A. Program Management and Information/Data Quality Objectives

A1. Title Page

Virginia Department of Environmental Quality
Office of Ecology's Chesapeake Bay Program

Commonwealth of Virginia's Verification Quality Assurance Project Plan for Managing and Reporting BMP Data to the U.S. EPA - Chesapeake Bay Program Office

Effective Date	December 2, 2024
Period of Applicability	July 1, 2023 - June 30, 2024
Revision/version control information	[DCN] 240370

A2. Approval Page

Concurrence

Project Managers

Name: William Keeling Organization: Virginia Department of Environmental Quality	Signature: *William G Keeling* Date: 2/11/2025
Name: Megan Sommers Bascone Organization: Virginia Department of Environmental Quality	Signature: *Megan Sommers Bascone* Date: 2/10/2025

Senior Manager

Name: Bryant Thomas Organization: Virginia Department of Environmental Quality	Signature: *Bryant Thomas* Date: 2/10/2025

Project Quality Assurance Manager

Name: Kevin McLean Organization: Virginia Department of Environmental Quality	Signature: *Kevin McLean* Date: 2/10/25

EPA Project Officer

Name: Erin Chapman Organization: Chesapeake Bay Program Office	Signature: *Erin Chapman* Date: 2/12/2025

Approval

EPA Region 3 Delegated Approving Official[1]

Name: Durga Ghosh Organization: Chesapeake Bay Program Office/United States Geological Survey	Signature: Durga Ghosh Digitally signed by DURGA GHOSH Date: 2025.02.24 16:36:48 -05'00' Date: 02/24/2025

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[1] Note: This approval action represents EPA's determination that the document(s) under review comply with applicable requirements of the EPA Region 3 Quality Management Plan and other applicable requirements in EPA quality regulations and policies. This approval action does not represent EPA's verification of the accuracy or completeness of document(s) under review, and is not intended to constitute EPA direction of work by contractors, grantees or subgrantees, or other non-EPA parties.

A3. Table of Contents, Document Format, and Document Control

Document Control

This table shows changes to this controlled document over time.

Table A3-1 QAPP Versions

DCN Version	Changes	Effective Date
240370	Reformatted and organized doc to meet new EPA standards for QAPPs DEQ Point Source QAPP was converted to a SOP and is included as Appendix 7 All appendices renumbered and all hyperlink references to appendices updated Updated sentence tenses to reflect shift from current to past tense for older revisions All acronym references updated, as needed All hyperlinks updated References of DCR QAPP changed to DCR SOP throughout Page 1: Updated period of applicability and version control info Page 4: Rearranged section A3 to meet standards Page 13: Updated staff POCs Page 15: Updated EPA project roles Page 23: Updated to non-direct measures for tillage survey Page 24: Added Waste Storage to Table B7-1 Page: 26: Added IIJA/BIL project related information Page 31: Linked to DOF SOP Page 33: Updated to include OLAP permit data for waste storage facilities BMPs Page 38: Updated DOF language regarding inspections for riparian forest buffers Page 41: Updated links stormwater codes to reflect recent VA code changes Page 45: Updated VDH language regarding inspection Page 46: Updated VDH database name for AOSS Page 47: Updated VDH language regarding training Page 57: Deleted references to AMR BMP Page 61: Updated verification group for AWMS practices Appendix 2: Updated to reflect changes to protocols where needed Appendix 6: Added description for preparation of USDA practice code 313 Waste Storage Facility BMP data Appendix 7: Inserted equivalent nutrient load definition, updated reporting dates, added methodology for estimated nutrient loads for non-sig facilities, added P species in Table 2, added values for <QL or missing data (Table 3), and values for PO4, TON, and TOP parameters (Table 4)	12/02/2024
	Page 1: Updated effective date on Title Page Page 2: Updated Management/Supervisor section of Approval Sheet and acquired DEQ signatures Page 5-6: Updated TOC Beginning on page 13: Updated DOF acronym due to agency's change of official acronym Page 13: Updated contacts in Table 4 Page 32-33: Updated Forestry section Page 35: Updated oyster harvesting paragraph to reflect VMRC's revised procedures. Page 40: Updated language related to PS QAPP to include revised EPA data reporting deadline Page 41-42: Updated onsite septic pump-out information Appendix 1: Updated DEQ organization chart Appendix 4: Removed Livestock Mortality Composting & Poultry Mortality Composting information since no credit is given for these practices All weblinks were reviewed and updated as needed including links to DCR's 2023 QAPP	12/01/2023
	Page 1: Updated effective date on Title Page Page 2: Updated Management and Quality Assurance Officer section of Approval Sheet Page 4-5: Updated TOC to include hyperlinks	02/08/2023

DCN Version	Changes	Effective Date
	Beginning on page 4: Added captions and numbers to tables throughout the document. Added relevant references to tables in the associated text. Page 7-8: Revised table to meet agency accessibility standards Page 9: Updated all DEQ staff and EPA Project Officer information Page 9: Updated DEQ staff roles Page 9: Updated DEQ BMP Verification website information Beginning on page 9: Replaced references to NEIEN throughout to reflect proper acronym (EN) Page 12: Updated agency acronyms, web links and POCs in Table 4 Page 16: Updated tillage practices information in Section B9 Page 18: Updated agency acronyms in Table 6 Page 20: Updated Section B10.3 to include additional QA/QC information Page 24: Updated agency acronyms and web links in Table 7 Page 29: Inserted reference to response party for cover crop inspections Page 31-32: Updated types of agricultural and urban sector BMPs reported to DEQ from DOF and included additional information for urban tree planting. Deleted outdated urban tree canopy information. Page 40-42: Updated Wastewater, CSO and Onsite section to include update and link for VPDES QAPP, revised information for VDH programs/BMPs Appendix 1: Updated DEQ organization chart Appendix 3: Updated formatting, added clarifying points to several BMPs, revised Urban Nutrient Management Certified Applicator information. Added reference to newly reported floating treatment wetlands BMPs to Table 2 – Urban. Appendix 4: Reformatted tables and added manure incorporation and injection information Appendix 5: Updated Urban Nutrient Management Certified Applicator information Appendices 7: Replaced original Appendix 7 with DEQ NPS BMP QA/QC Summary and removed Sector Specific Questions from Verification Program Plan Evaluation Form	
	Page 1: Updated title page to meet EPA standards Page 2: Updated signature page to meet EPA standards Page 3: Updated TOC Page 7: Updated distribution list and section A4 Page 9: Updated last 2 paragraphs (Section A5) Page 11: Updated data source table with new contact info for agency POCs Page 12: Updated first paragraph of page (Section A6) Page 13: Updated first paragraph of page (Section A7) and DEQ website link in A8, paragraph two Page 15: Updated Section B9 Page 16: Updated Section B9 Page 17: Updated table row regarding DOF practices Page 19: Updated Section B10.3 Page 20: Updated Section B10.3 Page 23-24: Updated QA Documentation Links for DCR, DOF and DEQ Page 27 and 30: Updated DCR SOP link in D2 agriculture section Page 34: Natural Sectors section paragraph 5 to reflect current info Page 35: Updated DEQ links in D2 Urban for E&S and Stormwater and added new link to list of MS4 permittees to replace the list in Appendix 8. Page 38: Updated link for VCAP Program Manual Page 39: Updated link for DEQ Stormwater Assistance Fund (SLAF) Guidelines Pages 44 and 45: Updated DEQ organizational chart Removed Appendix 8 – information now available via web link on page 35	12/01/2021

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Document Format

This Quality Assurance Project Plan (QAPP) was developed in accordance with the U.S. EPA Quality Assurance Project Plan Standard. The order of the elements in this QAPP follows the Standard, as seen in the Table of Contents. The QAPP is also in accordance with the U.S. EPA Region 3 Quality Management Plan, DCN R3QMP001-20200601.

A4. Project Purpose, Problem Definition, and Background

Purpose and Problem Definition

In 2014, the Chesapeake Bay Program partnership approved the Verification Framework which 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" and adopted five principles to guide partners' efforts as they build on existing local, state and federal practice tracking and reporting systems and make enhancements to their verification program (Table A4-1).

Table A4-1. Five Principles of Verification Framework

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 and defensible, 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 significance of or 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 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 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.

Background

The Partnership agreed that the documentation of each jurisdiction's Best Management Practice (BMP) verification program would build directly upon their existing QAPP, a standing requirement for recipients of Chesapeake Bay Implementation Grants and Chesapeake Bay Regulatory and Accountability Grants. The Virginia Department of Environmental Quality (DEQ) and other agencies (see A5 for a complete list) coordinate to generate pollution reduction tracking data. This document describes the various sources of data, the quality assurance measures taken to acquire and report that data, and the procedures DEQ uses to compile and assure data quality prior to submission to EPA-CBP.

DEQ is responsible for reporting annual NPS implementation activities, including a digital transfer of NPS BMP information across all NPS sectors via the EN. DEQ is also responsible for transmission of annual wastewater data directly to the EPA-CBP. DEQ assumed responsibility for the NPS reporting in 2013. Prior to that, the responsibility was with the Department of Conservation and Recreation (DCR).

The EPA, in conjunction with other EN Partners, including the Chesapeake Bay Program partnership, has developed an NPS BMP eXtensible Markup Language (XML) schema that provides a standardized structure and format for the data reporting elements for transmission via the EN. An EN Node is in place at DEQ that enables a direct, digital transfer of the NPS information. The EPA-CBP creates annual progress scenarios using the provided data. The Chesapeake Assessment Scenario Tool (CAST) is used to estimate the anticipated reductions in nitrogen, phosphorus and sediment loadings to Chesapeake Bay and its tidal tributaries. The resulting information, model outputs, are used along with other lines of evidence to assess progress towards meeting the Chesapeake Bay Total Maximum Daily Load (TMDL), as well as the goals outlined in Virginia's Watershed Implementation Plans and Two-year Milestones.

Other QA Documents

- Standard Operating Procedures (SOP) for Managing and Reporting Agricultural Non-Point Source Data to Virginia DEQ, SOP for Soil and Manure Testing for Nutrient Management Plan Development, Quality Assurance Project Plan for 2024 BMP Data Submission

- SOP for Virginia Pollutant Discharge Elimination System Permitted Point Source Dischargers in the Chesapeake Bay Watershed (Appendix 7)

A5. Project Task Description

The project objectives are to fulfill EPA-CBP's annual reporting requirements as outlined in the Bay Grant Guidance by supplying annual nutrient reduction implementation data for the period July 1 through June 30 of the reporting year. This data is provided to EPA-CBP for inclusion in the annual watershed model progress evaluations on or before December 1 of each year or as otherwise stipulated in the grant documents. Annual progress reporting from DEQ will include all available non-point source BMP implemented during the previous water year (July 1 through June 30) and any updated information such as new inspections, maintenance, or spot check data on non-annual BMPs previously reported. Progress will also include point source data reported for the previous water year (Appendix 7). With the Verification Framework fully implemented, BMPs with no documented inspection, maintenance or spot checks to confirm continued function will be dropped from the BMP record at the end of their credit duration by EPA-CBP.

All reported BMPs are documented in the most recent version of the National Environmental Information Exchange Network's (EN) NPS BMP CBP Data Flow Appendix A. DEQ will continue to work with EPA-CBPO to keep information in the Appendix up to date.

Table A5-1 lists potential sources of data that may be included in the data capture, aggregation, and reporting associated with this project along with a link to additional details on the programs that drive the implementation of those BMPs that may be reported by the source (see Appendix 1 for a detailed data flow diagram).

BMPs reported through this project have been determined to meet the EPA-CBP BMP definitions. The complete list of Bay Program BMPs, their definitions and information about how they are simulated in the watershed model are available online in the documentation of the Chesapeake Assessment Scenario Tool (CAST). The subset of these BMPS that are commonly reported in Virginia can be found in Appendix 3.

Further information regarding the quality assurance, quality control, and management of these datasets can be found in sections A.6, B.7, and D1 of this document.

Table A5-1. Potential Data Sources

Data Source	BMPs Provided	Point of Contact
DEQ	Urban Stormwater	April Rhodes
DEQ	Wastewater	Erica Duncan
DEQ	Erosion & Sediment Control	April Rhodes
DEQ	Manure Transport	Neil Zahradka
DEQ	319 Nonpoint Source Grant Projects	Justin Williams
DEQ	SLAF/WQIF Grant Projects	Karen Doran
DEQ	Bay Grant Projects	Susan Hale
DCR	Agriculture	James Martin
DCR	Agriculture Nutrient Management	Hunter Landis
DCR	Manure Transport	Hunter Landis (DCR), Neil Zahradka (DEQ)
DCR	Urban Nutrient Management	Gonzalo Ortiz
DCR	Manure Additives	Hunter Landis
Virginia Marine Resources Commission (VMRC)	Oyster Aquaculture	Andrew Button
Virginia Department of Health (VDH)	Septic	Lance Gregory
Virginia Department of Forestry (DOF)	Forest Harvesting Practices	Terry Lasher
Virginia Department of Agriculture and Consumer Services (VDACS)	Voluntary and Resource Improvement Agriculture	Darrell Marshall
VDACS	Certified Fertilizer Applicators	Larry Nichols
Virginia Department of Transportation (VDOT)	Urban Stormwater	Joseph Parfitt
Phase 1 MS4s (11 Local Governments)	Urban Stormwater	Erica Duncan
Phase 2 MS4s (Regulated portions of Cities, Counties, Towns and Federal, State and Municipal Facilities)	Urban Stormwater	Erica Duncan
Bay Act Localities (84 Cities, Counties and Towns)	Septic Pump-out, Erosion & Sediment Control, and Urban Stormwater	Justin Williams
Local Governments (approximately 200 Cities, Counties and Towns)	Urban Stormwater	Kevin McLean
Federal Facilities (approximately 200)	Any	Kevin McLean
Natural Resources Conservation Service (NRCS)	Agriculture	Olivia Devereux
Farm Service Agency (FSA)	Agriculture	Olivia Devereux
Virginia Association of Soil and Water Conservation Districts (VASWCD)	Urban Stormwater	Blair Blanchette
Alliance for the Chesapeake Bay	Urban Stormwater (residential scale)	Jenny McGarvey
National Fish and Wildlife Foundation (NFWF)	Any	Jake Reilly

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

Data Quality Objectives

DEQ seeks to provide EPA-CBP with the highest quality data possible and to ensure practices, treatments and technologies resulting in reductions of nitrogen, phosphorus and/or sediment pollutant loads are implemented and operating as intended through time. The intent of this section is to establish the expected minimum standards for data quality and verification for each class of BMPs. Because this project involves the aggregation of data from many diverse sources, DEQ does not have direct involvement or control over much of the original data collection and reporting. As such, data providers will need to document, and improve as necessary, their QA procedures. DEQ does anticipate ongoing improvements to quality assurance actions through time and acknowledges that this document will experience many iterative changes as a result.

