Practice (BMP) implementation that balance crop and livestock production with the need to protect natural resources. A key role in this process is the accurate accounting and verification of BMP implementation consistent with USEPA guidance to ensure appropriate quantification of nutrient reduction in support of Maryland's Watershed Implementation. As the lead agency for the agricultural sector in Maryland, MDA tracks and reports agricultural BMP implementation annually to the Chesapeake Bay Program Office (CBPO) through the National Environmental Information Exchange Network (NEIEN), the node of which is managed by the Maryland Department of the Environment. The established reporting protocol involves a manual transfer of data to the Maryland Department of Environment utilizing a pre-formatted spreadsheet. The following outlines documentation of data sources and any analyses that are done by the Maryland Department of Agriculture for each BMP for which implementation is tracked, compiled, and analyzed prior to submission to the Maryland Department of Environment.

The MDA's implementation tracking data currently includes data from MDA's Conservation Tracker and Nutrient Management Program databases, which together capture agricultural BMP implementation regardless of funding source. Outlined within this document are the proposed protocols to identify and verify the implementation of all reported BMPs across Maryland's agricultural landscape.

### **Forestry**

Reporting on forestry practices is derived from reporting systems developed and used by the Maryland Department of Natural Resources (DNR) for the Forest Conservation Act, the USDA Forest Service performance reporting, dedicated riparian forest buffer reporting forms, and sediment and erosion control plans required for forest harvesting.

Summary data in reports from jurisdictions and through State review are derived from acreages on approved plans measured using standard measurement techniques on scaled drawings and maps. Estimates are considered to be accurate to the nearest acre. From the approved plans, bonds are required to assure that planting is completed and successful for at least the first year (sometimes two years or more). Data are not accepted if they do not have a listed acre measurement. Categories of data are mutually exclusive, and no other avenues of reporting this information for Model BMPs are known.

### **Urban**

#### **Stormwater:**

The State of Maryland has developed comprehensive stormwater management, and erosion and sediment control programs to reduce the adverse impacts of development on stormwater runoff. This program addresses both the temporary and the permanent impacts associated with development

activities. The information found in this document describes various programs and lawful requirements, as well as presenting guidance on how stormwater management is implemented in Maryland. Stormwater verification in Maryland is typically conducted by county, municipal or federal personnel depending on the location with program review conducted by the Maryland Department of the Environment (MDE).

### **Septic:**

The Onsite Systems Division provides technical assistance and direction to County Health Departments and Local Approving Authorities for the implementation of delegated programs for Onsite Sewage Disposal Systems (OSDS) and individual wells. This is of the utmost importance in carrying out our mission of protecting groundwater quality and public health.

Some of the functions of the Onsite Systems Division are:

- Co-review of OSDS equal to or greater than 5,000 gpd for compliance with the Large System Guidelines.
- Provide guidance on the applicability and design of alternative and innovative systems
- Provide guidance on the proper interpretation and enforcement of COMAR regulations 26.04.02, 26.04.03, 26.04.04 and 26.04.05, concerning onsite sewage disposal systems, subdivision of land, well construction and shared facilities
- Provide guidance for site and soil evaluation, construction inspections, and enforcement issues. etc.
- Certify Sand Mound Installers
- Maintain a list of Individuals who have taken an approved course in the proper inspection of OSDS for property transfer

### **Wastewater:**

MDE's Wastewater Permits Program (WWPP), within the Water Management Administration, issues permits to protect Maryland's water resources by controlling industrial and municipal wastewater discharges. Surface water discharges are regulated through combined State and federal permits under the National Pollutant Discharge Elimination System (NPDES). Groundwater discharges are regulated through State issued groundwater discharge permits. Also related to the protection of groundwater is the WWPP coordination with all local health departments for the regulation of individual wells and septic systems.

## **B. Documentation of BMP Verification Protocols**

Maryland has chosen to list its protocols by sector and by verification procedures used for different BMP types. For example, the verification of Agronomic practices like nutrient management will differ from structural agricultural practices such as manure storage facilities. Therefore rather than focusing on individual BMPs, the State has chosen to focus on the methodology of verification instead with groupings of BMPS under those methodologies.

### **1. Documenting Existing Verification Programs**

*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, businesses, nongovernmental organizations—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.*

### **a. Agriculture**

See the DRAFT MDA QAPP document. A link to the document exists in [Appendix C](#).

### **b. Forestry**

See DNR Forestry QAPP. A link to the document exists in [Appendix C](#).

### **c. Urban**

- Stormwater: In Maryland, the data originators are local jurisdictions who maintain their own BMP inspection and maintenance programs under the guidance of State law. Initial verification of BMPs, inspection after one year, and inspections every three years thereafter are required by law in Maryland.

“Once construction is complete, as-built plan certification shall be submitted by either a professional engineer or professional land surveyor licensed in the State to ensure that ESD planning techniques, treatment practices, and structural stormwater management measures and conveyance systems comply with the specifications contained in approved plans. At a minimum, as-built certification shall include a set of drawings comparing the approved stormwater management plan with what was constructed. Other information shall be submitted as required by the approving agency.”

([COMAR 26.17.02.10.F](#)) BMPs must be built and inspected per specifications in the [Maryland Stormwater Design Manual](#) to ensure performance standards are met and maintained

MDE is responsible for oversight of the Municipal Separate Storm Sewer System (MS4) permit program. As part of stormwater triennial reviews, MDE will visit about 4 jurisdictions each year and inspect approximately a dozen sites, each one of which might include dozens of ESD practices. As part of E&SC, MDE visits 11 jurisdictions annually and inspects approximately a dozen sites in each jurisdiction. Each site may have dozens of BMPs. Other MS4 program inspections may include restoration BMPs and local program reviews (IDDE, street sweeping, SWPPs, etc.). Annual reports sent to MDE from regulated entities document the completion, inspection and maintenance of all BMPs within their jurisdiction. Data requirements for these reports can be found in each jurisdiction’s MS4 permit located [here](#).

MDE is also responsible for oversight of non-regulated jurisdictions and has required the Notice of Construction Completion form by law. “Each county or municipality shall submit notice of construction completion to the Administration on a form supplied by the Administration for each stormwater management practice within 45 days of construction completion. If BMPs requiring soil conservation district approval are constructed, notice of construction completion shall also be submitted to the appropriate soil conservation district.” ([COMAR 26.17.02.10.G](#))

A list of all local jurisdictions, regulated and non-regulated, that are required to provide data are included in **Table 2**.

**Table 2.** List of Stormwater data providing jurisdictions and responsible sections

Jurisdiction Name	Type	Reporting Division
Anne Arundel County	P1 MS4	DPW - Watershed Ecosystem and Restoration
Baltimore City	P1 MS4	DPW
Baltimore County	P1 MS4	Dept. of Environmental Protection & Sustainability
Carroll County	P1 MS4	Land Use, Planning & Development
Charles County	P1 MS4	Planning and Growth Management
Frederick County	P1 MS4	Office of Sustainability and Environmental Resources
Harford County	P1 MS4	DPW - Water Resources
Howard County	P1 MS4	DPW - Stormwater Management Division
Montgomery County	P1 MS4	Dept. of Environmental Protection
Prince George's County	P1 MS4	Dept. of Environmental Resources
State Highway Admin. (inside other P1 areas)	P1 MS4	Office of Environmental Design
Cecil County	P2 MS4	DPW
Washington County	P2 MS4	DPW - Environmental Office
Aberdeen	P2 MS4	City Public Works
Annapolis	P2 MS4	Municipality
Bel Air	P2 MS4	Municipality
Berwyn Heights	P2 MS4	PGC - Dept. of Environmental Resources
Bladensburg	P2 MS4	PGC - Dept. of Environmental Resources
Bowie	P2 MS4	City of Bowie Watershed Manager
Brentwood	P2 MS4	PGC - Dept. of Environmental Resources
Brunswick	P2 MS4	Municipality
Capitol Heights	P2 MS4	PGC - Dept. of Environmental Resources
Cheverly	P2 MS4	PGC - Dept. of Environmental Resources
College Park	P2 MS4	PGC - Dept. of Environmental Resources
Colmar Manor	P2 MS4	PGC - Dept. of Environmental Resources
Cottage City	P2 MS4	PGC - Dept. of Environmental Resources
District Heights	P2 MS4	PGC - Dept. of Environmental Resources
Elkton	P2 MS4	Municipality
Emmitsburg	P2 MS4	Municipality
Fairmount Heights	P2 MS4	PGC - Dept. of Environmental Resources
Forest Heights	P2 MS4	PGC - Dept. of Environmental Resources
Frederick City	P2 MS4	Municipality
Gaithersburg	P2 MS4	Municipality
Glenarden	P2 MS4	Municipality
Greenbelt	P2 MS4	PGC - Dept. of Environmental Resources
Hagerstown	P2 MS4	Municipality
Hampstead	P2 MS4	Municipality
Havre de Grace	P2 MS4	City Public Works
Hyattsville	P2 MS4	PGC - Dept. of Environmental Resources
Landover Hills	P2 MS4	PGC - Dept. of Environmental Resources
Laurel	P2 MS4	PGC - Dept. of Environmental Resources
Manchester	P2 MS4	Municipality
Middletown	P2 MS4	Municipality
Morningside	P2 MS4	Municipality