Performance and Acceptance Criteria

DEQ will continually work towards implementing a three-tiered data reporting system that will indicate the level of quality assurance and quality control (QA/QC) associated with a given data source. The first and lowest tier will be comprised of sources that have not provided any documentation to DEQ regarding QA/QC procedures. The second tier will include data sources that have some documented QA/QC procedures, but not an approved QAPP/SOP; this tier may include, for example, regulatory programs that have established protocols for data collection and reporting. The third and final tier will contain sources that have complete and approved QAPP/SOPs. The intent is to move each reporting source through the tiers over time, as appropriate.

When DEQ receives data from any source, there are certain qualitative accuracy and completeness objectives that are implemented at upload of data into the BMP Warehouse online reporting application. All data is reviewed for completeness (required information is present or not) and appropriate formatting that can be readily transferred or modified to allow posting to the EN. Required information includes dates of installation, correct information for BMPs such as proper units, and location information indicating that the implementation occurred within Virginia's Chesapeake Bay drainage. More detailed location information consistent with the functional capabilities of the models, such as Hydrologic Unit, City/County or latitude/longitude, will be used as the data is available and allowable. Examination for

anomalous data is performed as a multi-step process that includes comparison to previous years' reported data to ensure unit consistency. For example, if millions of acres of BMPs are reported instead of typically thousands of acres, or if nothing is reported from a significant data source, efforts will be made to contact the data provider and confirm or revise the data in question. Additionally, during the reporting process, CBP provides error reports indicating records that may have passed EN validation, but fail processing in CAST.

Every attempt is made to contact missing data providers before internal deadlines lapse. If data is received after established deadlines and it is complete and formatted appropriately, every effort is made to include that information in the annual reporting. DEQ continues to work to develop and refine these qualitative accuracy and completeness procedures; updates will be provided in future iterations of the QAPP.

A7. Distribution List

The following individuals in Table A7-1 will receive a copy of this QAPP and any subsequent revisions. A complete copy of the original version and all revisions of the QAPP shall be maintained in the organization's files by the Project Manager and made available to approval authorities upon request. The project roles listed in Table A7-1 are detailed in Section A8.

Table A7-1. QAPP Distribution List and Project Roles

Name	Project Role	Organizational Affiliation
Kevin McLean	Project Quality Assurance Manager	DEQ
William Keeling	Project Manager	DEQ
Arianna Johns	Data Scientist	DEQ
Megan Sommers Bascone	Project Manager	DEQ
Bryant Thomas	Senior Manager	DEQ
Erin Chapman	EPA Project Officer	EPA-CBP
Durga Ghosh	Delegated Approving Official	USGS

A8. Project Organization

Each staff member is individually and ultimately responsible for understanding and adhering to the quality and operation procedures they perform, and for the quality of the data they collect or produce. The responsibilities of personnel involved in project implementation are enumerated below.

The Senior Manager, who has leadership authority for the project, will be responsible for the following activities:

- Oversee resource allocation
- Review and internally approve the QAPP and any other relevant documentation

The Project Manager(s) will:

- Conduct outreach with potential participants, data users, and stakeholders
- Ensure all project personnel are properly trained and/or have the skills to fulfill assigned project tasks
- Oversee participation, data collection, and data analysis tasks, ensuring all protocols and this QAPP are followed
- Issue reports as applicable, including preparing a summary of any data quality issues
- Retain project records according to applicable Agency policy
- Review and approve QAPP and any other relevant documentation
- Distribute final QAPP and any subsequent revisions
- Maintain and amend this QAPP as necessary and notify QAM

The Data Scientist will be responsible for:

- Reading and being very familiar with this QAPP and the related standard operating procedure(s) (SOPs) or methods for any operation they perform
- Ensuring they are properly trained and/or have the skills to fulfill assigned task
- Identifying and reporting to the Project Manager any emerging/unanticipated problems, data anomalies, or other project/data issues
- Annotating the related SOPs for any activity they perform if necessary and permanent changes arise or authoring new SOPs if a gap exists
- Recording, entering, verifying, and validating data as outlined in this QAPP

- Maintaining data and retaining project records in conjunction with the Project Manager and in accordance with applicable Agency policy

The Quality Assurance Manager (QAM) will be responsible for the following activities:

- Reviewing QAPP
- Assessing effectiveness of the QAPP
- Discussing any corrective actions or other quality issues with Project Manager and any relevant staff as applicable
- As necessary, discussing quality-related issues with their organization's Senior Manager, even if outside of their direct supervisory chain

A9. Project Quality Assurance Manager Independence[2]

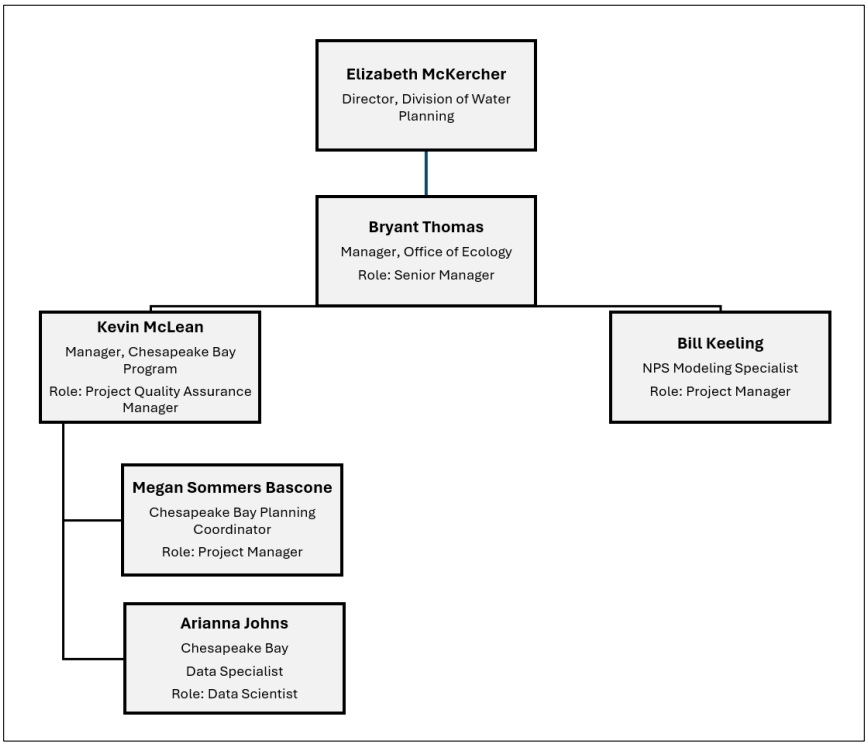
The Project QAM shall be independent of environmental information operations. This independence will be ensured by the QAM not participating in any environmental information collection activities outside of their role of quality oversight. The Project QAM is not required to be independent of senior management who are nominally, but not functionally, involved in operations. The Project Manager or designee will not have authority to sign QAPPs for the QAM or designee, nor will the QAM or designee have authority to sign QAPPs for the Project Manager or designee.

[2] Non-EPA Organizations: The two functions, QA and operations, must remain independent; however, in small organizations outside of EPA and EPA contractors (e.g., small tribal departments), these two functions may be combined with approval from the EPA R3 QAM.

A10. Project Organization Chart and Communications Project Organization Chart

Figure A10-1 reflects the project's organizational structure and roles.

Figure A10-1. Project Organization Chart



Communication[3]

The BMP Warehouse system generates an email to the data provider highlighting the errors and includes an attached spreadsheet detailing the records with errors and the nature of the error(s). Once corrected, the data provider resubmits the dataset (upload template) through the same process.

[3]Non-EPA Organizations: Shall also describe communication procedures to EPA to include elevating discrepancies and QAPP non-conformances.

DEQ staff also fields questions from BMP Warehouse users with concerns throughout the progress year. Changes to the application are communicated to users through email and during the annual webinar.

DEQ staff works with EPA to resolve discrepancies and non-conformance concerns through email correspondence and phone calls. Written communication to confirm resolution actions are encouraged.

A11. Personnel Training/Certification

Training and certification for DEQ internal data are inherent to the regulatory programs from which the data is generated. Information on the training and certification requirements for these programs are included in the sector specific sections of B1 and additional details can be found by following the links in the table in A5. Programmatic training and certification requirements for the external data providers described in B7 are documented in their respective QAPP/SOPs and are summarized in the sector specific sections of B1. Additional details can be accessed, where available, by following the links in the table in A5.

To continue the public education process and communication of these verification expectations, DEQ posts this Verification Program Plan and related updates conspicuously on their Chesapeake Bay Phase III WIP BMP Verification website and provides a copy to all data providers. DEQ will conduct an annual webinar for BMP Warehouse application users to communicate updates to the application, provide tutorials, and field questions. Additionally, EPA has committed to provide verification training (e.g., webinars, meetings) and support the development and distribution of outreach materials, in cooperation with other Bay Program partners.

A12. Documents and Records

Project-Specific Documents and Records

Data providers will need to maintain documentation of their own records. Because this project involves the aggregation of data from many diverse sources, DEQ does not have direct involvement or control over much of the original data collection, management, and reporting to DEQ via the BMP Warehouse application. When DEQ receives data from individual sources it has undergone validation by the application at upload to ensure the reporting entity has provided the correct formats, measures, and units for reporting the BMP installation. Where feasible DEQ ensures appropriate quality assurance and verification protocols are in place for the data provider when establishing them as a source of data. Copies

of all datasets are stored in DEQ's BMP Warehouse application and associated database. The Virginia Information Technology Agency (VITA) backs up all network drives nightly on servers located at their secure facility in Chesterfield County. All data is retained in perpetuity.

QAPP Preparation and Distribution

This QAPP conforms to the format described in the U.S. Environmental Protection Agency publication Quality Assurance Project Plan Standard [Directive No: CIO 2105-S-02.1]. The QAPP shall always govern the operation of the project and must be accessible during operations. Each responsible party listed in Table A7-1 shall adhere to the procedural requirements of the QAPP and ensure that subordinate personnel do likewise.

This QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. In addition, it is expected that ongoing and perhaps unexpected changes may need to be made to the project. Project Managers, QA Staff and other applicable personnel in Table A7-1 shall participate in the review of the QAPP. The Project Manager(s) shall authorize all changes or deviations in the operation of the project. The review and any revisions will be documented. If significant changes need to be made, the QAPP will be sent to the DAO again for approval. Examples of significant revisions include changes in:

1) The scope of the project resulting in new or revised objectives
2) Implementation such as how information will be collected, produced, evaluated, or used
3) The design, construction, operation, or application of environmental technology
4) The statement of work or workplan for extramural agreements
5) Expiration of the QAPP
6) The organization's mission or structure, such as in the delegation status of QAPPs
7) Performance criteria as to how results will be assessed for acceptance

The Project Manager will document the effective date of all changes made in the QAPP and distribute revised versions to all individuals listed in Table A7-1.

Storage

Internal data is stored in DEQ Agency network databases and documents as it is received. These databases are secured and backed up daily on external and network drives, creating a dual redundant

backup of all reported information. These data handling and backup procedures follow state information technology standards. The internal DEQ data for annual BMP reporting is drawn from these sources during the annual progress data collection process. The data is selected based on the date implemented based on the progress year established in the Chesapeake Bay Program Office. Quality assurance checks are conducted to identify and correct any data inconsistencies or outliers. The internal data then proceeds to follow the process described in Section B7.

B. Implementing Environmental Operations

B1. Identification of Project Environmental Information Operations

This section does not apply to this QAPP.

B2. Methods for Environmental Information Acquisition

This section does not apply to this QAPP.

B3. Integrity of Environmental Information

This section does not apply to this QAPP.

B4. Quality Control

This section does not apply to this QAPP.

B5. Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

This section is not applicable to this QAPP. No instruments/equipment are used in the collection of the BMP verification data.

B6. Inspection/Acceptance of Supplies and Services

This section is not applicable to this QAPP. The project scope does not include the acceptance of supplies and services.

B7. Environmental Information Management

Non-direct Measurements

Current data submissions include two classes of BMPs derived from non-direct measurements: Tillage practices and some Urban Nutrient Management. Tillage practices, which include Low Residue Tillage, Conservation Tillage, and High Residue Tillage Management, are based on survey results from Conservation Technology Information Center (CTIC) historically and from a Virginia specific transect tillage survey which began in 2015 and 2016 with a 2022 update and a planned five-year recurrence, conducted by DCR. The results of this tillage survey are loaded into the BMP Warehouse by DCR annually and is expressed as a percentage of the total cropland getting various forms of conservation tillage. Urban nutrient management relies in part on non-directly measured information. VDACS has regulations requiring the certification of commercial fertilizer applicators. The training and certification of these individuals includes elements of Urban Nutrient Management. The resulting certified applicators commit to following turf nutrient management standards on their contracted acreage without having to develop formal nutrient management plans for that land. Commercial Applicators with more than 50 acres under management are required to report to VDACS. These acres are reported as Urban Nutrient Management, just as if they had plans in place and coordinated with DCR in the reporting of total urban nutrient management plan acres.

Data Management: DEQ Internal Data

DEQ internal program data is derived from regulatory requirements or grant programs (Table B7-1). The regulatory programs include expectations of data quality assurance and the use of inspections and audits as a means for verifying them. The grant data is collected in accordance with grant guidance and contractual agreements. These agreements currently include some quality assurance requirements.

Table B7-1. DEQ Programs and Associated BMP Types

DEQ Program	BMP Types
Urban Stormwater (MS4, VSMP, Bay Act, Industrial Stormwater)	Urban Stormwater
Virginia Pollutant Discharge Elimination System (VPDES) Wastewater	Discharge Data
Erosion & Sediment Control	Erosion & Sediment Control
Land Application	Manure Transport, Waste Storage
319 Nonpoint Source Grant Projects	Any
SLAF/WQIF Grant Projects	Urban Stormwater
Bay Grant Projects	Any

Data Management: External Data

Table B7-2 below provides a list of all external data sources that may provide data to DEQ for reporting to EPA-CBP through the EN including the source organization and sector BMP type.

Table B7-2. External Data Sources

Data Source	**BMPs Provided**
DCR	Agriculture
DCR	Agriculture Nutrient Management
DCR	Manure Transport and Manure Incorporation
DCR	Urban Nutrient Management
DCR	Manure Additives
DCR	Shoreline Management
VMRC	Oyster Aquaculture
VDH	Septic
DOF	Forestry Practices
VDACS	Voluntary and Resource Improvement Agriculture
VDACS, DCR	Urban Nutrient Management
VDOT	Urban Stormwater
Phase 1 MS4s (11 Local Governments)	Urban Stormwater
Phase 2 MS4s (Regulated portions of Cities, Counties, Towns and Federal, State and Municipal Facilities)	Urban Stormwater
Bay Act Localities (84 Cities, Counties and Towns)	Septic Pump-out, Erosion & Sediment Control, and Urban Stormwater
Local Governments (approximately 200 Cities, Counties and Towns)	Urban Stormwater
Federal Facilities (approximately 200)	Any
NRCS	Agriculture
FSA	Agriculture
VASWCD	Urban Stormwater (residential scale)
Alliance for the Chesapeake Bay	Urban Stormwater (residential scale)
NFWF	Any

DEQ has invested significant effort pursuing a 1619 Conservation Cooperator agreement with the United States Department of Agriculture (USDA). Unfortunately, the efforts have been unsuccessful to date. As a result, DEQ must rely on aggregated data provided through a USDA agreement with USGS. Absent detailed USDA data, the information cannot be examined for elimination of duplicate records with respect to DCR's Virginia Agricultural Cost-Share (VACS) BMP dataset. Per agreement with the Bay Program, Virginia will report both VACS and NRCS datasets since the minor amounts of duplication between the systems is less of an error than not reporting the NRCS data at all. DEQ will obtain data from USGS and submit it through the BMP Warehouse to CBP via the EN.

In progress year 2024, Infrastructure Investment and Jobs Act/Bipartisan Infrastructure Law (IIJA/BIL) funding was used by DCR to implement approximately 188 agricultural BMPs reported to the CBP via the BMP Warehouse. Reported BMPs include: SL-6N, SL-6W, WP-4, WP-2A, WP-2W, and WP-4C. QA/QC procedures used for data collection, reporting and verification of these BMPs is outlined in the DCR SOP as well as in Section D1 and Appendix 2, Table 1 of this document.

Data Management: Reporting to EPA-CBP

DEQ developed the BMP Warehouse, an online reporting application linked to a network database and reporting application, to collect, link, store, and report all provided sources of BMP data and has been using this application since 2015. The application has undergone modification each year through the 2022 progress year. These modifications have included data access improvements, expanding QA/QC steps during template validation, expanding the number of fields that can be exported, and multiple administrative functions have been added. Detailed information on DEQ's QA/QC process to validate the data uploaded to the BMP Warehouse is included in Appendix 6.

The BMP Warehouse improves data accessibility, automates most quality assurance and data validation processes, expedites conversion to XML and allows for management of BMP credit durations by allowing a BMP record's inspection information to be updated and reported. The system enables DEQ to notify data providers of BMPs approaching the end of their creditable life, and to solicit updates to those records demonstrating dates of any recent maintenance or inspections. For example, until July 2021 all BMPs implemented via VACS have been hard coded within the BMP Warehouse application. Specifically, each VACS BMP code was mapped and handled by computer code not accessible to the DEQ BMP Warehouse administrators. DCR's ability to add new codes to the VACS program had far outpaced the ability of DEQ's IT procurement and internal IT governance rules to keep up, resulting in a backlog of

VACS codes and associated records. Upgrades to the BMP Warehouse application allow the DEQ site administrator to make the needed code changes to allow this backlog to be reported and future code changes to be made at any time and no longer dependent on procurement of IT services.

With these new administrative features, the situations that existed that created a backlog of unmapped BMP codes and/or transformation error will no longer exist. DEQ does not anticipate such a situation occurring again with VACS data. In addition, DEQ has completely reorganized the XML instance file submissions that contain the BMP history currently on file with EPA at the CBP node. The former configuration of the BMP Warehouse application had an upper limit of 5,000 BMP records that can be submitted in any single XML instance file. As part of the 2021 upgrades, DEQ expanded that capacity to 50,000 records. With the 5,000-record limit DEQ required 90 instance files to provide the history up through progress year 2020. With the new limit DEQ increased the total number of BMP records submitted for progress year 2021, but only needed seven instance files. Additionally, the VACS code WP-4B was previously mapped and reported as Barnyard Runoff Controls. Based on guidance from DCR, this BMP should have been mapped to Loafing Lot Management Systems. Therefore, the Commonwealth now reports this practice code as Loafing Lot Management Systems and updates the historical submissions where possible to include this change in BMP name mapping. In addition, there were more USDA NRCS practice codes reported for 2022 since there were several additional codes that moved from draft to release status.

All internal and external data providers upload their data to the BMP Warehouse. QA/QC checks are run during the upload to ensure data includes all required fields for reporting. Records are also checked to avoid duplicate reporting of a BMP. Each record being uploaded is compared to the data in the import database of the BMP Warehouse. If data QA/QC issues are found, the entire data submission (template) is rejected. The BMP Warehouse system generates an email to the data provider highlighting the errors and includes an attached spreadsheet detailing the records with errors and the nature of the error(s). Once corrected, the data provider resubmits the dataset (upload template) through the same process. When all data is complete and required fields included and no duplicate records are detected, the data is added to the BMP Warehouse database. All records implemented within the Chesapeake Bay drainage of Virginia and that are accepted by CBP are transformed by the application into the correct XML statements and made ready for submission via the EN.

In preparation for annual progress reporting, all new BMP installation records reported into the BMP Warehouse are queried for a given reporting year (July 1 – June 30). The resulting XML file is

transmitted to EPA via established protocols. Additionally, updated records with new inspection/maintenance dates are also made available for re-submission by the BMP Warehouse reporting application. Existing and reported records are associated with an existing EN submission ID. The submission IDs with associated updated records are re-submitted providing updated files containing the modified BMP record(s). This would also include removal of any record found to be duplicative or otherwise in error. The most recent guidance documents for EN data inputs are used for this work. The schemas, Appendix A, codes list and other guidance is available from the Chesapeake Bay Program Office.

C. Assessment, Response Actions, and Oversight

C1. Assessments and Response Actions

The quality objectives and criteria described in Section A6 and the data management procedures described in Section B, which collectively describe DEQ's data validation procedures along with the verification procedures outlined in Section D are used to evaluate the quality of internal and external data sets. If data sets are missing, incomplete, are received in an unusable format, or fail to meet the verification requirements for the appropriate BMP class, attempts are made to contact the data provider and explain what issues exist in the provided data that prohibit its collection in the BMP Warehouse application and inclusion in the annual progress data exchange. Every attempt is made to resolve identified data issues before the reporting deadlines occur. If data issues are not resolved and the data cannot be loaded into the application, DEQ will continue to work with the data provider to possibly correct the data for reporting in subsequent progress reporting cycles.

The historical record of BMPs will be evaluated annually to determine which BMPs are approaching the end of their credit duration. Beginning in 2021, the BMP Warehouse generates and sends email notifications to organizations with BMPs that are either out of their lifespan (credit duration) or will be within six months of the date on the email. The email includes a spreadsheet attachment detailing the expired and/or expiring practices and solicits updates to those records demonstrating dates of any recent maintenance, inspections or spot checks. BMPs with no documented inspection, maintenance or spot check based, statistically derived BMP verification rate will be dropped from the BMP record at the end of their credit duration by CBP during the annual progress scenario development.

C2. Oversight and Reports to Management

This section does not apply to this QAPP.

D. Environmental Information Review and Useability Determination

D1. Environmental Information Review

Table D1-1 provides the list of potential internal and external providers of practices implemented within Virginia that may be reported by DEQ for nutrient and sediment pollutant load reduction credit in accordance with the Chesapeake Bay Program Partnership's Verification Principles. Because DEQ is an aggregator of data from many diverse sources, DEQ does not have direct involvement or control over much of the original data collection and reporting. Therefore, the table includes a link to the originating organization's internal QA procedures (where available). Over the coming years, DEQ will work with data providers to document, and improve as necessary, their QA procedures. The QA procedures of the data providers is supplemented by the quality objectives and criteria described in A6 and the data management procedures described in B7, which collectively describe DEQ's data validation procedures.

Data verification standards are outlined below in Table D1-1. Any dataset that fails to meet these standards for validation and verification will result in exclusion of that data from the DEQ reporting of practices, treatments and technologies resulting in reductions of nitrogen, phosphorus and/or sediment pollutant loads in the Chesapeake Bay.

Table D1-1. Internal and External Providers of Practices Reported for Nutrient and Sediment Pollutant Load Reduction Credit

Data Source	BMPs Provided	QA Documentation Link
DEQ	Urban Stormwater	DEQ QAPP
DEQ	Wastewater	DEQ QAPP and Regulations
DEQ	Erosion & Sediment Control	DEQ QAPP
DEQ	Manure Transport	DEQ QAPP
DEQ	319 Nonpoint Source Grant Projects	DEQ QAPP
DEQ	SLAF/WQIF Grant Projects	DEQ QAPP
DEQ	Bay Grant Projects	DEQ QAPP
DCR	Agriculture	DCR SOP
DCR	Agriculture Nutrient Management	DCR SOP
DCR	Manure Transport	DCR SOP
DCR	Urban Nutrient Management	DCR SOP
DCR	Manure Additives	DCR SOP
DCR	Shoreline Management	DCR SOP
VMRC	Oyster Aquaculture	VMRC SOP
VDH	Septic	VDH SOP
DOF	Forest Harvesting Practices	DOF SOP
VDACS	Voluntary and Resource Improvement Agriculture	Included in DCR SOP
VDACS	Urban Nutrient Management	VDACS SOP
VDOT	Non-MS4 Urban Stormwater	VDOT SOP (planned)
Phase 1 MS4s (11 Local Governments)	Regulated Urban Stormwater	Regulatory Guidance
Phase 2 MS4s (Regulated portions of Cities, Counties, Towns and Federal, State and Municipal Facilities)	Regulated Urban Stormwater	Regulatory Guidance
Bay Act Localities (84 Cities, Counties and Towns)	Septic Pump-out, Erosion & Sediment Control, and Urban Stormwater	Septic Pump-out Guidance, Erosion & Sediment Control Guidance, Urban Stormwater Guidance
Local Governments (approximately 200 Cities, Counties and Towns)	Urban Stormwater	BMP Warehouse
Federal Facilities (approximately 200)	Any	BMP Warehouse
NRCS	Agriculture	BMP Warehouse
FSA	Agriculture	BMP Warehouse
Alliance for the Chesapeake Bay	Urban Stormwater (residential scale)	BMP Warehouse
VASWCD	Urban Stormwater (residential scale)	BMP Warehouse
NFWF	Any	BMP Warehouse

The tables in Appendix 2, based on the Jurisdictional Verification Protocol Design Table from the Verification Framework document, outline DEQ's verification expectations for all practices, treatments, and technologies reported for nitrogen, phosphorus and/or sediment pollutant load reduction credit through the Bay Program. The verification program design includes scientifically rigorous and defensible, professionally established and accepted methods to assure reported BMPs are in place and functioning

prior to reporting and that function remains intact through time. Varying methods are used for different BMP groups based on the specific traits of that group and to ensure the cost-effectiveness of the program. While different BMP groups have different verification procedures or frequencies, the overall framework strives to achieve equity in the measurement of functionality and effectiveness of implemented BMPs among and across the source sectors.

One approach to grouping and assessing BMPs for verification, identified in the guidance, uses estimates of the potential nutrient and sediment reductions associated with BMPs based on Watershed Implementation Plans to stratify or prioritize practices. The guidance also provides a default sampling rate of 10% for re-inspecting the practices. The default sampling rate was intended as a placeholder, pending the development of scientifically defensible, statistical sampling protocols. While both approaches are included in the guidance, they do not represent the only viable approaches to designing a Verification Protocol. The verification framework specifically allows for jurisdictional flexibility in designing their verification protocols, if the five Verification Principals remain sound. Virginia has elected to group BMPs by sector, delivery program and risk rather than the default breakout and prioritization used in the guidance. Furthermore, Virginia has taken the time to develop a statistically valid sampling approach for several BMPs. This approach has been reviewed by the Statistical Design Review Team (SDRT), an independent team of experts in statistical sample design, appointed by the Verification Review Panel. The SDRT has confirmed that Virginia's statistical sampling approach is valid and when implemented will produce results that have a minimum of 90% confidence $\pm$ a 5% margin of error. In other words, when we evaluate a sample of the population, we will know that there is a 90% chance that the results are within 5% of the correct answer for the entire population. This confidence interval exceeds the expectations established in the guidance of 80% and serves as a strong example for the expected confidence other model inputs (e.g., Land use) should strive to achieve.

Additional details relating to the statistical sampling and Virginia's overall approach to Verification can be found throughout the narrative of this document and is summarized in Appendix 2. Additional details and calculations associated with the statistical sampling approach can be found in Appendix 4.