Mount Airy	P2 MS4	Municipality
Mount Rainier	P2 MS4	PGC - Dept. of Environmental Resources
Myersville	P2 MS4	Municipality
New Carrollton	P2 MS4	PGC - Dept. of Environmental Resources
New Windsor	P2 MS4	PGC - Dept. of Environmental Resources
Riverdale Park	P2 MS4	Municipality
Rockville	P2 MS4	City Public Works
Salisbury	P2 MS4	Municipality
Seat Pleasant	P2 MS4	PGC - Dept. of Environmental Resources
Smithsburg	P2 MS4	Municipality
Sykesville	P2 MS4	Municipality
Takoma park	P2 MS4	Department of Public Works
Taneytown	P2 MS4	Municipality
Thurmont	P2 MS4	Municipality
Union Bridge	P2 MS4	Municipality
University Park	P2 MS4	PGC - Dept. of Environmental Resources
Walkersville	P2 MS4	Municipality
Westminster	P2 MS4	Municipality
MD-ANG (multiple properties)	P2 MS4	MD Army National Guard
Cheltenham	P2 MS4	Federal Law Enforcement Training Center
Fort Detrick	P2 MS4	U.S. Department of the Army
Andrews Air Force Base	P2 MS4	U.S. Department of the Air Force
Adelphi Laboratory Center	P2 MS4	U.S. Department of the Army
WSSC (multiple properties)	P2 MS4	Washington Suburban Sanitary Commission
National Plant Germplasm & Biotech Laboratory	P2 MS4	U.S. Department of Agriculture APHIS-PPQ
Martin State Airport	P2 MS4	MD Aviation Admin. - Office of Planning and Env. Services
Bethesda Campus	P2 MS4	National Institutes of Health
College Park Campus	P2 MS4	University of Maryland
Towson Campus	P2 MS4	Towson University
William Bolger Center	P2 MS4	U.S. Postal Service
MTA (Multiple Properties)	P2 MS4	MD Transit Administration
Goddard Space Flight Center	P2 MS4	National Aeronautics & Space Administration
Naval District Washington-Indian Head	P2 MS4	U.S. Department of the Navy - NAVFAC
National Naval Medical Center	P2 MS4	U.S. Department of the Navy - NAVFAC
US Army Garrison, Aberdeen Proving Ground	P2 MS4	U.S. Department of the Army
Library of Congress @ Ft. Meade	P2 MS4	Architect of the Capitol
Multiple (Outside Phase I Jurisdictions)	P2 MS4	Maryland State Highway Administration
Multiple Metro Rail Station	P2 MS4	Washington Metropolitan Area Transit Authority
Washington Aqueduct	P2 MS4	U.S. Department of the Army
U.S. Naval Academy	P2 MS4	U.S. Department of the Navy - NAVFAC
Naval Surface Warfare Center, Carderock	P2 MS4	U.S. Department of the Navy - NAVFAC
National Institute of Science & Technology - Gaithersburg Campus	P2 MS4	U.S. Dept. of Commerce - NIST - Environmental Mgmt.Group
Ellicott City District Court & John Hargrove Dist. Court	P2 MS4	Maryland Department of General Services
Fort Meade	P2 MS4	U.S. Department of the Army
Camden Yards Sports Complex	P2 MS4	Maryland Stadium Authority

Reserves (multiple properties)	P2 MS4	U.S. Department of the Army
Fort Meade	P2 MS4	U.S. Department of Defense
Beltsville Agricultural Research Center	P2 MS4	U.S. Department of Agriculture
Glen Burnie Headquarters	P2 MS4	MD Department of Motor Vehicle Administration
MD MVA (multiple properties)	P2 MS4	MD Department of Motor Vehicle Administration
MD Port Admin (multiple properties)	P2 MS4	MD Department of Transportation - MD Port Authority
Mont. Co. Dept of Parks (multiple properties)	P2 MS4	M-NCPPC
BWI Airport	No MS4	MD Aviation Admin. - Office of Planning and Env. Services
Leonardtown	No MS4	Municipality
Allegany County	No MS4	Department of Community Services
Calvert County	No MS4	
Caroline County	No MS4	Dept. of Planning & Codes
Dorchester County	No MS4	
Garrett County	No MS4	
Kent County	No MS4	Dept. of Planning, Housing, & Zoning
Queen Annes County	No MS4	
Saint Marys County	No MS4	Department of Public Works and Transportation
Somerset County	No MS4	
Talbot County	No MS4	Department of Public Works
Wicomico County	No MS4	Dept. of Planning, Zoning & Community Dev.
Worcester County	No MS4	

- Erosion and Sediment Control: COMAR 26.17.01.02 states that “The [Water Management] Administration shall establish matters of policy, procedures, standards, criteria, approvals, and enforcement related to the Sediment Control Subtitle [Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland]. The practices adopted and used by the soil conservation districts, the [Washington Suburban Sanitary] Commission, the counties, the municipalities, and State units are to be consistent with the guidelines and regulations adopted by the Administration.” ([COMAR 26.17.01.02](#)) BMPs must be built per the [2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control](#), which include frequent inspections and maintenance if deficiencies are identified. Currently 14 counties & 10 municipalities have delegated authority from MDE to track and inspect ESC practices. A list of all jurisdictions with delegated authority is included as **Table 3**.

**Table 3.** Jurisdictions with delegated ESC authority.

Delegated Jurisdiction	Type
Aberdeen	Municipal
Annapolis	Municipal
Anne Arundel	County
Baltimore City	Municipal
Baltimore County	County
Bel Air	Municipal
Bowie	Municipal
Calvert	Partial County
Carroll	County
Cecil	County
Charles	County
Dorchester	County
Frederick	County
Gaithersburg	Municipal
Greenbelt	Municipal
Harford	County
Howard	County
Kent	County
Laurel	Municipal
Montgomery	County
Prince George's	County
Rockville	Municipal
Worcester	County
Washington Suburban Sanitation Commission	State
Maryland Department of the Environment	State

- Homeowner and NGO: Homeowner and NGO BMPs are verified and tracked through the University of Maryland’s [Stormwater Management and Restoration Tracker](#) (SMART) tool.
- Septic: The verification of septic systems in Maryland is delegated to county, local jurisdictions and BAT installers who must report all new or replacement septic systems and maintenance to MDE’s Onsite Systems Division (OSD) per State law. ([COMAR 26.04.02.07](#)) MDE’s OSD provides technical assistance and direction to County Health Departments and Local Approving Authorities for the implementation of delegated programs for Onsite Sewage Disposal Systems (OSDS). OSD also tracks and reports all new systems and maintenance for BAT septic systems.
- Urban Nutrient Management: **Documentation Gap Exists**

## 2. Focusing Verification

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

### **a. Agriculture**

See the DRAFT MDA QAPP document. A link to the document exists in [Appendix C](#).

### **b. Forestry**

See DNR Forestry QAPP. A link to the document exists in [Appendix C](#).

### **c. Urban**

- Stormwater: MDE's MS4 program focuses its verification on a subset of BMPs within jurisdictions as part of its program review oversight role. Inspection results of a representative sample of BMPs provide MDE WMA the necessary information to assess the jurisdictions program as a whole. Local jurisdictional staff are required to inspect and verify all BMPs and report that data to MDE.
- Septic: All BAT upgrades and maintenance from 2015 on are required to be reported to MDE WMA by law.
- Erosion & Sediment Control: Delegated jurisdictions are required to report installation, inspection and maintenance of all BMPs in this category.
- Homeowner and NGO: MDE has not received information currently from this BMP group, but intends to include this as aggregate BMP types.
- Urban Nutrient Management: **Documentation Gap Exists**
- WWTP: Permittees are legally responsible for reporting all discharge and nutrient concentration to MDE WMA.

## 3. Responsible Parties

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

### **a. Agriculture:**

See the DRAFT MDA QAPP document. A link to the document exists in [Appendix C](#).

### **b. Forestry:**

See DNR Forestry QAPP. A link to the document exists in [Appendix C](#).

### **c. Urban:**

- Stormwater: MS4 and non-regulated jurisdictions are responsible for verifying implementation, inspection and maintenance of BMPs by State law. MDE WMA is responsible for oversight of all MD stormwater inspection and management programs implemented in the State.
- Erosion and Sediment Control: Delegated Jurisdictions are responsible for inspection and enforcement on all acres within their regulated area. MDE is responsible for inspection and enforcement on the remaining area. See **Appendix D** on page 13.



- Homeowner and NGO: <http://www.extension.umd.edu/watershed/smart-tool>
- Urban Nutrient Management: **Documentation Gap Exists**
- WWTP: Permittees are responsible for reporting discharge and nutrient concentration to MDE WMA and data entry and QAQC are documented in the ICIS QAPP and ENR Data QAPP that have links to the documents located in **Appendix C**.

## 4. Future Verification

*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.*

### **a. Agriculture:**

See the DRAFT MDA QAPP document. A link to the document exists in **Appendix C**.

### **b. Forestry:**

TBD upon results of Verification Review Panel

### **c. Urban:**

- Stormwater: MDE has finalized a new geodatabase for all contributing partners to report information on BMP installations and inspections, which is available for immediate use. A data input tool is being built into the system to provide front end quality control of the data entered into the database.
- Erosion and Sediment Control: Currently delegated jurisdictions and MDE WMA report those acres estimated from permit documents. However, there is a potential overestimation of those acres based on the permit time frame and current reporting methodology. MDE has contractual services from Tetrattech to investigate, document and determine a methodology to estimate the amount disturbed acres covered under this practice for any given year.
- Homeowner and NGO: MDE has not received information currently from this BMP group, so methods for incorporating this data will need to be assessed in the future.
- Urban Nutrient Management: **Documentation Gap Exists**

## 5. Future Programmatic Changes

*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.*

### **a. Agriculture:**

See the DRAFT MDA QAPP document. A link to the document exists in [Appendix C](#).

### **b. Forestry:**

TBD upon results of Verification Review Panel

### **c. Urban:**

- Stormwater: MDE SSA is planning to aggregate and analyze the monitoring data provided by the MS4 entities and use it as part of the 303(d) listing, TMDL review and miscellaneous watershed assessments. It is currently not clear if and what format this information may be reported to EPA.
- Erosion and Sediment Control: MDE is planning to improve its reporting mechanism.
- Homeowner and NGO: TBD upon results of Verification Review Panel
- Urban Nutrient Management: MDE will work with the reporting agency, MDA, to provide a more comprehensive assessment of the origination and verification of the UNM data provided to EPA that will address the documentation gap.

### **d. WWTP:**

TBD upon results of Verification Review Panel

## **C. Access to Federal Cost Share Practices**

A Memorandum of Understand between MDA, Soil Conservation Districts (SCDs) and USDA-Natural Resource Conservation Service (NRCS) is in place that defines the roles and responsibilities of each agency and directs their mutually cooperative efforts to achieve the conservation and protection of soil, water and related resources through the optimum use of State and Federal resources. A copy of which can be found at

[http://mda.maryland.gov/resource\\_conservation/Documents/macs\\_manual/4/1\\_mou.pdf](http://mda.maryland.gov/resource_conservation/Documents/macs_manual/4/1_mou.pdf).

Maryland SCDs are a combination of federal, state, and county employees. Roles and responsibilities can differ between staff across SCDs, but all are committed to promoting appropriate conservation practices in Maryland. However, data entry into Conservation Tracker is generally limited to state and county employees, so each SCD has developed a procedure to ensure practices lead by federal partners are also entered into the Conservation Tracker tool. In addition, MDA Headquarters receives an annual report from NRCS at the conclusion of the state fiscal year of federally funded practices. This report is cross-referenced with Conservation Tracker to confirm all installed practices have been accounted for by MDA.

**(Source: MDA Draft QAPP)**

## D. Accounting for Non-cost Shared Practices

### **1. SCD Assisted BMPs – Ag (Source: MDA Draft QAPP)**

SCD staff work with a farmer to develop voluntary, farm-specific SCWQPs to assess resource needs of the operation, appropriate BMPs to address those resource needs, and potential funding mechanisms. Staff then works with the farmer to implement BMPs over a time period based on priority needs and available funding. Funding may be acquired from other State agencies, NGOs, or the farmer may opt to use their own funds. Regardless of the funding source, SCD staff is on-site throughout the construction phase to ensure all elements of the design and construction meet NRCS technical standards and specifications. This process is completed for 100% of structural BMPs at time of implementation. Subsequently, SCD staff is responsible for the timely submission of data into Conservation Tracker including spatial location of the structure, extent of the structure, date of installation, and cost-share sources if any.

Alternatively, farmers may install BMPs that meet NRCS technical design standards but the technical assistance was not provided by the SCD staff. Under these circumstances, BMPs may still receive water quality credit according to the CBPO's protocol for reporting and tracking non cost-shared BMPs. Consistent with the CBPO protocol, MDA has developed the "Non-Cost Shared Best Management Practice and Resource Improvement Practice Verification Procedures Manual." This training manual, in addition to training materials and training workshops, is being rolled out in June 2015. Training attendance is required for individuals to become certified at identifying non-cost-shared BMPs

### **2. Resource Improvement BMPs – Ag (Source: MDA Draft QAPP)**

Structural BMPs installed by farmers without cost-share assistance and without SCD assistance that provide similar annual environmental benefits for water quality but do not meet all the design criteria of existing NRCS standards are known as Resource Improvements (RIs). Preliminary surveys of RIs in some Maryland counties (e.g. Howard and Baltimore) revealed an extensive number of RIs on the agricultural landscape in Maryland. While record keeping availability on the timing of RI installation can be challenging, it is agreed by the CBPO that these practices provide water quality benefits and should be credited toward WIP progress. As a result, the CBPO has approved a separate but concurrent process to identify and document RI existence.

Maryland SCD staff will be the lead partner in identifying and tracking RIs according to the "Non-Cost Shared Best Management Practice and Resource Improvement Practice Verification Procedures Manual." This training manual, in addition to training materials and training workshops, is being rolled out in June 2015 and includes Visual Indicator checklists that qualified SCD staff can use to assess the functionality of a potential RI. Identification of RIs would generally occur during on-site farm inventories by SCD staff. If an RI meets the defined requirements of the Visual Indicator checklist, staff would record the spatial location of the structure, extent of the structure, and date of installation into the MDA Conservation Tracker software. The RI would be noted as Farmer Installed in Conservation Tracker. Training attendance is required for individuals to become certified at identifying RIs. .

## E. Preventing Double Counting Procedures

### **1. Agriculture**

MDA utilizes a centralized ORACLE Relational Database Management System to store program records. Records include ownership, farm information, watershed information, practice information, requested cost share information, and expected costs and design information if needed. Additional details about MDA's program-specific databases are provided in the 2015 draft MDA QAPP linked in [Appendix C](#).

### **2. Forestry**

Forestry Data comes from a variety of sources based on BMP type. Details of the different sources, data reliability and data handling methods are included in the DNR QAPP linked in [Appendix C](#).

### **3. Urban**

- Stormwater: In Appendix B of MDE's Accounting for [Stormwater Wasteload Allocations and Impervious Acres Treated](#) guidance, which is being used for non-regulated jurisdictions as well, reporting indicates that all structures and practices be given a unique structure ID.
- Septic: MDE's database contains a unique ID for each septic connection or denitrification upgrade. Septic Pump-out is not currently being submitted to the State.
- Erosion & Sediment Control: Aggregated disturbed acres are reported by delegated jurisdictions and MDE WMA maintains a database with unique ID's for individual permits for all non-delegated jurisdictions.

### **4. NEIEN**

Data validation procedures use conditional formatting in each partner submission to ensure that each BMP\_ID provided by a data partner, for individual or aggregated sets of BMPs, does not overlap before data is aggregated for submission.

### **5. WWTP**

Please review MDE WMA ICIS QAPP linked in [Appedix C](#) for more detail.

## F. Historic Database Clean up

### **1. Agriculture**

The Maryland Department of Agriculture went through a BMP clean-up effort (~3,300 records reviewed) from March through May reviewing the MACS cost-shared practices from 1985 to present and cross-referenced with the Conservation Tracker reporting system. Districts were each provided a custom report of “gaps” between the systems and required to reconcile the records and report back to me with progress. We have since QA/QC'd the data with other historical reports (Trib Strategy, NEIEN, etc.) to ensure that Conservation Tracker is our most robust reporting tool for the majority of BMPs.

The exceptions are cover crop, manure transport, nutrient management, and conservation tillage. Tracking and reporting for these annual BMPs come directly from cost-shared agreements (cover crop and manure transport) or the NM regulatory reqs. (NM and tillage). We also supplemented the tillage records with historical data via National Crop Residue Management surveys and Ag Census data.