The development of Verification Protocols is intended to be an iterative and adaptive process. The Verification Framework and Bay Grant Guidance calls for the Quality Assurance Plans to be reviewed and updated annually, as needed. As new BMPs are approved, or implementation programs evolve, the document will be updated to reflect those changes. The same is true of the statistical sampling approach. The sample findings will guide future adaptation of the sampling approach, including potential re-

stratification. The sampling approach will be adjusted adaptively if a few BMP types or geographic areas show higher failure rates. Should the sample data reveal increasing trends in BMP failure rates, it may indicate the need to reconsider the broader Verification approach. The key is that this approach begins to build a robust data collection capability that can, with great confidence, ensure reported BMPs are functioning as intended through time as well as empower science-based decision making and adaptation in the future.

Agriculture

Verification procedures for BMPs in the agriculture sector are outlined in Appendix 2, Table 1. The BMPs are subdivided into verification groups, based primarily on the risk of failure, as demonstrated by the spot check histories for each type of BMP, as well as program type (cost-share, voluntary, regulatory, cooperative), credit duration, and applicability to the Chesapeake Bay Watershed Implementation Plan. Details of this grouping can be found in Appendix 3, Table 1. The result is nine verification groups, each with specific procedures for initial inspection, follow-up checks and lifespan/sunset provisions. Additionally, any agricultural BMPs required in Confined Animal Feeding Operation (CAFO)/Animal Feeding Operation (AFO) permits are subject to compliance inspections associated with those programs. These regulatory compliance inspections are independent of and in addition to this verification protocol and will serve to add additional confidence in the BMPs installed on CAFO/AFO sites.

Beginning in progress year 2024, Virginia will begin utilizing the DEQ Office of Land Application Programs' (OLAP) permit data for reporting waste storage facilities BMPs. As part of this process, DEQ provided spatially explicit data from the animal operation permits to DCR, who evaluated that data against the protected data DCR collects on these BMPs and operations. That analysis determined the DEQ permit data represented the various forms of poultry and swine operations more completely than the VACS cost share data did, but the VACS data was more complete for all other animal types. Therefore, poultry and swine waste storage BMPs will be reported by DEQ OLAP and all other animal type waste storage BMPs will be reported from the VACS and USDA data. All records dealing with poultry and swine will be purged from the reporting history of both USDA and DCR VACS data.

Onsite initial inspections for 100% of practices are the standard for all but three of the agricultural verification groups. These onsite inspections are performed by the implementing agencies, typically DCR, Soil and Water Conservation Districts (SWCDs), and NRCS. Records of the initial onsite inspections are captured in the reporting agency's databases, along with the appropriate reportable measures for the

installed practice. Information on data management by these agencies are, or will be, included in each reporting agency's QAPP or SOP. Links to these documents can be found in the table in Section D1.

The three practice groups that do not have 100% initial onsite inspections are tillage practices, manure transport and feed additives. Tillage practice reporting will be based on a transect survey, described in Section B2 of this plan. The transect survey approach was reviewed by the SDRT and found to be sufficient for use in the Bay Program modeling system. Manure transport reporting will be based on weigh station tickets from manure haulers (specific to DCR) and transport records required in the Poultry General Permit (9VAC25-630). Feed additives are verified through manure/litter sampling where P concentrations are compared against pre-Phytase baseline data to calculate reductions. This sampling is required by permit and is also associated with Nutrient Management Plan development. These classes of BMPs do not lend themselves to traditional onsite inspections to ensure implementation, but these alternate measures represent a reasonable approach to satisfying the Verification requirements.

Several alternative approaches are used for the follow-up inspections to ensure reported BMPs are still in place and functioning as intended through time. Annual practices typically do not have follow-up checks. Four of the nine verification groups fall into this category: Cover Crops, Tillage Practices, Manure Transport and Feed Additives. However, cover crops will receive two inspections by SWCD staff; once at planting, and a second time once established.

Nutrient Management Plans are reported as an annual BMP in the Bay model, but the plans typically have a three-year life. Each year plans that are within their active life are reported to the Bay Program for credit. More details on this procedure can be found in the DCR SOP. Certified planners conduct follow-up inspections of Nutrient Management Plans at the time of plan renewal. Farmer records of yields and nutrient applications are compared against the Nutrient Management Plan and standards for nutrient management as promulgated in Standards and Criteria.

Stratified random sampling will be used to spot check the BMPs in three verification groups as part of the follow-up inspection process. The statistical sample size calculations can be found in Appendix 4 and utilized the sampling calculator provided by Raosoft. The number of practices data in Appendix 4 originated from the DCR cost-share tracking database. It should be noted that these numbers represent only one of the potential data providers in the agricultural sector, and the numbers are not static; this data is a snapshot in time. More BMPs are installed every day and other BMPs drop out of the contractual period, thereby changing their verification group. The purpose of Appendix 4 is to demonstrate how

BMPs are grouped, give a sense for the numbers of practices in each data group and to establish the method for identifying the necessary sample size to achieve a 90% confidence interval with a ±5% margin of error.

The calculation of statistical sample size and confidence intervals requires some assumption or prior knowledge (data) of the size of the population and the anticipated pass/fail rate of the sample (response distribution). The existing Virginia Cost-Share Program has a strong database of all practices installed through the history of the program and documented results from past spot checks that have found an average 97% compliance rate for practices within the contractual period. This data is included in Appendix 5.

Practices that are installed under State or Federal Cost-Share programs and have contracts requiring maintenance are divided into three BMP Types for the purpose of verification. The three BMP Types in this group are Structural, Land Management and CREP. The BMPs that comprise each of these groups can be found in Appendix 3, Table 1. The spot-check data support using a response distribution of 97/3 for the practices that are within the contractual period. It should be noted that failure to maintain BMPs during the contractual period also carries the potential for financial penalty to the producer. This requirement to repay cost-share funds if practices are not maintained serves as a significant deterrent to non-compliance. Additionally, cost-shared practices are designed and installed following strict standards and there is robust initial inspection (100% onsite initial verification) to ensure the practices, as built, meet those strict design standards. Even with the historical spot check data and these additional lines of evidence that reduce the probability of failure, to be conservative, the assumed response distribution used in calculating the confidence interval for the three verification groups under State or Federal Cost-Share in Contractual Period is 90/10. The resulting sampling rates and procedures for each of the BMP verification types in this group are documented in Appendix 2, Table 1.

The next BMP Group includes those practices that were designed and installed in accordance with the strict standards of agricultural cost-share programs, but no longer have a contractual maintenance requirement. These could be practices that used State or Federal Cost-Share programs, but have fallen out of the contractual period, as well as voluntary practices installed in accordance with the program standards and specifications, but without the financial assistance or contractual stipulations of the State or Federal Cost-Share programs. Practices in this group are split into two types: Structural and Land Management. CREP is not included in this group because the practices in the CREP type are specific to participation in that Cost-Share program. The BMPs that comprise the types in this group can be found in

Appendix 3, Table 1. Based on the robustness of the design, construction and initial verification of the practices in this group, they are assumed to have a relatively low rate of failure, but higher than that of practices within the contractual period. However, because this group does not have any history of spot checks, the statistical sample calculations in Appendix 4 use a 50/50 response distribution, the most conservative assumption possible. The resulting sampling rates and procedures for each of the BMP verification types in this group are documented in Appendix 2, Table 1.

The third verification BMP grouping in the agricultural sector that uses statistical sampling for follow-up inspections includes all practices that meet the Bay Program approved definitions of Resource Improvement Practices. In general, these are BMPs that are similar to a cost-shared BMP, but do not meet the same design and construction standards. Despite this fact, these BMPs have been determined during the initial onsite inspection to be functioning and producing a resource improvement. Typically, these practices have been voluntarily installed at the producers' full expense. These practices have shorter credit durations in the modeling system that will result in the removal of the practice from the models unless a re-inspection is conducted. The high level of producer initiative and investment in the practices in this group lends itself to a high likelihood that the practices will be continually maintained. However, because of the uncertainty in the design and lack of contractual maintenance, the statistical sample calculations in Appendix 4 for this group assume a 50/50 response distribution. This group also separates out practices into Structural and Land Management types as described in Appendix 3, Table 1. To date, Virginia has not reported any BMPs that would fall into this grouping. The resulting sampling rates and procedures for each of the BMP verification types in this group are documented in Appendix 2, Table 1.

The final grouping in the agricultural sector is for practices that may be part of a Resource Management Plan. This agricultural certainty program includes a compliance inspection every three years for all practices required for the RMP certificate. These inspections would be in addition to the other verification requirements described in this section.

The spot check failure rate calculations and the resulting sampling design will be reevaluated triennially, incorporating the results obtained from the previous samples. The goal of the verification program is to strive for a 90% confidence level with a margin of error of ±5% for sample-based follow-up inspections. This confidence interval exceeds the expectations established in the guidance of 80% and is in line with the expected confidence of other model inputs (e.g., Land use).

Unless the practices are re-inspected to verify continued operation and those records updated information

is submitted via EN protocols, the Bay Program using approved credit durations will be removing reported BMPs for all verification groups in the agricultural sector during annual progress run preparation. DCR plans to conduct 100% re-inspections for all BMPs prior to the end of their credit duration. While this is encouraged for other providers of agricultural BMP data, it is not a requirement for satisfying the verification standard.

Additional details on the training and certification of the individuals conducting agricultural BMP initial inspections, verification spot checks or writing nutrient management plans can be found in the DCR SOP.

Forestry

Verification procedures for BMPs in the Forest sector are outlined in Appendix 2, Table 3. The two BMPs included in this sector can be found in Appendix 3, Table 3. The forest harvesting BMP is an annual practice in the Bay Program modeling system. This practice requires operators to notify DOF of the operation, that then allows DOF to conduct inspections in accordance with the Virginia silvicultural water quality law. Based on these inspections, DOF provides DEQ with data on the total acres of harvested forest in Virginia's Bay Watershed. DOF then randomly selects 240 sites to monitor BMPs that have been applied to the sites through a vigorous evaluation process and have forest harvesting practices in place and functioning. The percentage BMP scores are then applied to all harvested acres in the watershed and acres under BMPs are reported to the Bay Model through the EN. This practice is an annual BMP in the modeling system, so for the purpose of verification DOF holds annual training sessions for its BMP auditors to ensure consistency in reporting, as well as spot checks on the monitored sites by the Water Quality Program Manager. Sites that are monitored for BMPs are evaluated during the first six months, post-harvest, to verify that the BMPs are in place. Follow-up inspections are not required because the lifespan for the forest harvesting BMPs is one year, and new sites are evaluated annually. Forest Harvesting BMPs are evaluated to a 95% confidence interval (CI) which more than meet the 80% CI required by the Bay Program.

Reporting of the Forest Conservation BMP requires documentation of appropriate local ordinances requiring the preservation of trees when parcels are developed and the acres of forest conserved as a result. The extent of forest conservation must meet the Bay Program definition for the practice to be reportable. These ordinances remain in effect until changed or removed and areas of forest conserved under such ordinances would likely remain in perpetuity even if the ordinance were rescinded. The Bay Program credit duration for this practice of one year is inappropriate and this BMP should be treated as a

permanent practice.

DOF also contributes to agricultural and urban sector BMPs, including riparian forest buffers, rural tree planning and urban tree BMPs. These practices will be verified in accordance with the protocols specific to those sectors. The proposed site inspections for these forest related practices include consideration of the common maintenance issues related to water quality for such practices (e.g., tree survival, channelization).

In addition to the verification protocols described in Appendix 2, DOF has a Memorandum of Understanding with FSA, NRCS and DCR to provide technical assistance in support of Riparian Forest Buffer establishment projects. DOF's role is to provide a planting plan to include species selection, planting density, and site preparation, if needed (either mechanical, chemical, or both). During the planting operation or shortly thereafter, a DOF forester will perform a planting quality check to ensure that the trees were planted according to the plan and correctly planted, including species size and type, planting density, installation of tree shelters and mats (if required) and appropriate competition control. Two years post planting, a DOF forester will again perform an inspection to check on planting survival, competition from other vegetation and to determine any maintenance that may be required, including the potential need for replanting. This information is provided to the landowner, as well as the agency that is providing the cost-share funding for the project. Any planting failures would be required to be re-planted at that point. The agency that provided the cost-share (NRCS, FSA, and DCR through SWCDs) would then be responsible for performing periodic (five-year) spot checks for continued maintenance of the project through the contract period. DOF partners with those agencies to perform some of these spot checks as time allows. DOF has also been involved through a technical service agreement to re-visit CRP/CREP Projects to ensure adequate tree density for CREP re-enrollment. This is likely to occur annually as projects come up for re-enrollment.

In addition to the cost-share practices that fall under this agreement, planting quality inspection and survival inspection are identified as standard operating procedure for all DOF buffer planting projects, as well as hardwood open field planting projects in the Commonwealth. Based on these inspections, DOF provides DEQ with data on the total acres of riparian forest buffers and rural tree planting that receive technical assistance from DOF each year.

DOF's Virginia Trees for Clean Water (VTCW) grant program provides financial assistance for on-the-ground tree planting efforts across the Commonwealth. The program focuses support on urban tree

planting BMPs (urban forest buffer, urban forest planting, tree planting – canopy). Applicants must submit design plans, planting specifications and photos of proposed planting sites. All proposed applicants receive a pre-proposal site visit from DOF staff to assist with application development and review. Once applications are submitted, a panel of International Society of Arboriculture Certified Arborists review them and determine eligibility for funding. Corrections are made as needed based on the panel's expertise. The panel uses ANSI A300 Part 6 Specifications as standards for operation for tree planting activities. BMPs for projects are installed via contractors, volunteers and public staff. DOF staff also assist as needed with project implementation. Once planted, grantees submit data to DOF's "My Trees Count" portal and DOF staff inspect projects. The number of trees and proper planting practices are verified through the inspection process. Planting inspections must occur prior to grant reimbursement.

Natural Sector Practices

Verification protocols for stream restoration and wetland practices are included in the appropriate source sector. Specifically, protocols for urban stream restoration and wet ponds/wetlands are included in the urban sector. Non-urban Stream Restoration, Stream Access Control (Stream Crossings) and agricultural wetland restoration are included in the agricultural sector protocols. In all cases, stream restoration and wetland practices will have an initial onsite inspection. Follow-up inspections will vary based on the specifics of the installation. Practices owned by MS4s would be inspected annually. Those in MS4 areas that are privately owned would be inspected every five years. Practices installed in an agricultural setting would be subject to a statistical sampling-based approach to account for practice failures, as well as an inspection of every practice as it approaches the end of its credit duration.

Stream restoration practices are a highly regulated activity, typically requiring permit coverage from both state and federal agencies. The oversight provided by these permitting programs is in addition to and strengthens the onsite verification protocols described in this document. Inspection checklists are commonly used as part of state regulatory inspections. Where appropriate, these tools will be adapted for use specifically for inspection of stream restoration projects to ensure follow-up inspections consider both the continued presence of the structures as well as their function to control nutrient and sediment loads. Virginia will continue to explore methods for assessing the functionality of streams after stream restoration. Once complete, these BMP specific procedures will be posted to the DEQ website and links to the documents added to this Verification Plan.

Practices reported as wet ponds/wetlands in the urban sector are typically designed to address the storm

water flows and loads originating from the drainage area to the facility. These designs may or may not include wetlands as part of the functional design of the system. Where wetlands are part of the practice functional design, storm flows and inundation durations are factored into the wetland siting, species selections, planting densities and other design characteristics. Agricultural wetland restoration projects can be designed for different purposes. Some designs may focus on waterfowl habitat, while others have a more water quality focus. When implemented through the VACS program, the practice design and construction standards are specified in the DCR Cost-Share manual. NRCS practice standards, 657 (Wetland Restoration) and 658 (Wetland Creation) may also apply.

Shoreline management practices incorporating living shoreline techniques could also be seen as restoring or protecting wetlands. These practices will also follow the protocols of the sector, agriculture or urban, where the practice is implemented and reported. Follow-up inspections of wetland related practices will consider both the continued presence of the systems as well as their function to control nutrient and sediment loads. DEQ made corrections to the BMP Warehouse application allowing reporting beginning in 2019 of shoreline BMPs with multiple measures such as protocol TN, TP, or TSS. Previously, DEQ reported all records as either urban or agricultural shoreline management with a single measure of linear feet because the BMP Warehouse application was not configured to produce multiple measures tied to a single state unique tracking ID. For progress year 2019, DEQ expunged all records and replaced them with the correct multiple measure shoreline reporting. Overall linear feet for the previously reported records did not change, but instead of a general shoreline management practice, DEQ now differentiates those records into the appropriate versions (vegetated, non-vegetated) of agricultural and urban shoreline management including all pertinent measures.

Oyster aquaculture BMPs are reported by the VMRC for the previous calendar year. VMRC has historically provided the reported oyster harvest from public grounds. Beginning progress year 2023 VMRC is providing both public and now private grounds, as well as off bottom cages reported in bushels and numbers as specified in the VMRC SOP. That SOP details the VMRC estimate of oysters per bushel to convert bushels to number of oysters by size class and ploidy by the designated VMRC oyster harvesting areas. The 2023 progress year is also the first year DEQ was provided the VMRC oyster harvesting areas as a GIS layer by VMRC. DEQ intersected the VMRC harvest area polygons with the HUC12 polygons to estimate harvesting by the EN accepted HUC12 reporting geography for the 2023 EN data transmission.

Urban

Verification procedures for BMPs in the urban sector are outlined in Appendix 2, Table 2. The BMPs are subdivided into verification groups based on the type of practice (management, structural, annual, and land conversion), program type (cost-share, voluntary, regulatory, cooperative), credit duration, and the risk for failure. Details of this grouping can be found in Appendix 3, Table 2. The result is ten verification groups, each with specific procedures for initial inspection, follow-up checks and lifespan/sunset provisions.

Many of the BMPs implemented in the urban sector are required by permits or regulatory programs. These include practices implemented for compliance with MS4 permits, the construction general permit and Virginia's Stormwater Management Program (VSMP). Each of these programs and permits include requirements for BMPs to be properly installed and maintained. For MS4s, the permit requires the development of an MS4 Program Plan (see Section II.B.5.d.) that describes the procedures for implementing the program. The program plans include the specific policies and procedures for ensuring practices are properly designed and installed and for conducting inspections. Each MS4 is required to post its current Program Plan on their website. DEQ maintains a list of MS4 permittees and their associated websites. The construction CGP requires practices be installed and maintained in accordance with the Virginia Erosion & Sediment Control (ESC) Handbook and the Erosion and Sediment Control Law and Regulations. The VSMP has practice design standards and specifications described in the Virginia Stormwater Management BMP Clearinghouse, with additional information on program requirements in the Virginia Stormwater Management Handbook.

If erosion and sediment control is outside the usual initial inspection process, DEQ will acquire the permitted allowed disturbed acres from the Stormwater CGP database and multiply those records by 0.4 to estimate the universe of actual disturbed acreage associated with construction activities and report that information to CBP in August of each year. This will constitute the universe of construction-disturbed acres to be simulated and will be aggregated at the city/county scale for the annual progress run. DEQ will apply a 0.75 compliance factor to those city/county total disturbed acres as having ESC Level 2 applied and report this with the annual BMP progress reporting. In addition, if a locality provides actual ESC BMP reporting via the BMP Warehouse application their actual reporting will be substituted and reported in place of the process described above using the factors as detailed.

Onsite initial inspections are the standard for all but two of the urban verification groups. Street sweeping

and storm drain cleanout practice reporting will be based on weigh station reports indicating the date and weight of material collected or by vehicle logs documenting the area swept. The second practice without onsite initial inspection is the Urban Phosphorus Fertilizer Reduction practice. This credit is based on the established regulations prohibiting phosphorus in lawn maintenance fertilizer. Beginning with the progress data submission in December 2016, the preliminary default credit for this practice was replaced with documented changes in non-agricultural fertilizer sales data for phosphorus through the Fertilizer Tonnage Reporting System (FTRS). Additional information on the FTRS is included in this section. These two classes of BMPs do not lend themselves to traditional onsite inspections to ensure implementation, but these alternate measures represent a reasonable approach to satisfying the Verification requirements. Only BMPs satisfying the Bay Program BMP definitions will be reported, even though regulatory programs may accept additional implementation information to satisfy their permitting requirements.

Virginia's Commercial Fertilizer Law requires distributors of regulated products (commercial fertilizers, specialty fertilizers, soil amendments, and horticultural growing media) to submit (i) statistical tonnage reports, (ii) inspection fee reports, and (iii) payment of inspection fees. Distributors are required to report to VDACS the tons of regulated products sold to a non-licensee during the fiscal year (July 1 – June 30). Also required is submission of an inspection fee of $0.25/ton or $35.00, whichever is greater. If zero tons have been distributed during the fiscal year, submission of the report accompanied by the minimum inspection fee ($35.00) is still required.

Statistical tonnage data and inspection fee payments can now be submitted online using FTRS. VDACS deployed the FTRS in June 2016. FTRS is an online reporting tool for the collection of fertilizer distribution data in Virginia. The online reporting system streamlines and improves the ability of fertilizer distributors to submit data and allows VDACS to produce summary reports of distribution data; this summary data is made available to the public and posted on the VDACS website.

The FTRS can be accessed from the VDACS website. Fertilizer distributors must create an account to submit data; a VDACS registrant number is required to gain access to the system. Once an account has been created, the fertilizer distributor may enter fertilizer tonnage data via FTRS. The reporting system allows for reporting of fertilizer tonnage by fertilizer code. This is a numeric code that corresponds to a specific fertilizer grade (example: 10-10-10 or 24-0-0). If the fertilizer grade is unknown, the data can be entered using the nitrogen, phosphorus and potash percentages contained in the fertilizer product. Additional fields include "Container," which indicates bagged, bulk or liquid and "Usage," which is farm

or non-farm. Once all fields are populated, the entry is saved and the user proceeds to enter the next record. In addition, data can also be uploaded to FTRS using an Excel spreadsheet. A spreadsheet template can be downloaded from the FTRS website, populated off-line, and then uploaded to the system. Annual fertilizer reports are generated using the reporting tool. Reports can be based on nutrient application at the locality level.

Several alternative approaches are used for the follow-up inspections to ensure reported BMPs are still in place and functioning as intended. Annual practices typically do not have follow-up checks. BMPs installed under regulatory programs and permits include a requirement that a maintenance agreement be recorded with the parcel's land records. This requirement for long-term maintenance of permanent stormwater management facilities is specified in 9VAC25-875-130. Additionally, MS4s are required to inspect BMPs they own annually and all other practices that are privately owned every 5 years. These regulatory programs also include compliance and enforcement processes that ensure the regulatory requirements are being followed. When program compliance inspections reveal BMPs that are not properly maintained, the permittees are typically given no more than 90 days to resolve the issues and provide documentation of such actions to the inspectors. Collectively, these procedures ensure the proper initial implementation and continued operation of the BMPs installed pursuant to these regulatory programs. As such, this class of BMPs is expected to be maintained in perpetuity.

BMPs installed in areas with no regulatory requirement represent a unique challenge. In the non-regulated urban sector BMP reporting is voluntary, as is BMP inspection. For these practices, DEQ will utilize the BMP warehouse database to notify the BMP reporting source of the need for re-inspections as BMPs exceed or approach the end of their credit duration. The notification will recommend a re-inspection to verify continued performance and provide the procedures for reporting data documenting, such re-inspections. Inspection updates provided by reporting sources will be used to update data records and extend credit life.

Two relatively new programs provide additional inroads to verification in the unregulated urban sector. The Virginia Conservation Assistance Program (VCAP) provides cost-share and technical assistance to residential-scale property owners for implementation of urban stormwater BMPs. The VCAP program is administered by VASWCD and implemented by local SWCDs throughout the Bay watershed. The program includes homeowner consent that allows SWCD staff access to the property for the purpose of inspecting installed BMPs, as well as funding for Districts to conduct follow-up inspections for Verification. This program is eligible on both regulated and non-regulated urban lands.

The program provides a mechanism to satisfy the verification re-inspection requirements. To ensure ongoing maintenance, SWCD technical staff are responsible for conducting annual spot checks of twenty-five percent (25%) of all active contracts executed in their Districts. District staff also ensure that participants adhere to the VCAP maintenance agreement. Appendix C of the VCAP Program Manual includes guidance on data collection for BMP reporting to the Chesapeake Bay Program.

SLAF provides cost-share assistance through grants to local governments for urban BMP implementation. SLAF targets larger projects implemented by local government recipients. To date, most of these projects have been by MS4 localities where verification is already a regulatory requirement. The program provides new inroads for verification for projects in non-regulated areas. SLAF grant agreements have a provision that requires the development of a "Responsibilities and Maintenance Plan" that includes maintenance and inspection schedules and responsible parties for the useful service life of the installed facility. Additionally, the grant agreements require Grantee's rights of access for facilities on privately owned property as well as provisions requiring the maintenance plan be recorded in the land records for the property in accordance with 9VAC25-875-130 for long-term maintenance of permanent stormwater management facilities.

Statistical sampling will be used to spot check the Urban Nutrient Management Plan and Urban Nutrient Management Certified Applicator groups. The statistical sample size calculations can be found in Appendix 4. The sample size will be reevaluated at least triennially, incorporating the results obtained from the previous samples. The goal of the verification program is to strive for a 90% confidence level with a margin of error of ±5% for sample-based follow-up inspections. In other words, when we evaluate a sample of the population, we will know that there is a 90% chance that the results are within 5% of the correct answer for the entire population. This confidence interval exceeds the expectations established in the guidance of 80% and serves as a strong example for the expected confidence other model inputs (e.g., Land use) should strive to meet. A list of SLAF eligible BMPs applicable for Chesapeake Bay reporting and established efficiencies is included in the SLAF Program Guidelines.

Except for BMPs installed pursuant to regulatory requirements, the Bay Program approved credit durations will be used as the basis for removing reported BMPs by CBP for all verification groups in the urban sector, unless the practices are re-inspected to verify continued operation and historical reporting updated via established EN protocols. Training and certification of personnel involved in the design, installation, inspection and maintenance of urban practices is conducted through program specific training for VSMP authorities and Virginia's ESC Program. Additional information on the specific certifications

offered through these programs can be found on the DEQ Training and Certification website.

Wastewater, CSO, and Onsite

Verification procedures for BMPs in the Wastewater, Combined Sewer Overflows (CSO), and Onsite sectors are outlined in Appendix 2, Table 3. The BMPs are subdivided into verification groups based on the sector, type of practice (management, structural, annual, land conversion), program type (cost-share, voluntary, regulatory, cooperative), credit duration, and the risk for failure. Details of this grouping can be found in Appendix 3, Table 3. The Wastewater and CSO sectors are included in this section of the Verification Protocol Design Table as well, although they are not typically thought of or reported as BMPs. The result is seven verification groups, each with specific procedures for initial inspection, follow-up checks and lifespan/sunset provisions.

A separate QAPP was developed in 2018 for VPDES permitted point source dischargers in the Chesapeake Bay Watershed. The document was revised in November 2023 to reflect changes to EPA's data reporting schedule and converted to a SOP in late 2024 (Appendix 7). Point source data is reported to EPA by December 1 of the progress year.

CSOs are not a BMP, but data regarding the regulated area draining to CSOs along with the frequency and estimated volumes of overflow events are used in the modeling system. Implementation and verification of actions to reduce the impact of CSOs follows the CSO Control Plans and applicable regulations. DEQ reviews and approves plans and specifications that result from implementation of Long-Term Control Plans for CSO localities, in accordance with Virginia's Sewage Collection and Treatment Regulation (SCAT) (9VAC25-790). Procedures and requirements to secure a Certificate to Construct (CTC) and Certificate to Operate (CTO) post-construction are described in Section 50 of the SCAT Regulation. Maintenance is verified through periodic inspections and annual reports submitted in accordance with VPDES Permit Regulation (9VAC25-31) requirements. As CSO control projects are completed, the model data is updated through the Bay Program modeling team.