### **2. Forestry**

Forestry records were provided back to 2010 for the draft submission, but will be revised to include more historic data in the final submission.

### **3. Urban**

- Stormwater: In Maryland, the historic data clean up has already begun and a draft submission was conducted on June 30, 2015. Included in this initial submission was information from 17 municipal, State and federal partners within the urban sector including all but one Phase 1 MS4 jurisdiction. Records date back to 1950.
- Septic: All septic upgrades in the State are maintained by MDE. The entire database was queried for BAT systems and maintenance. Records date back to 1999.
- Erosion & Sediment Control: Records were provided back to 2010 for the draft submission, but will be revised to include more historic data in the final submission.

### **4. WWTP**

MDE recently reported its methodology for estimating and updating historic discharge from point sources in the CBPO Wastewater Work Group and is working actively with CBPO staff to incorporate this data.

## Reference

Maryland Department of the Environment. 2004. Sediment Control Guidelines for State and Federal Projects (1990). Maryland Department of the Environment. Baltimore, MD.

Maryland Department of the Environment. 2010. Stormwater Management Guidelines for State and Federal Projects. Maryland Department of the Environment. Baltimore, MD.

Maryland Department of the Environment. 2014. Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated. Maryland Department of the Environment. Baltimore, MD.

Maryland Department of the Environment. 2008. 2009 Maryland Stormwater Design Manual, Volume II (including Supplement 1). Maryland Department of the Environment. Baltimore, MD.

Maryland Department of the Environment. 2011. 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Maryland Department of the Environment. Baltimore, MD.

*Procedures for Reporting Forest-related Practices for the Chesapeake Bay Watershed Model*, Maryland Department of Natural Resources Forest Service, June 2011.

*Urban Best Management Practices Database, Quality Assurance Project Plan*, Maryland Department of the Environment, Technical and Regulatory Services Administration, May 24, 2011.

# Appendix A – Data Flow Diagrams

Figure 1. Overall Data Flow for NEIEN

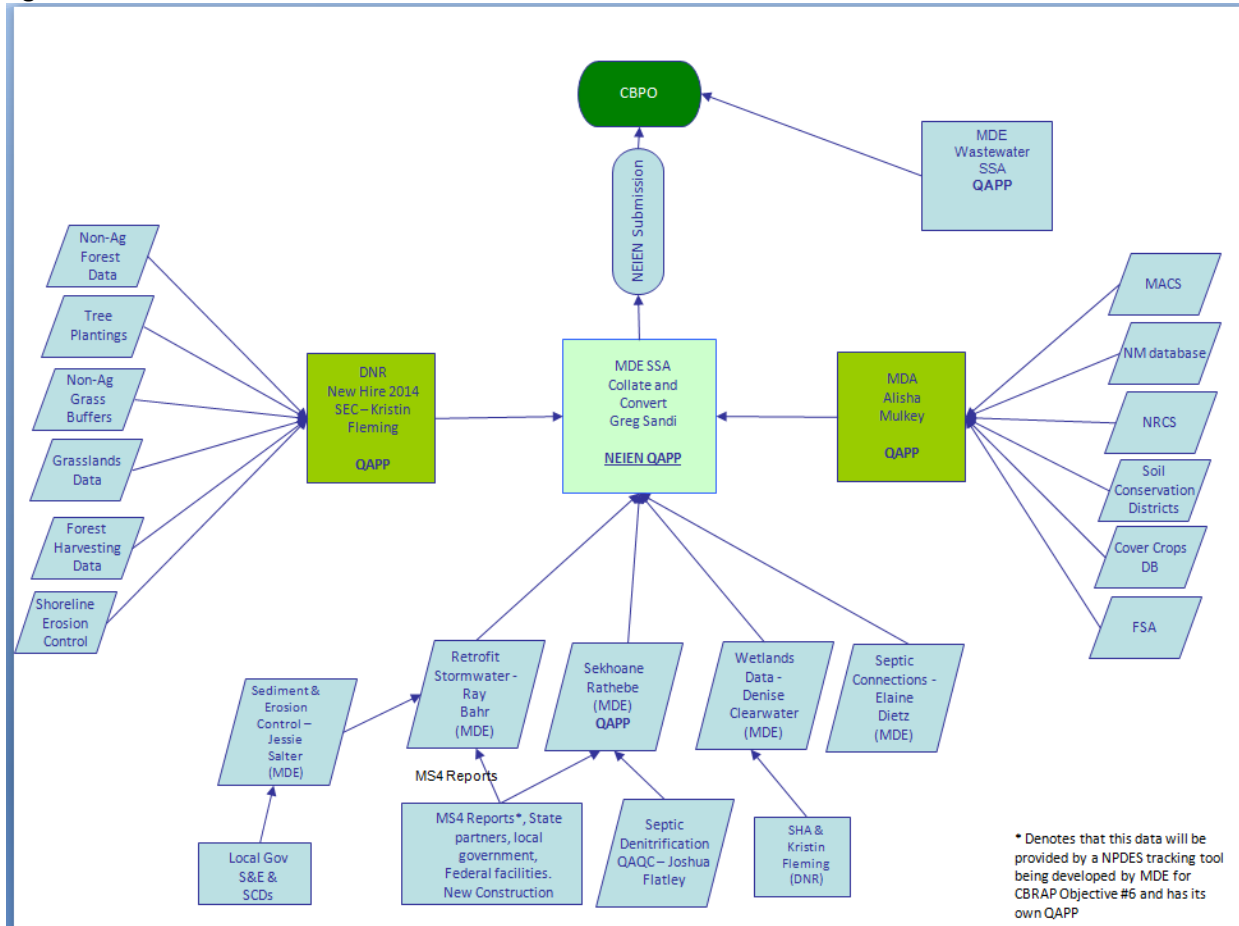
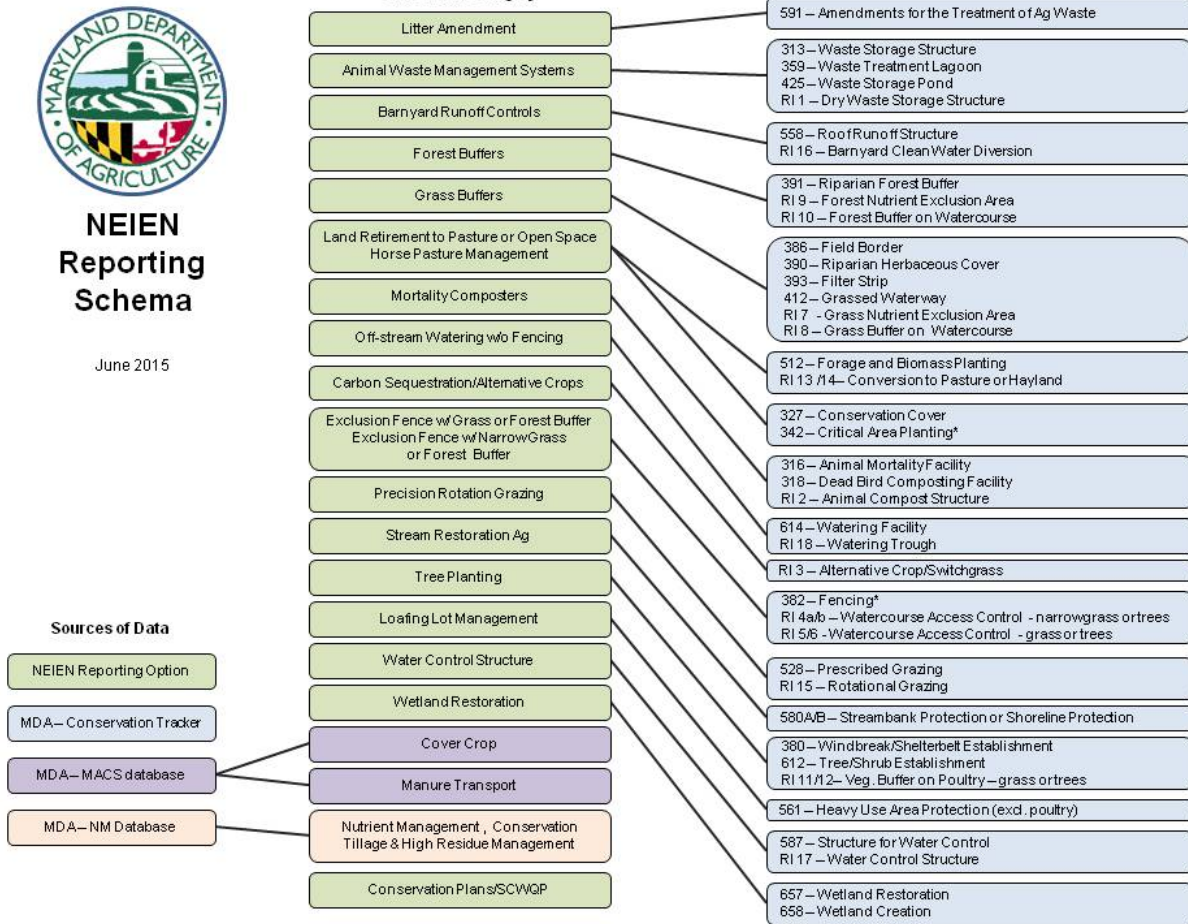