For the verification groups in the onsite septic sector, the annual practice of septic tank pump-out does not require any follow-up checks for the purpose of verification. Initial onsite inspections performed by licensed onsite sewage service providers are standard for the remaining two approved practices – connection to sewer and Alternative Onsite Sewage Systems (AOSS), including all nitrogen reducing systems. The Virginia Onsite Water and Wastewater Services program at VDH, through regulations, requires that onsite septic systems be inspected by a licensed designer (onsite soil evaluator or

professional engineer) according to Virginia's Sewage Handling and Disposal Regulations (12VAC5-610).

Following system installation and approval, AOSSs are then required to have at least an annual inspection by a properly licensed operator, including nitrogen reducing systems. Inspections are performed and reported by licensed operators and tracked by local health department staff using a statewide environmental health database. Systems with a design flow greater than 1,000 gallons per day (GPD) require an inspection and effluent sampling frequency that is more frequent than annually, per Virginia's Regulations for Alternative Onsite Sewage Systems (12VAC5-613). Issues or critical malfunctions identified during the annual inspection are typically corrected immediately. VDH issued Guidance Memorandum and Policies (GMP) 2018-01 to implement enforcement of AOSS Operation and Maintenance (O&M) requirements including civil penalties for homeowners with nitrogen reducing systems who do not submit annual inspection reports. The GMP describes the process of sending notices of alleged regulatory violation, fines, and civil court proceedings if fines are left unpaid and the system remains uninspected. BMP data are collected by VDH staff in the local health districts and maintained in a statewide environmental health database. Data quality is reviewed by VDH data management staff on a district-by-district basis, and regular requests for data cleanup are coordinated with VDH district staff. An Onsite Quality Assurance Policy (GMP 2017-04) was developed by VDH staff in 2007 and updated in 2017 to guide local health departments in standard data collection, data entry into the statewide environmental health database, and requires quarterly reporting on metrics to improve data quality.

Duplication of reported nitrogen reduction BMPs is unlikely to occur, as VDH is the only agency that collects and tracks data for nitrogen reducing onsite septic systems. VDH has developed internal job aids for local health department staff to establish standard procedures for processing and reviewing O&M inspection reports.

VDH reports pump-outs that occur across the Commonwealth. Septic tank pumping is regularly the first step in correcting a failing onsite sewage system, and VDH uses repair permits logged in the statewide environmental health database as a proxy for the number of septic tank pump-out. In 2022, the General Assembly approved legislation (HB 769) that directed VDH to manage and enforce Chesapeake Bay septic tank pump-out requirements within the Three Rivers and Eastern Shore Health Districts. This legislation took effect July 1, 2023 and includes a requirement for conventional maintenance providers within those health districts to report pump-outs within those districts using VDH's MyHD maintenance reporting portal. The conventional maintenance reporting portal is also available statewide for any

conventional maintenance reporters throughout the rest of the state to voluntarily report maintenance or pump-outs.

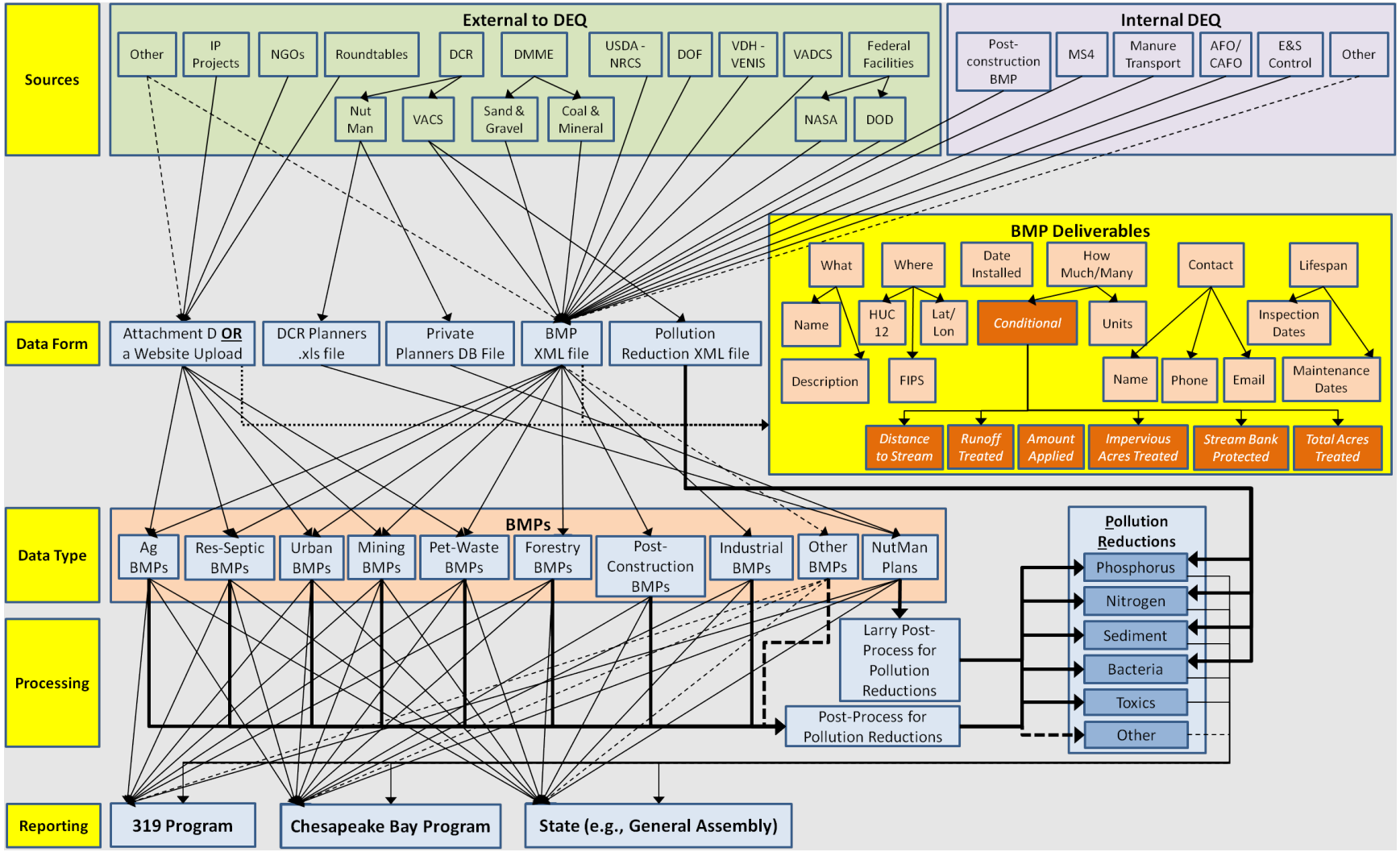
Documentation of connection to public sewer service is logged in the statewide environmental health database when an onsite sewage system is abandoned. Additionally, localities and individual wastewater treatment facilities may report public sewer connections to VDH or DEQ. VDH will continue to work with DEQ and localities to improve the reporting process for public sewer connections to increase the accuracy of reporting in this BMP category. All onsite septic sector BMPs are reported annually to DEQ using a data template with approved EN BMP names.

The Virginia Department of Professional and Occupational Regulation (DPOR) oversees certification and licensure for professionals in the onsite sewage sector. DPOR provides oversight of Professional Engineers (18VAC10-20). Most AOSSs are designed by Alternative Onsite Evaluators pursuant to the AOSS Regulations (Regulations for Alternative Onsite Sewage Systems, 12VAC5-613-40). Design requirements for onsite BMPs are found in policy (GMP 2013-01). Manufacturers, professional organizations, and VDH routinely offer training to licensed service providers on the proper design, installation, and maintenance of onsite wastewater systems.

Annual operation and maintenance of nitrogen reducing systems comprises another aspect of BMP verification for the onsite septic sector. Regular trainings are offered to licensed service providers by multiple organizations across the state, including the Virginia Onsite Wastewater Recyclers Association (VOWRA), National Onsite Wastewater Association (NOWRA), State Onsite Regulators Alliance (SORA), and National Association of Wastewater Technicians (NAWT). VDH coordinates with Virginia Tech to offer training on operation and maintenance of nitrogen reducing onsite sewage systems to wastewater works operators working towards additional licensure as an alternative onsite sewage system operator.

Additionally, targeted trainings developed by VDH are offered to Environmental Health employees covering Chesapeake Bay TMDL requirements, nitrogen reduction from onsite sewage systems, and O&M regulations and reporting. VDH also provides targeted training for Environmental Health staff to standardize onsite septic practices, such as recent region specific soils training offered in Southwest and Eastern Virginia.

Appendix 1 – Internal and External Data Flow



Appendix 2 – Verification Protocol Design Table 1: Agriculture

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Agriculture	State or Federal Cost-Share Cover Crops	Annual	Onsite	100% at planting	DCR, SWCD, NRCS	VACS Database, NRCS	Onsite	100% at establishment to ensure required cover is achieved	Practices that fail to establish sufficient cover are disallowed and not reported as cover crops	Annual
Agriculture	Tillage Practices	Annual	Transect Survey	Every 5 years	DCR, SWCD or Certified Planner	VACS Database	N/A	N/A	N/A	Annual
Agriculture	State or Federal Cost-Share In Contractual Period	Structural	Onsite	100%	DCR, SWCD, NRCS	VACS Database, NRCS	Onsite	Statistical sample of 2% per year 100% Re-inspection of practices one year prior to end of contract is encouraged.	Practices found not functioning as intended are issued a 60-day Corrective Action Agreement (CAA) to restore BMP function. If CAA not completed, BMP is deemed failed in survey. Sample failure rate will be applied to type population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.
Agriculture	State or Federal Cost-Share In Contractual Period	Land Management	Onsite	100%	DCR, SWCD, NRCS	VACS Database, NRCS	Onsite	Statistical sample of 5% per year 100% Re-inspection of practices one year prior to end of contract is encouraged.	Practices found not functioning as intended are issued a 60-day CAA to restore BMP function. If CAA not completed, BMP is deemed failed in survey. Sample failure rate will be applied to type population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Agriculture	State or Federal Cost-Share In Contractual Period	CREP	Onsite	100% Forestry verification during first 2 years	NRCS, DOF	NRCS	Onsite	Statistical sample of 5% per year (NRCS) 100% Re-inspection of practices one year prior to end of contract is encouraged.	Practices found not functioning as intended are issued a 60-day CAA to restore BMP function. If CAA not completed, BMP is deemed failed in survey. Sample failure rate will be applied to type population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.
Agriculture	State or Federal Cost-Share Out of Contractual Period or Voluntary meets program design standards	Structural	Onsite	100%	DCR, SWCD, NRCS or Certified Planner	VACS Database	Onsite	Statistical sample of 4% per year 100% Re-inspection of structural and land use change practices one year prior to end of credit duration is encouraged.	Practice components found not functioning as intended are deemed failed in the survey. Sample failure rate will be applied to group population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.
Agriculture	State or Federal Cost-Share Out of Contractual Period or Voluntary meets program design standards	Land Management	Onsite	100%	DCR, SWCD, NRCS or Certified Planner	VACS Database	Onsite	Statistical sample of 7.5% per year 100% Re-inspection of structural and land use change practices one year prior to end of credit duration is encouraged.	Practice components found not functioning as intended are deemed failed in the survey. Sample failure rate will be applied to group population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Agriculture	Voluntary Resource Improvement (Does not meet program design standards, but adequately provides the desired resource improvement)	Structural	Onsite Visual Indicators	100%	DCR, SWCD, VDACS, or Certified Planner	VACS Database, ASA module	Onsite	Statistical sample of 5% per year 100% Re-inspection of structural and land use change practices one year prior to end of credit duration is encouraged.	Practices found not meeting the visual indicators are deemed failed in the survey. Sample failure rate will be applied to group population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.
Agriculture	Voluntary Resource Improvement (Does not meet program design standards, but adequately provides the desired resource improvement)	Land Management	Onsite Visual Indicators	100%	DCR, SWCD, VDACS, or Certified Planner	VACS Database, ASA module	Onsite	Statistical sample of 10% per year 100% Re-inspection of structural and land use change practices one year prior to end of credit duration is encouraged.	Practices found not meeting the visual indicators are deemed failed in the survey. Sample failure rate will be applied to group population to remove practices from the reporting record.	Per CBP approved Credit Duration: Re-inspection regimen ensures practices are sampled during credit duration and encourages all practices be inspected prior to end of contractual period or Credit Duration to re-verify and extend.
Agriculture	Manure Transport	Annual	Report with weight records (DCR only) and transfer reporting	100%	DCR, DEQ	DCR and DEQ databases	N/A	N/A	N/A	Annual
Agriculture	Nutrient Management Plans	Annual	Onsite Plan Development	100%	Certified Planner	NutMan Database	Onsite, Farmer interview, yield and fertilizer/manure application records evaluation	100% DCR and DCR Contractor Developed Plans at time of plan renewal or revision in 2016 to establish baseline data. Program design to be adjusted based on initial findings.	Frequency of sampled plan acres found to have not been implemented consistent with nutrient management planning standards will be used to discount implemented BMPs included in future reporting.	Currently, all practices within the plan effective dates are reported. Typical plan is effective for 3 years, but may be revised several times within that period. Reporting discount rate to be reassessed annually based on previous 3 years results

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Agriculture	Resource Management Plans (with RMP Certificate)	Group	Onsite Implementation Certification	100%	Certified Planner, SWCD, DCR	VACS Database, RMP module	Triennial onsite compliance evaluation	100% Triennial	Practices found not functioning as intended are issued a 90-day CAA to restore BMP function. If CAA not completed, RMP Certificate is revoked and BMP(s) removed from the reporting record.	BMPs associated with RMPs are tracked, reported and verified as described above for each BMP Grouping.