Figure 2. MDA BMP Data Flow



\* These BMPs are tracked and recorded as 342A or 342B, and 382A, 382B, 382C, or 382D for additional reporting needs



Figure 3. Forestry BMP Data Flow

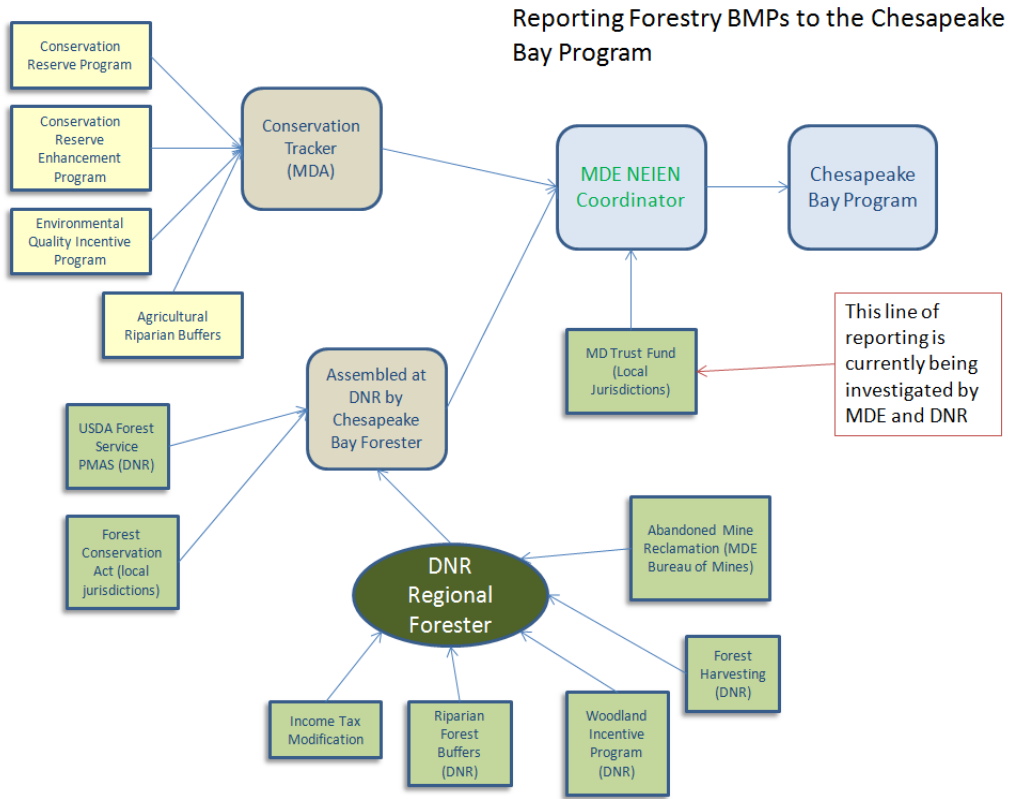


Figure 4. Current Reporting of Phase 1 MS4 BMPs to Chesapeake Bay Program

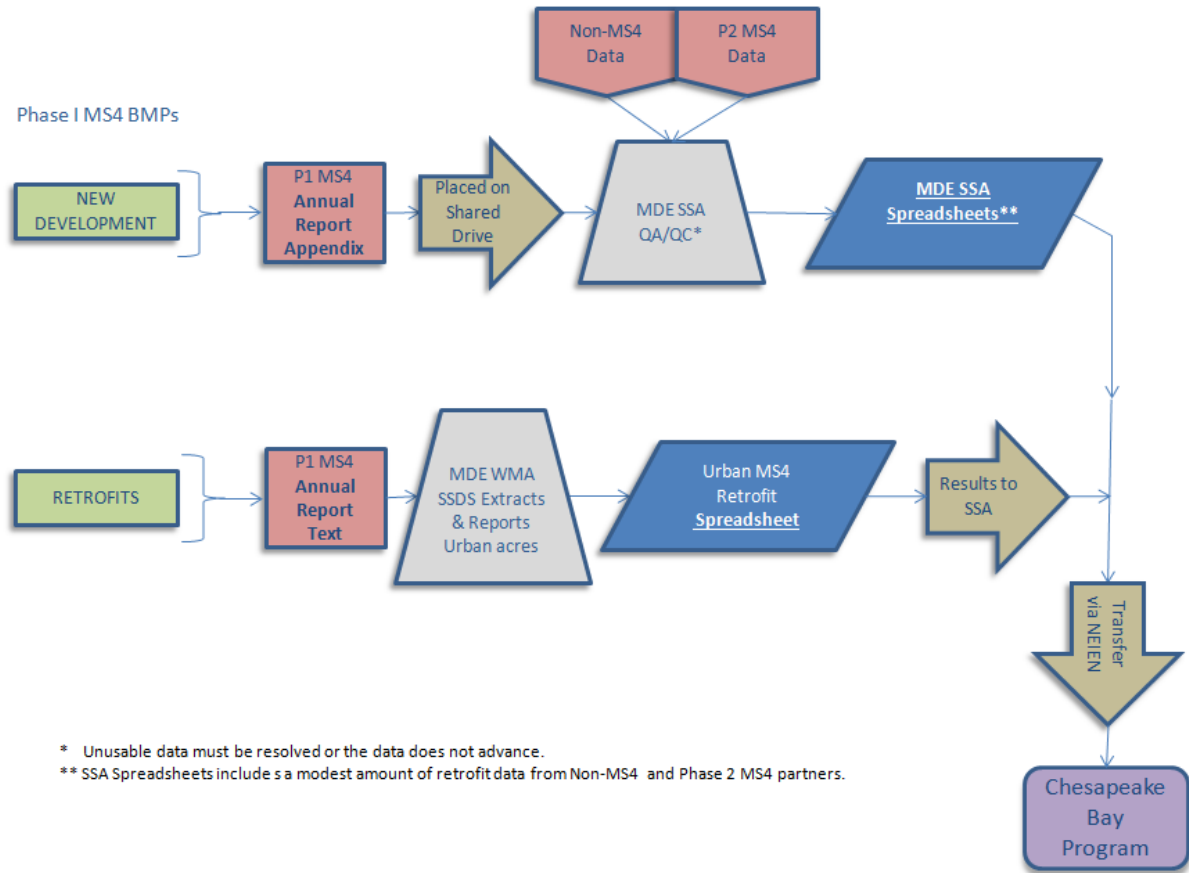
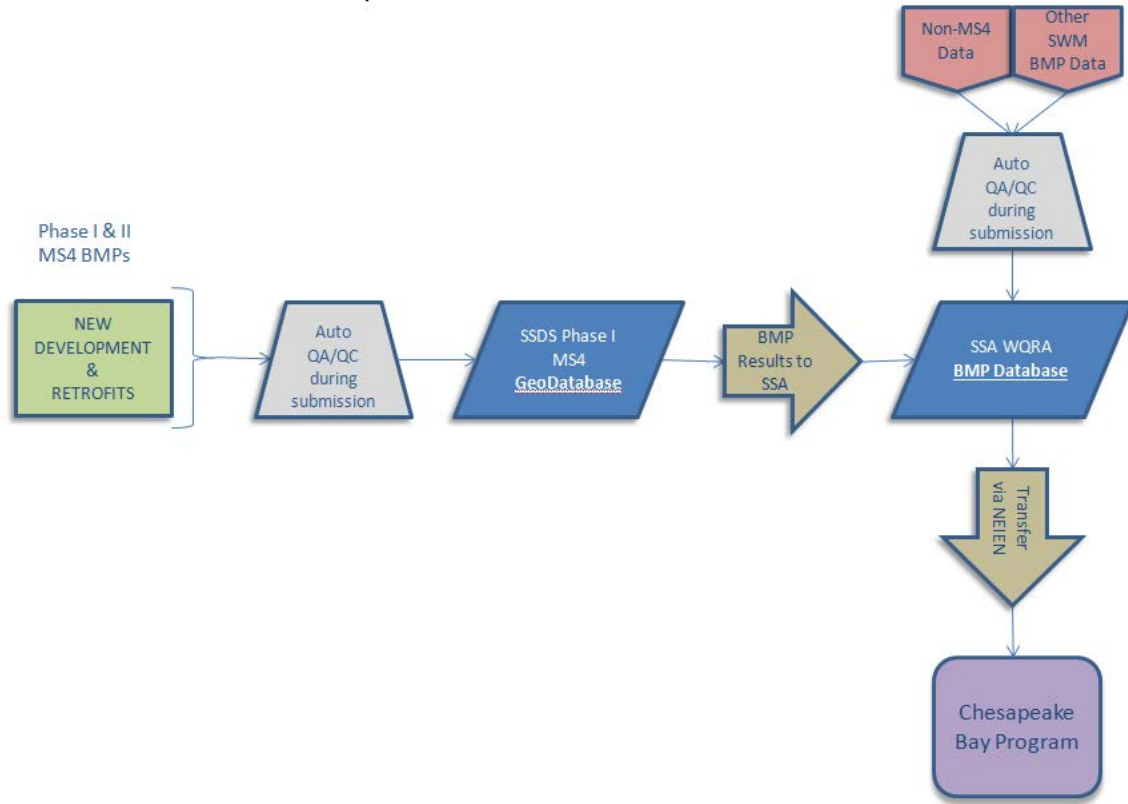


Figure 5. Future Reporting to Chesapeake Bay Program using SSDS Geodatabase Input Tool



## Appendix B – Urban BMP Definitions with new CBPO Names and mapping

(Updated to reflect how BMPs are mapped in NEIEN)

Structural BMPs				
Structure Type	Code	Structure Function	Chesapeake Bay Program Classification P6 (Units)	New Performance Standard BMP Type (unit)
Artificial Wetlands (See Shallow Marsh also)	SM	A structure with a permanent shallow pool planted with wetland vegetation often designed to provide extended detention.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)
Attenuation swale or dry swale	SW	Open drainage channel designed to detain and promote the filtration of stormwater runoff through underlying fabricated soil media (see Grassed Swale or SW).	Filtering Practices (acres)	Stormwater Treatment (Volume)
Bio-retention	BR	Landscape designed such that stormwater runoff collects in shallow depressions before filtering through fabricated planting soil media .	Filtering Practices (acres)	Stormwater Treatment (Volume)
Check Dam	CD	A small dam constructed in a gully or other small waterway to decrease flow velocity (by reducing the channel gradient), minimize scour, & promote deposition of sediment.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Detention Structure (Dry Pond)	DP	Designed to store runoff without a permanent pool.	Dry Detention Ponds & Hydrodynamic Structures (acres)	NA
Dry Well	DW	An infiltration trench variant designed to exclusively accommodate rooftop runoff.	Dry Well (acres)	Runoff Reduction (Volume)
Extended Detention Structure (Two types):	ED	Designed to temporarily detain a portion of runoff for 24 hrs after a storm using a fixed orifice to regulate outflow at a specific rate, allowing solids & associated time to settle out.	Dry Extended Detention Ponds (acres)	NA
Extended Detention Structure, Dry	EDSD	Designed for the temporary storage of runoff associated with at least a 24 hr 1-year storm without creating a permanent pool of water.	Dry Extended Detention Ponds (acres)	NA
Extended Detention Structure, Wet	EDSW	Designed for the storage of runoff associated with at least a 24 hr 1-year storm. The detained water drains partially & the remaining portion creates a permanent pool .	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)
Filter Strip	FS	Vegetated land designed to intercept sheet flow from upstream development.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Flow Splitter	FISp	Hydraulic structure designed either to divert a portion of stream flow to a BMP located away from a channel, direct stormwater to a parallel pipe system or bypass a portion of base flow around a pond .	Not a WQ BMP	NA
Flood Management Area	FLOOD	10 year storm overbank flood protection	Not a WQ BMP	NA
Forebay	FOREBAY	Storage structure adjoining a SWM BMP inlet designed to trap coarse sediments and thereby lessen their accumulation in the main treatment area .	Dry Detention Ponds & Hydrodynamic Structures (acres)	NA

Gabion	GABION	A large rectangular box made of heavy gauge wire mesh which holds cobbles and boulders for changing stream flow patterns, bank stabilization, and erosion control.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Grass Swale	SW	Open vegetated channel used to convey runoff and provide treatment by filtering pollutants and sediment.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Hydrodynamic Structure such as: 1) Oil grit separator 2) Bay Saverã 3) Stormceptorã	OGS BS SC	An engineered structure used to separate sediments and oils from stormwater runoff using gravitational separation and/or hydraulic flow.	Dry Detention Ponds & Hydrodynamic Structures (acres)	NA
Infiltration Basin	IB	Designed to allow stormwater to infiltrate into permeable soils. It differs from a retention structure in that it may include a back-up underdrain pipe to ensure eventual removal of standing water.	Infiltration Practices (acres)	Runoff Reduction (Volume)
Infiltration Trench (Three types):	IT	An excavated trench that has been backfilled with exposed or unexposed stones to form an underground reservoir (Also see Dry Well).	Infiltration Practices (acres)	Runoff Reduction (Volume)
Complete Exfiltration	ITCE	Runoff can only exit the trench by exfiltrating through the stone reservoir into the underlying soil		
Partial Exfiltration	ITPE	Runoff exits the trench by exfiltrating a) through the stone reservoir into the underlying soil, and b) via a perforated underdrain at the bottom of the trench that diverts runoff to a central outlet.		
Water Quality Exfiltration	ITWQE	Storage volume is set to receive only the first ½" of runoff (first flush) from an impervious area of the watershed.		
Landscape	LANDSCAPE	Impervious area reduction.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Level Spreader	LS	A device for distributing stormwater uniformly over the ground surface as sheet flow to prevent concentrated, erosive flow and promote infiltration.	Not a WQ BMP	
Micropool (Reported by various jurisdictions before the standardization of codes)	MP	A smaller permanent pool used in a stormwater pond to mitigate the thermal impacts of a larger pond, impacts on existing wetlands, or compensate for lack of topographic relief.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)
Observation well	OBS_WELL	A test well installed in an infiltration trench to monitor draining time after installation.	Not a SWM BMP – Observation Well	NA
Other	OTH	A stormwater facility that is known to have been implemented but whose type cannot definitively be identified at the time of submitting a Notice of Completion report to MDE.Construction	Defaults to Dry Detention Ponds & Hydrodynamic Structures (acres), evaluated as the least efficient class of facilities in removing	NA
Porous Pavement	PP	A porous asphalt surface designed to have bearing strength similar to conventional asphalt but provides a rapid conduit for runoff to reach a subsurface stone reservoir.	Infiltration Practices (acres)	Runoff Reduction (Volume)
Retention Pond (See Wet Pond/WP)	WP	A structure with a permanent pool of water for treating incoming storm runoff.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)

Sand Filter	SF	A bed of sand to which the first flush of runoff is diverted. Water leaving the filter is collected in underground pipes & returned to a waterway. A layer of peat, limestone, and/topsoil may be added to improve removal efficiency.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Shallow Marsh	SM	A structure with a permanent shallow pool planted with wetland vegetation often designed to provide extended detention.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)
Underground Storage	UGS	Vault like structure designed for the temporary storage of storm flow.	Dry Detention Ponds & Hydrodynamic Structures (acres)	NA
Vegetated Buffer	VB	A vegetated protective zone of variable width located along both sides of a waterway.	Filtering Practices (acres)	Stormwater Treatment (Volume)
Water Quality Inlet	OGS	See Hydrodynamic Structure-Oil Grit Separator.	Dry Detention Ponds & Hydrodynamic Structures (acres)	NA
Wet Pond	WP	A structure with a permanent pool of water for treating incoming storm runoff.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)

Environmental Site Design Practices				
Practice Type	Code	Function	Chesapeake Bay Program Classification P6 (Units)	New Performance Standard BMP Type
Environmental Site Design -- alternative surfaces, non-structural and micro-scale practices may be grouped as a comprehensive stormwater design system and identified singly as ESD.	ESD	A comprehensive design strategy for maintaining predevelopment runoff characteristics and protecting natural resources is available. This strategy relies on integrating site design, natural hydrology, and smaller controls to capture and treat runoff.	Stormwater to the MEP (Not currently CBPO Practice)	NA
Alternative Surfaces				
Green Roof	ESDGR	Alternative surface used in place of traditional flat or pitched roofs to reduce runoff.	Green Roofs (acres)	Runoff Reduction (Volume)
Permeable Pavements	ESDPERMP	Any of the available materials that are used to replace traditional pavements (e.g., asphalt, concrete) and reduce runoff.	Permeable Pavement (acres)	Runoff Reduction (Volume)
Reinforced Turf	ESDRTRF	Grassed or gravel area with open, load-bearing matrix for structural integrity.	Green Parking Lot (acres)	Runoff Reduction (Volume)
Nonstructural Practices				
Disconnection of Rooftop Runoff	ESDRTD	Rooftop runoff is disconnected and then directed to a pervious area where it either infiltrates or is filtered.	Disconnection of Rooftop Runoff (acres)	Runoff Reduction (Volume)
Disconnection of Non- Rooftop Runoff	ESDNRTD	Runoff from surface impervious areas is disconnected and then directed to a pervious area where it either infiltrates or is filtered. Examples: Overland sheet flow, permeable pavers, rain gardens and small scale filters.	Still under panel review	NA