Appendix 2 – Verification Protocol Design Table 2: Urban

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Urban	BMP installed pursuant to MS4 Permit requirement (does not include BMP installed to meet VSMP requirements under the Construction GP).	Group	Onsite	100%	Locality or Facility	Locality or Facility database, MS4 Annual Report/Bay TMDL Action Plan	MS4 conducts onsite inspections and maintenance per VPDES MS4 permit requirements.Annual for MS4 owned. Quinquennial for privately owned within MS4.	DEQ MS4 program conducts inspections, audits and review of annual reports to ensure compliance is maintained.	CAA, Notice of Violation (NOV) or Consent Order	BMPs implemented in MS4s must be maintained in accordance with permit conditions. Non-MS4 owned BMPs have maintenance agreements with the BMP owners recorded with land records. As such, this class of BMPs is expected to be maintained in perpetuity. Reported BMPs will be reduced to account for identified non-compliance with the above maintenance requirements.
Urban	BMP installed pursuant to Bay Act requirement	Group	Onsite	100%	Bay Act Locality	Bay Act Locality records (site plans, inspection reports, maintenance agreements), Bay Act Annual Report	Locality conducts or requires documentation of owner inspection quinquennially.	DEQ Bay Act program conducts locality program evaluations and review of annual reports to ensure compliance is maintained.	CAA, NOV or Consent Order	BMPs implemented in Bay Act Localities must be maintained in accordance with permit conditions. BMP maintenance agreements with the BMP owners are recorded with land records. As such, this class of BMPs is expected to be maintained in perpetuity. Reported BMPs will be reduced to account for identified non-compliance with the above maintenance requirements.

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Urban	BMP installed to meet VSMP requirements under the Construction GP	Group	Onsite	100%	VSMP Authority (Locality and DEQ)	CGPS Database	Locality conducts quinquennial inspections.	DEQ Construction GP program conducts inspections, locality program evaluation to ensure compliance is maintained.	CAA, NOV or Consent Order	BMPs implemented per VSMP regulations must be maintained in accordance with permit conditions. BMP maintenance agreements with the BMP owners are recorded with land records. As such, this class of BMPs is expected to be maintained in perpetuity. Reported BMPs will be reduced to account for identified non-compliance with the above maintenance requirements.
Urban	BMP installed with no regulatory requirement (e.g., more stringent local VSMP requirements, unregulated urbanized area choosing to install BMPs)	Low Risk of Failure	Onsite	100%	Locality or Facility	Locality or Facility database	Reporting source will be notified of BMPs approaching the end of their credit duration recommending a reinspection to verify continued performance.	N/A	Inspection updates provided by reporting sources will be used to update data records and extend credit life.	Per CBP approved Credit Duration.: If system is not inspected, maintained or is otherwise abandoned, it will be removed from the reporting record.
Urban	Floating Treatment Wetlands 1 to 5	Low Risk of Failure	Onsite	100%	Locality or Facility	Locality or Facility database	Reporting source will be notified of BMPs approaching the end of their credit duration recommending a reinspection to verify continued performance.	N/A	Inspection updates provided by reporting sources will be used to update data records and extend credit life.	Per CBP approved Credit Duration: If system is not inspected, maintained or is otherwise abandoned, it will be removed from the reporting record.
Urban	Homeowner BMPs	Group	Onsite	100%	Locality, SWCD,	SMART	Reporting source will be notified of BMPs approaching the end of	N/A	Inspection updates provided by reporting sources will be used to	Per CBP approved Credit Duration.: If system is not inspected,

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
					PDC or NGO		their credit duration recommending a reinspection to verify continued performance.		update data records and extend credit life.	maintained or is otherwise abandoned, it will be removed from the reporting record.
Urban	Street Sweeping and Storm Drain Cleanout conducted outside of MS4 Permit	Annual	Report with weight records	100%	Locality, Facility, VDOT	Locality or Facility database	N/A	N/A	N/A	Annual
Urban	Erosion and Sediment Control (during construction)	Annual	Onsite	100%	Locality, DEQ, Standard and Specs Holder	Locality database, DEQ CGPS database (> 1 acre), Standard & Specs Holder	Reporting source will be notified of BMPs approaching the end of their credit duration recommending a reinspection to verify continued performance.	N/A	N/A	Annual
Urban	Urban Nutrient Management Plan	Annual	Onsite Plan Development	100%	Certified Planner, Certified Applicator	NutMan Database	Onsite compliance evaluation for acres under active plans	Statistical sample of 2% of acres with active plans each year conducted by certified plan developer. 50% of those will be joint evaluations by certified plan developer and DCR program staff.	Reduce reporting based on rates determined from sample.	Annual, plans typically written for 3-5 years
Urban	Urban Nutrient Management Certified Applicator	Annual	Onsite Applicator	100%	Certified Applicator	VDACS Certified Applicator database	Compliance evaluation for certified applicators, including fertilizer records check	A statistical sample of a minimum of 2% of the acreage reported under management by contractor applicators will be evaluated by VDACS program staff	Reduce reporting based on rates determined from sample.	Annual

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Urban	Urban Phosphorus Fertilizer Reduction	Annual	State Fertilizer Sales Data	100%	State Regulatory Agency	VDACS Database	N/A	N/A	N/A	Annual

Appendix 2 – Verification Protocol Design Table 3: Wastewater, Onsite, Forest and Extractive

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Wastewater, CSO & Onsite	Significant Wastewater	Discharge Loads	VPDES significant facilities sample in accordance with the VPDES Chesapeake Bay watershed general permit. All laboratory analysis is performed by laboratories certified under the Virginia Environmental Laboratory Accreditation Program (VELAP) administered by the Virginia Division of Consolidate Laboratory Services (DCLS), a National Environmental Laboratory Accreditation Conference (NELAC) recognized accreditation body. DEQ VPDES Inspectors verify monitoring protocols as part of regular compliance inspections.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wastewater, CSO & Onsite	Non-Significant Wastewater	Discharge Load Estimates	Nutrient loads from nonsignificant facilities are estimates provided by DEQ using a percentage of the wasteload allocations included in the TMDL. Information regarding point source reporting is provided in Appendix 7.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Wastewater, CSO & Onsite	CSOs	Discharge Load Estimates	Nutrient loads from CSOs are estimates. Improvements resulting from implementation of Long-Term Control Plans for CSO localities and associated maintenance is verified through periodic inspections and annual reports submitted in accordance with VPDES Permit Regulation (9 VAC 25- 31) requirements.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wastewater, CSO & Onsite	Onsite Pump-outs	Annual	Onsite Certified Entity	100%	Locality, Facility	Locality or Facility database	N/A	N/A	N/A	Annual
Wastewater, CSO & Onsite	Onsite Connection to Sewer	Group	Onsite Certified Entity	100%	Locality, VDH, WWTP Operator	Multiple possible data sources	N/A	N/A	N/A	Per CBP approved Credit Duration.
Wastewater, CSO & Onsite	AOSS including all nitrogen reducing onsite systems	Group	Onsite Certified Entity, VDH	100%	VDH	VDH EHD Database	Onsite Certified Entity	Annual Maintenance Required per regulation	Issues identified during annual maintenance inspection are typically repaired immediately. Failure to repair would result in condemnation and discontinued use.	Per CBP approved Credit Duration. If system is not maintained or is otherwise abandoned, it will be removed from the reporting record.

A. Sector	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?)
-	-	-	Method	Frequency	Who inspects	Documentation	Follow-up Inspection	Statistical Sub-sample	Response if Problem	
Forest & Extractive	Forest Harvesting Practices	Annual	Onsite	100%	DOF Foresters	DOF Database	N/A	N/A	N/A	Per CBP approved Credit Duration. Harvested forest acres discounted based on identified non-compliance rate.
Forest & Extractive	Forest Conservation	Based on local requirements mandating forest conservation on new development sites	Onsite	100%	Locality	Locality	N/A	N/A	N/A	Reporting of this BMP requires documentation of appropriate local ordinances requiring the preservation of trees when parcels are developed. Once established, the ordinance remains in effect until changed or removed and areas of forest conserved under the ordinance would likely remain in perpetuity. As such, this BMP will be treated as a permanent practice.

Appendix 3 – Best Management Practices Verification Crosswalk Table 1: Agriculture

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Nutrient Management Core	nmcoren	Nutrient Management Core N	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Core	nmcorep	Nutrient Management Core P	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Rate	nmraten	Nutrient Management N Rate	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Rate	nmratep	Nutrient Management P Rate	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Timing	nmtimen	Nutrient Management N Timing	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Timing	nmtimep	Nutrient Management P Timing	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Placement	nmplacen	Nutrient Management N Placement	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Nutrient Management Placement	nmplacep	Nutrient Management P Placement	1	Management	DCR	Cost-Share/Voluntary/ Regulatory	Nutrient Management Plans
Conservation Tillage	ConserveTill	Conservation Tillage	1	Management	DCR	Survey	Tillage Practices
High Residue Tillage	HRTill	High Residue Tillage Management	1	Management	DCR	Survey/Cost-Share	Tillage Practices
Reduced Tillage	LowResTill	Reduced Tillage	1	Management	DCR	Survey/Cost-Share	Tillage Practices
Cover Crop	CoverCropTradWLO	Cover Crop	1	Annual	USDA	Cost-Share/Voluntary	Federal Cost-Share Cover Crops

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Cover Crops	(All Cover Crops)	Cover Crops	1	Annual	DCR	Cost-Share/Voluntary	State Cost-Share Cover Crops
Commodity Cover Crop	CoverCropComNormal	Commodity Cover Crop-Standard	1	Annual	DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
CREP Streambank protection	GrassBuffExcl	Exclusion Fence with Grass Buffer	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
Streambank protection (fencing)	GrassBuffExcl	Exclusion Fence with Grass Buffer	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
CREP Grazing land protection	PrecRotGrazing	Prescribed Grazing	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
Stream Exclusion with Grazing Land Management	GrassBuffExcl	Exclusion Fence with Grass Buffer	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
Stream Exclusion with Grazing Land Management	PrecRotGrazing	Prescribed Grazing	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
CREP Riparian Forest Buffer	ForestBuffers	Forest Buffers	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
Woodland buffer filter area	ForestBuffers	Forest Buffers	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
CREP Grass filter strips	GrassBuffers	Grass Buffers	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops
Grass filter strips	GrassBuffers	Grass Buffers	10	Management	USDA/DCR	Cost-Share/Voluntary	State or Federal Cost-Share Cover Crops

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Stream Access Control with Fencing	GrassBuffExcl	Exclusion Fence with Grass Buffer	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Pasture Alternative Watering	OSWnoFence	Alternative Water System	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Water Control Structures	WaterContStruc	Water Control Structures	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
NonUrban Stream Restoration	NonUrbStrmRest	Non-Urban Stream Restoration	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
NonUrban Shoreline Erosion Control	shoreag	Ag Shoreline Management	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Livestock Waste Management Systems	AWMS	Animal Waste Management System	15	Structural	DEQ/DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or State issued permit compliance inspection or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Poultry Waste Management Systems	AWMS	Animal Waste Management System	15	Structural	DEQ/DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or State issued permit compliance inspection or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Amendments for the Treatment of Agricultural Waste	LitAmend	Amendments for the Treatment of Agricultural Waste	1	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Barnyard Runoff Control	BarnRunoffCont	Barnyard Runoff Control	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Loafing Lot Management	LoafLot	Loafing Lot Management	10	Structural	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Exclusion Fence with Forest Buffer	ForestBuffExcl	Exclusion Fence with Forest Buffer	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Prescribed Grazing	PrecRotGrazing	Prescribed Grazing	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Horse Pasture Management	HorsePasMan	Horse Pasture Management	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Forest Buffers	ForestBuffers	Forest Buffers	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Forest Buffers	ForestBuffNarrow	Narrow Forest Buffer	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Wetland Restoration	WetlandRestoreFloodplain	Wetland Restoration	15	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Land Retirement	LandRetireOpen	Land Retirement	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Land Retirement	LandRetirePas	Land Retirement	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Grass Buffers	GrassBuffers	Grass Buffers	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Grass Buffers	GrassBuffNarrow	Narrow Grass Buffer	10	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period

Agriculture Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Tree Planting	TreePlant	Tree Planting	15	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Conservation Plans	ConPlan	Conservation Plans	1	Land Management	DCR/USDA	Cost-Share/Voluntary	State or Federal Cost-Share in Contractual Period or Voluntary (meets program design standards) or State or Federal Cost-Share Out of Contractual Period
Manure Transport	ManureTransport	Manure Transport	1	Annual	DEQ/DCR	Cost-Share/Voluntary/Regulatory	Manure Transport
Manure Incorporation	Incorphighlate, Incorphighearly, Incorplowlate, incorplowearly	Manure Incorporation	1	Annual	VCE	Voluntary	Manure Incorporation
Manure Injection	Injection	Manure Injection	1	Annual	DCR	Cost-Share/Voluntary	Manure Injection
Resource Improvement BMPs	(All RI Practices)	(All RI Practices)	3-10	Structural/Management	DCR/VDACS	Voluntary	Voluntary Resource Improvement (Does not meet program design standards, but adequately provides the desired resource improvement)