Sheetflow to Conservation Areas	ESDSFNAC	Runoff is discharged to a natural conservation or buffer area (e.g. stream buffers, forest buffers) through overland flow.	Vegetated Treatment Area (acres)	Stormwater Treatment (Volume)
<b>Micro-Scale Practices</b>				
Rainwater Harvesting	ESDRH	These practices intercept and store rainfall for future use.	Cisterns & Rain Barrels (acre & count)	Runoff Reduction (Volume)
Submerged Gravel Wetlands	ESDSGW	Small-scale filter using wetland plants and a gravel media to provide treatment.	Wet Pond & Wetlands (acres)	Stormwater Treatment (Volume)
Landscape Infiltration	ESDIL	Combination of landscape features with infiltration practices.	Infiltration Practices (acres)	Runoff Reduction (Volume)
Infiltration Berms	ESDIB	Series of small berms used in sloped areas to detain, infiltrate, and filter runoff.	Infiltration Practices (acres)	Runoff Reduction (Volume)
Dry Wells	ESDDW	An infiltration trench variant designed to exclusively accommodate rooftop runoff.	Dry Well (acres)	Runoff Reduction (Volume)
Micro-Bioretention	ESDMB	Small, vegetated filter used to capture and treat runoff from adjacent impervious areas.	Bioretention (acres)	Runoff Reduction (Volume)
Rain Gardens	ESDRG	Shallow landscaped feature used to detain and filter runoff and used primarily in residential applications.	Rain Garden (acres)	Runoff Reduction (Volume)
Swales	ESDSW	Channels that provide conveyance, water quality treatment and flow attenuation of runoff. Variants include the grassed swale, bio-swale, and wet swale.	Dry Swale, Bioswale, Vegetated Open Channel (acres)	Runoff Reduction (Volume)
Enhanced Filters	ESDEF	A modification applied to other filters that increase nutrient removal and groundwater recharge.	Filtering Practices (acres)	Stormwater Treatment (Volume)

<b>Alternative MS4 BMPs</b>				
Practice Type	Code	Description	Chesapeake Bay Program Classification P6 (Units)	New Performance Standard BMP Type
Mechanical Street Sweeping	MSS	Removes the buildup of pollutants that have been deposited along the street or curb using a mechanical sweeper truck	Street Sweeping (Acre, Feet, LBS or TONS)	NA
Regenerative/Vacuum Street Sweeping	VSS	Removes the buildup of pollutants that have been deposited along the street or curb using a vacuum-assisted sweeper truck	Street Sweeping (Acre, Feet, LBS or TONS)	NA
Nutrient Management	NM	Comprehensive nutrient management plan for reducing and or eliminating fertilizer use	Urban Nutrient Management (acres)	NA
Grass/Meadow Buffers	GMB	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by infrequently-mowed grass, meadow flora species, and other vegetation that is adjacent to a body of water	Urban Grass/Meadow Buffers (acres)	NA
Forest Buffers	FB	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	Urban Forest Buffers (acres)	NA
Impervious Surface Elimination (to Pervious)	IMPP	Pollutant load reduction expected when land cover is converted from impervious to pervious	Reduction of Impervious Surface (acres)	Runoff Reduction (Volume)

Impervious Surface Elimination (to Forest)	IMPF	Pollutant load reduction expected when land cover is converted from impervious to forest	No Specific CBPO BMP, (Tree Planting as surrogate?)	Runoff Reduction (Volume)
Planting Trees or Forestation on Pervious Urban	FPU	100 trees per acre or greater is necessary with at least 50% of the trees being 2 inches or greater in diameter at 4 ½ feet above ground level (an aggregate of smaller sites may be used)	Tree Planting (acres)	NA
Catch Basin Cleaning	CBC	Routine cleanouts performed on targeted infrastructure that have high accumulation rates	Street Sweeping (LBS or TONS)	NA
Storm Drain Vacuuming	SDV	Routine vacuuming performed on targeted infrastructure that has high accumulation rates	Street Sweeping (LBS or TONS)	NA
Stream Restoration	STRE	Stream restoration includes re-establishing a stable channel; reconnecting the stream with the floodplain; introducing habitat features such as step-pools, woody debris, or riparian vegetation; and integrating structural approaches such as rock walls or riprap.	Stream Restoration Urban	NA
Shoreline Stabilization	SHST	These practices apply to the shoreline of the Chesapeake and Atlantic Coastal Bays and tidal rivers. Nonstructural practices or living shorelines include tidal marsh creation and beach nourishment; structural practices include stone revetments, breakwaters, or groins.	Urban Shoreline Management	NA
Septic Pumping	SEPP	Implementation of septic system pumping	Septic Tank Pumpout	NA
Septic Denitrification	SEPD	Implementation of enhanced denitrification technology	Septic Denitrification	NA
Septic Connections to WWTP	SEPC	Removal of septic system and waste stream connection made to a waste water treatment plant.	Septic Connection to WWTP	NA
Education	EDU	Education	To Be Determined	NA
Sub-Soiling	SUB	Sub-Soiling	To Be Determined	NA
Trash Removal	TRA	Trash Removal	To Be Determined	NA
Pet Waste Management	PET	Pet Waste Management	To Be Determined	NA
Outfall Stabilization	OUTS	Outfall Stabilization	To Be Determined	NA
Floodplain Restoration	FPRES	Floodplain Restoration	To Be Determined	NA
River Bank Stabilization	RBS	River Bank Stabilization	To Be Determined	NA
Bio-Reactor Carbon Filter	BRCF	Bio-Reactor Carbon Filter	To Be Determined	NA
Disconnection of Illicit Discharges	DID	Disconnection of Illicit Discharges	To Be Determined	NA
Step Pool Storm Conveyance	SPSC	Step Pool Storm Conveyance; if used as a filtration practice, the pollutant removal efficiencies for micro-bioretenion can be applied to the drainage area treated.	Regenerative Stormwater Conveyance	Runoff Reduction (Volume)



## Appendix C –Links to Maryland Approved/Draft QAPPs and Additional Verification Documentation

### **Agriculture** [Back to Overview](#)

Maryland Department of Agriculture’s Draft [2015 QAPP](#)

### **Forestry**

Maryland Department of Natural Resources [2011 QAPP](#)

### **Urban**

Maryland Department of the Environment Water Management Administration (MDE – WMA) [Standard Operation Procedures for Stormwater and Erosion and Sediment Control](#)

MDE - WMA [2012 Geodatabase QAPP](#)

MDE – WMA [2014 ICIS \(WWTP permits\) QAPP](#)

### **Data Transfer**

MDE – Science Services Administration [2015 ENR \(WWTP\) Data Processing QAPP](#)

MDE – Science Services Administration [2015 NEIEN QAPP](#)

## Appendix D – Jurisdictional Urban and Forestry Verification Protocol Design Tables

( **Red text** indicates potential deficiencies in the protocols or documentation of protocols) \*\*\*Agricultural Practice Tables can be found in the MDA Draft QAPP\*\*\*

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (Is BMP there?)				E. Follow-up Check (Is 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		
Low	Urban: Erosion and Sediment Control	Erosion and Sediment Control	Physical Inspection: <a href="#">COMAR 26.17.01.11</a> references <a href="#">2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control</a> as the official guide for E&SC principles, methods, and practices.	The appropriate enforcement authority shall inspect sites with an approved erosion and sediment control plan an average of once every 2 weeks for compliance with the approved plan.	MDE-delegated Jurisdictions. Currently 14 counties & 10 municipalities are delegated by MDE.  Training and certification requirements are in <a href="#">COMAR 26.17.01.06</a> .  Online Training for inspectors found <a href="#">here</a> .	E&SC document shows that information documented in <i>DA Tracking Spreadsheet</i> and <i>E&amp;SC Inspection &amp; Enforcement Data Sheet</i> . BMP-VG does not list specific data recommendations.	Follow-up inspections follow the same methodology as the initial inspection.  The appropriate enforcement authority shall inspect sites with an approved erosion and sediment control plan an average of once every 2 weeks for compliance with the approved plan.	NA – All BMPs are inspected per state law at various stages in construction	COMAR 26.17.01.09 Describes the process for violations found during inspections and complaints. Enforcement actions can include a corrective action plan, stop work order, penalty/fine, or legal action.	BMP is removed upon final inspection, release of ESC performance bond or expiration of the permit.	Data is collected from the delegated SCD and submitted to MDE using the <i>DA Tracking Spreadsheet</i> .  Data is tied to the NPDES permit number, so is not double-counted. WMA maintains a database of NOI permits. Sends summary to SSA for submission to NEIEN. MDE currently working on improving the reporting system.
High	Stormwater	Varies	Physical Inspection:  Inspections shall be conducted by county or municipal staff or certified by a professional engineer licensed in the State.	Frequency is determined by construction stage and practice type. <a href="#">COMAR 26.17.02.10</a>	Inspections shall be conducted by certified county or municipal staff or certified by a professional engineer licensed in the State.	Phase I MS4 entities document BMP activities (installations and inspections) in a geodatabase as part of their annual report requirements. A list of required information is included in Appendix A of their Phase I MS4 permit.	The local jurisdiction is responsible for the follow-up BMP inspections.  All BMPs are to be inspected every three years per state law. <a href="#">COMAR 26.17.02.03</a>	NA – All BMPs are inspected per state law every 3 years	If the BMP is not operational, load reduction and impervious area treated credits are not given to the reporting entity until the facility is repaired.	According to CBPO guidance, all stormwater practices that provided record of inspection and maintenance under the verification guidelines will continue to receive credit.  If not inspected, it will be	A list of required information is included in Appendix A of their Phase I MS4 permit.  Phase II MS4 entities report Notice of Construction Completion forms and excel spreadsheets.  MDE SSA staff performs an independent verification of the data that is submitted in the geodatabase. This review includes standardizing site descriptions and addresses, spell-checking, removing non-built BMPs, general location check, verifying valid land

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (Is BMP there?)				E. Follow-up Check (Is 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		
						Notice of Construction Completion (NOCC) forms are required for all new Stormwater facilities in the State <a href="#">COMAR 26.17.02.10.G</a>				removed from the submission.	use code and other values/codes, and identifying missing or unclear information. MDE performs site visits on select on sub-sample of large projects.
Low	Homeowner and NGO	Varies	Physical Inspection	Once	Jurisdiction or trained volunteer staff  For BMPs installed under a DNR grant, either DNR staff, engineers, or specialists perform the BMP inspections.	<a href="#">S.M.A.R.T. Tool</a>  Final reports are required for BMPs installed under a DNR grants or loans. These reports include pictures, BMP location, and BMP units.	For BMPs installed under a DNR grant, there are varying requirements on follow up inspections; most require maintenance for 5 years.	NA – All BMPs must be inspected for credit	Local jurisdiction notified by inspector	Removed from submission if not inspected and maintained	<a href="#">S.M.A.R.T. Tool</a>  Final reports are required for BMPs installed under a DNR grants or loans. These reports include pictures, BMP location, and BMP units.
Medium	Urban Nutrient Management	Urban Nutrient Management	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed	Documentation being constructed
High	WWTP ENR Upgrade	ENR	Municipal and industrial wastewater- BMP verification is not a component of this document. The document pertains to how DMR and MOR data are recorded and stored, rather than BMP inspection	Documentation being constructed	MDE Water Management Administration (WMA)	Documentation being constructed	Documentation being constructed	NA – Annual Discharge Monitoring Reports provide flow and Nutrient Concentrations	Documentation being constructed	Documentation being constructed	Wastewater- major, minor, and industrial facilities- no GW, water treatment, or formerly municipal facilities. BMP verification is not a component of this document.  Permits will need to be reviewed for sampling training, procedures and frequency.

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection <i>(Is BMP there?)</i>				E. Follow-up Check <i>(Is BMP still there?)</i>			F. Lifespan/ Sunset <i>(Is the BMP no longer there?)</i>	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects?	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
			Compliance Sampling Inspection (CSI) or Compliance Evaluation Inspection (CEI), or Performance Audit Inspections (PAI).								
Medium	BAT for OSDS	Septic Denitrification	Physical Inspection	Once	BAT service providers perform the inspection. They have MDE certification on BAT systems and certification from the manufacturer of the system being installed. <a href="#">The certification can be revoked by MDE. (COMAR 26.04.02.07.D)</a>	A certified service provider is required to report inspection and O&M activities to MDE yearly.  Initial documentation includes location of the system, the date of installation, and type of system.  MDE keeps a database of O&M records that are submitted to MDE.	The BAT systems are verified annually.  MDE performs a database search every quarter to identify BATs that do not have the required once a year O&M visit by a qualified provider.  MDE performs a random audit of at least 10% of a county's BATs.	NA – All systems must be inspected and maintained annually	During an MDE audit, if the information is in conflict with information from the service provider, other work from that provider may come under greater scrutiny. The documentation details what MDE staff is to do if they find problems onsite.	If system is not inspected and maintained, or removed, it will be removed from the submission	BAT installers provide MDE with a report.  MDE maintains for BMP installations. MDE keeps a database of O&M records that are submitted to MDE.  SSA
Low	n/a	Septic Pumping	There is no documentation on this BMP.	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP	There is no documentation on this BMP
Medium	Riparian Forest Buffers on urban land	Structural/management	Acres of trees planted adjacent to streams, shorelines, or other waterways out to 300 feet in	Documentation in Development	Documentation in Development	RFB tracking sheets	DNR forestry staff follows up with survival checks	Documentation in Development	Reinforcing planting where needed	Eventually BMP will be sunset as forest when new aerial overlays are	Performed by RFB coordinator.  Double-counting is avoided at the State level by counting the MDA acreage for CREP/CP-22, and reporting non-CREP acreage

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection <i>(Is BMP there?)</i>				E. Follow-up Check <i>(Is BMP still there?)</i>			F. Lifespan/ Sunset <i>(Is the BMP no longer there?)</i>	G. Data QA, Recording & Reporting
			Method	Frequency	Who inspects?	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem		
			areas deemed urban. 200 trees/ac							used in the model land use.	to MDE from the DNR Forest Buffer Database.
Low?	Ag Forest	Structural/management	Acres of trees planted adjacent to streams, shorelines, or other waterways out to 300 feet outside of urban areas; can include areas where existing trees are adjacent to water but buffer is less than 35 feet in width.	Documentation in Development	Documentation in Development	RFB tracking sheets	Documentation in Development	Documentation in Development	Documentation in Development	Eventually BMP will be sunset as forest when new aerial overlays are used in the model land use.	
Low?	Forest Harvesting	Structural/management	Onsite inspection, acreage from GIS, timber sales	Follow-up checks not explicitly ID'd, but permits are valid for 2 years	Regional Foresters and Project Managers	Grantee responsible for submitting information for Ches Bay progress runs and subject to MDE or MDA verification procedures.	Follow-up checks not explicitly ID'd, but permits are valid for 2 years- assume same method as original	Documentation in Development	Documentation in Development	BMP is removed upon final inspection, release of ESC performance bond or expiration of the permit.	Grantee responsible for submitting information for Ches Bay progress runs and subject to MDE or MDA verification procedures.  Tracked through State land harvesting, quarterly reports from project foresters through the PMAS activity reporting system, and when available, summaries from Soil Conservation District reports.

**A. WIP Priority:** What relative priority is the BMP type in the jurisdiction's WIP in terms of contribution to needed nutrient and sediment pollutant 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 costshare 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 other type of BMP 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 Source Sector/Habitat Workgroup's BMP Verification 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 Source Sector/Habitat Workgroup's BMP Verification Guidance?
- **Who inspects:** Who conducts the initial inspection? Is the jurisdiction following the recommended inspection personnel qualifications for the BMP type in the Source Sector/Habitat Workgroup's BMP Verification Guidance?
- **Documentation:** What type of documentation is recorded for the BMP? Is there specific data recommended to be collected for the BMP type by Source Sector/Habitat Workgroup's BMP Verification Guidance?

**E. Follow-up Check:** Is a system in place to confirm that the BMP is still there and operational some time after initial inspection as specified by Source Sector/Habitat Workgroup's BMP Verification Guidance? The follow-up check may be accomplished by methods recommended in the Source Sector/Habitat Workgroup's BMP Verification Guidance such as: a second in-person visit to the BMP; a spot check of a statistically valid sub-sample; etc.

- **Follow-up Inspection:** Is the follow-up check conducted using the recommended Source Sector/Habitat Workgroup's BMP Verification 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 be translated for reporting a specific number/aerial 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 lifespan 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 the additional steps taken by the jurisdictions to properly receive credit?