Appendix 3 – Best Management Practices Verification Crosswalk Table 2: Urban

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Wet Ponds & Wetlands	WetPondWetland	Wet Ponds and Wetlands	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Dry Ponds	DryPonds	Dry Detention Ponds and Hydrodynamic Structures	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Extended Dry Ponds	ExtDryPonds	Dry Extended Detention Ponds	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Infiltration Practices	Infiltration	Urban Infiltration Practices w/o Sand, Veg. - A/B soils, no underdrain	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Infiltration Practices	InfiltWithSV	Urban Infiltration Practices w/ Sand, Veg. - A/B soils, no underdrain	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Filtering Practices	Filter	Urban Filtering Practices	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Bioretention	BioRet	Bioretention - with underdrain, AB Soils	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Bioretention	BioRetNoUDAB	Bioretention/rain gardens - A/B soils, no underdrain	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Bioretention	BioRetUDAB	Bioretention/rain gardens - A/B soils, underdrain	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Bioretention	BioRetUDCD	Bioretention/rain gardens - C/D soils, underdrain	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Bioswale	BioSwale	Bioswale	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Permeable Pavement	PermPavNoSVNoUDAB	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Permeable Pavement	PermPavNoSVUDAB	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Permeable Pavement	PermPavNoSVUDCD	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Permeable Pavement	PermPavSVNoUDAB	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Permeable Pavement	PermPavSVUDAB	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Permeable Pavement	PermPavSVUDCD	Permeable Pavement	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Vegetated Open Channels/Vegetated Treatment Area	VegOpChanNoUDAB	Vegetated Open Channels/Vegetated Treatment Area	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Vegetated Open Channels/Vegetated Treatment Area	VegOpChanNoUDCD	Vegetated Open Channels/Vegetated Treatment Area	10	Structural	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Urban Stream Restoration	UrbStrmRest	Urban Stream Restoration	10	Structural	Locality	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Urban Shoreline Erosion Control	shoreurb	Urban Shoreline Management	10	Structural	Locality/DCR	Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Reduction of Impervious Surface	ImpSurRed	Reduction of Impervious Surface	10	Land Conversion	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Urban Forest Buffers	ForestBufUrban	Urban Forest Buffers	10	Land Conversion	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Urban Tree Planting	UrbanTreePlant	Urban Tree Planting	10	Land Conversion	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Urban Forest Planting	UrbanForPlant	Urban Forest Planting	10	Land Conversion	Locality/DEQ	Cost-Share/Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or BMP installed pursuant to Bay Act requirement or BMP installed to meet VSMP requirements under Construction GP or BMP installed with no regulatory requirement
Street Sweeping or Storm Drain Cleanout	SCP1 to SPC11	Street Cleaning Practice 1 to 11	1	Annual	Locality	Voluntary/Regulatory	BMP installed pursuant to MS4 Permit requirement or Street Sweeping and/or Storm Drain Cleanout conducted outside of MS4 Permit
Erosion and Sediment Control	EandS1	Erosion and Sediment Control Level 1	1	Management	Locality/DEQ	Regulatory	Erosion and Sediment Control (during construction)
Erosion and Sediment Control	EandS2	Erosion and Sediment Control Level 2	1	Management	Locality/DEQ	Regulatory	Erosion and Sediment Control (during construction)
Erosion and Sediment Control	EandS3	Erosion and Sediment Control Level 3	1	Management	Locality/DEQ	Regulatory	Erosion and Sediment Control (during construction)

Urban Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Urban Nutrient Management	UrbanNMPlan	Urban Nutrient Management Plan	1	Management	DCR, VDACS	Cooperative/Regulatory/Cost-Share/Voluntary	Urban Nutrient Management Plan or Urban Nutrient Management Certified Applicator
Urban Nutrient Management	UrbanNMPlanHR	Urban Nutrient Management Plan	1	Management	DCR	Cooperative/Regulatory/Cost-Share/Voluntary	Urban Nutrient Management Plan or Urban Nutrient Management Certified Applicator
Urban Nutrient Management	UrbanNMPlanLR	Urban Nutrient Management Plan	1	Management	DCR	Cooperative/Regulatory/Cost-Share/Voluntary	Urban Nutrient Management Plan or Urban Nutrient Management Certified Applicator
Urban Phosphorus Fertilizer Reduction	UrbanPLegislation	Urban Phosphorus Legislation	1	Annual	VDACS	Regulatory	Urban Phosphorus Fertilizer Reduction
Homeowner BMPs	(All Homeowner Practices)	(All Homeowner Practices)	5/1	Structural/Management	Locality/Alliance/ SWCD	Voluntary	Homeowner BMPs

Appendix 3 – Best Management Practices Verification Crosswalk Table 3: Onsite, Forestry and Extractive

Onsite Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Septic Connections	SepticConnect	Septic Connection	100	Structural	VDH	Voluntary/Regulatory	Connection to Sewer
Septic Denitrification	SepticDeCon	Septic Denitrification	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeCon	Septic Tank Advanced Treatment	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeCon	RMF	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeCon	IFAS	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeCon	Proprietary Ex Situ	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	IFAS Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	IFAS Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	Proprietary Ex Situ Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	Proprietary Ex Situ Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	RMF Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticDeEnhance	RMF Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems

Onsite Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Septic Denitrification	SepticEffEnhance	Septic Effluent Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticEffEnhance	Septic Effluent Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecCon	Constructed Wetland Septic	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecCon	IMF	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecCon	NSF 40	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	Constructed Wetland Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	Constructed Wetland Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	IMF Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	IMF Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	NSF 40 Elevated Mound	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Denitrification	SepticSecEnhance	NSF 40 Shallow Pressure	10	Structural	VDH	Voluntary/Regulatory	AOSS including all nitrogen reducing systems
Septic Pumping	SepticPump	Septic Tank Pump-out	1	Annual	Locality/VDH	Voluntary/Regulatory	Pump-outs

Forest and Extractive Practices	BMP Short Name	BMP Long Name	Credit Duration	BMP Type	Data Source(s)	Program Type(s)	Verification Group
Forest Harvesting Practices	ForHarvestBMP	Forest Harvesting Practices	1	Management	DOF	Regulatory	Forest Harvesting Practices
Forest Conservation Act	ForestCon	Forest Conservation	1	Management	Locality	Regulatory	Forest Conservation
Dirt & Gravel Road E&S	DirtGravelDSA	Dirt & Gravel Road Erosion & Sediment Control - Driving Surface Aggregate + Raising the Roadbed	10	Structural	DOF/Virginia Energy/Locality	Voluntary/Regulatory	Dirt & Gravel Roads
Dirt & Gravel Road E&S	DirtGravelDSAOut	Dirt & Gravel Road Erosion & Sediment Control - with Outlets	10	Structural	DOF/Virginia Energy/Locality	Voluntary/Regulatory	Dirt & Gravel Roads
Dirt & Gravel Road E&S	DirtGravelnoDSA	Dirt & Gravel Road Erosion & Sediment Control - Outlets only	10	Structural	DOF/Virginia Energy/Locality	Voluntary/Regulatory	Dirt & Gravel Roads

Appendix 4 – Stratified Random Sampling Calculations

Sector	Data Grouping	BMP Type	Number of Practices	Response Distribution	Verification Sample	Resulting Confidence and Error
Agriculture	State or Federal Cost-Share In Contractual Period	Structural	6,054	Assumed 90/10 pass/fail	2% = 121	90% ± 4.44
Agriculture	State or Federal Cost-Share In Contractual Period	Land Management	3,436	Assumed 90/10 pass/fail	5% = 172	90% ± 3.67
Agriculture	State or Federal Cost-Share In Contractual Period	CREP	3,232	Assumed 90/10 pass/fail	5% = 162	90% ± 3.78
Agriculture	State or Federal Cost-Share Out of Contractual Period or Voluntary meets program design standards	Structural	-	Assumed 50/50 pass/fail	4%	TBD
Agriculture	State or Federal Cost-Share Out of Contractual Period or Voluntary meets program design standards	Land Management	-	Assumed 50/50 pass/fail	7.5%	TBD
Agriculture	Voluntary Resource Improvement (Does not meet program design standards, but adequately provides the desired resource improvement)	Structural	-	Assumed 60/40 pass/fail	5%	TBD
Agriculture	Voluntary Resource Improvement (Does not meet program design standards, but adequately provides the desired resource improvement)	Land Management	-	Assumed 50/50 pass/fail	10%	TBD
Urban	Urban Nutrient Management Plan	Annual	15,000	Assumed 50/50 pass/fail	2% = 300	90% ± 4.70

Urban	Urban Nutrient Management Certified Applicator	Annual	75,000	Assumed 50/50 pass/fail	2% = 1,500	90% ± 4.70

The sample size and confidence interval calculations in this table were developed using the following website: http://www.raosoft.com/samplesize.html. These calculations have been evaluated and confirmed to be accurate by the SDRT.

Appendix 5 – Historical BMP Failure Rates from DCR Spot Checks (1998-2015)

Row Labels	Total Number of BMPs	Total Number of Spot Checks on Individual BMP	Number of Inactive/Destroyed BMPs	Failure Rate
Structural	**6054**	**1628**	**44**	**2.7%**
AWMS	**784**	**259**	**4**	**1.5%**
Animal Mortality Incinerator	1	1	0	0.0%
Animal waste control facilities	760	258	4	1.6%
Voluntary Animal waste control facilities	23	0	0	0.0%
Barn Runoff Control	**95**	**31**	**0**	**0.0%**
Loafing lot management system	91	31	0	0.0%
Voluntary Loafing lot management system	4	0	0	0.0%
Exclusion Fencing	**283**	**52**	**0**	**0.0%**
Agricultural Sinkhole Protection	16	5	0	0.0%
Livestock Exclusion with Reduced Setback	49	2	0	0.0%
Livestock Exclusion with Riparian Buffers for TMDL Imp.	218	45	0	0.0%
Exclusion Narrow Buffer	**48**	**15**	**1**	**6.7%**
Livestock Exclusion with Reduced Setback for TMDL Imp.	48	15	1	6.7%
Exclusion with Buffer	**878**	**177**	**12**	**6.8%**
Stream Exclusion - Maintenance Practice	325	39	7	17.9%
Streambank protection (fencing)	526	138	5	3.6%
Voluntary Streambank Protection	27	0	0	0.0%
Exclusion with Buffer and Prescribed Grazing	**3428**	**931**	**23**	**2.5%**
Stream Exclusion With Grazing Land Management	3304	931	23	2.5%
Voluntary Stream Exclusion With Grazing Land Management	124	0	0	0.0%
Exclusion with Buffer Continuation (new lifespan)	**1**	**0**	**0**	**0.0%**
Maintenance of Stream Exclusion Fencing	1	0	0	0.0%
Mortality Composter	**272**	**101**	**3**	**3.0%**
Composter Facilities	272	101	3	3.0%
Non-urban Stream Restoration	**50**	**18**	**0**	**0.0%**
Streambank Stabilization	45	18	0	0.0%
Voluntary Maintenance of Stream Exclusion Fencing	5	0	0	0.0%
Non-WIP Practice	**9**	**5**	**0**	**0.0%**
Stream Channel Stabilization	1	1	0	0.0%
Stream Crossing & Hardened Access	8	4	0	0.0%
Pasture Fence	**159**	**19**	**1**	**5.3%**
Stream Exclusion with Grazing Land Management for TMDL Imp.	113	8	0	0.0%
Stream Protection - TMDL	46	11	1	9.1%
Water Control Structure	**47**	**20**	**0**	**0.0%**
Sediment retention, erosion or water control structures	47	20	0	0.0%

Row Labels	Total Number of BMPs	Total Number of Spot Checks on Individual BMP	Number of Inactive/Destroyed BMPs	Failure Rate
Land Management	**3436**	**758**	**28**	**3.7%**
Forest Buffer	**119**	**40**	**2**	**5.0%**
Woodland buffer filter area	119	40	2	5.0%
Grass Buffer	**23**	**14**	**1**	**7.1%**
Grass filter strips	21	13	1	7.7%
Herbaceous Riparian Buffer - Maintenance Practice	2	1	0	0.0%
Horse Pasture Management	**7**	**1**	**0**	**0.0%**
Small Acreage Grazing System	5	1	0	0.0%
Small Acreage Grazing System (TMDL)	2	0	0	0.0%
Land Retirement	**2758**	**543**	**21**	**3.9%**
Fescue Conversion/Wildlife Option	55	1	0	0.0%
Field Borders/Wildlife Option	115	6	0	0.0%
Filter Strips/Wildlife Option	7	3	0	0.0%
Idle Land/Wildlife Option and Idle Tobacco Land	60	5	0	0.0%
Long Term Vegetative Cover on Cropland	2466	505	21	4.2%
Sod waterway	52	23	0	0.0%
Voluntary Permanent Vegetative Cover on Cropland	3	0	0	0.0%
Prescribed Grazing	**99**	**8**	**0**	**0.0%**
Extension of CREP Watering Systems	35	3	0	0.0%
Grazing Land Management	29	2	0	0.0%
Pasture Management	19	1	0	0.0%
Support for Extension of CREP Watering Systems - TMDL	15	2	0	0.0%
Voluntary Grazing Land Management	1	0	0	0.0%
Tree Planting	**430**	**152**	**4**	**2.6%**
Aforestation of erodible crop and pastureland	422	152	4	2.6%
Forested Riparian Buffer - Maintenance Practice	6	0	0	0.0%
Voluntary Reforestation of erodible crop and pastureland	2	0	0	0.0%

Row Labels	Total Number of BMPs	Total Number of Spot Checks on Individual BMP	Number of Inactive/Destroyed BMPs	Failure Rate
CREP	**3232**	**141**	**6**	**4.3%**
Exclusion Fencing	**1**	**0**	**0**	**0.0%**
CREP Agricultural Sinkhole Protection	1	0	0	0.0%
Exclusion with Buffer	**170**	**15**	**1**	**6.7%**
CREP Streambank protection	38	1	0	0.0%
Streambank protection (fencing)	132	14	1	7.1%
Exclusion with Buffer and Prescribed Grazing	**1239**	**93**	**3**	**3.2%**
CREP Grazing land protection	301	11	0	0.0%
Stream Exclusion With Grazing Land Managemen	938	82	3	3.7%
Forest Buffer	**1621**	**8**	**2**	**25.0%**
CREP Riparian Forest Buffer Planting	1618	8	2	25.0%
Woodland buffer filter area	3	0	0	0.0%
Grass Buffer	**201**	**25**	**0**	**0.0%**
CREP Grass filter strips	45	3	0	0.0%
Grass filter strips	156	22	0	0.0%
Voluntary Exclusion Not Meeting Spec	**105**	**0**	**0**	**0.0%**
Exclusion Narrow Buffer	**105**	**0**	**0**	**0.0%**
Voluntary Stream Exclusion	105	0	0	0.0%

Appendix 6 – DEQ NPS BMP QA/QC Summary

Validation steps are completed by the BMP Warehouse on the general template uploads prior to importing into the import database portion of the application. These are done to ensure correctly formatted information is collected in a non-duplicative manner.

All required fields must contain information in the required format or be selected from dropdown menus. Based on the reason selected for doing the upload, different fields are required. If the reason selected is for MS4 reporting, all standard upload required fields are required, in addition to ones needed for permit compliance reporting.

All uploads must have data in the following fields:

1) Date Installed (mm/dd/yyyy)
2) BMP Name selected from dropdown menu
3) Measurement Name auto-populated based on BMP name selected. Some BMPs have multiple measurement names that display on the dropdown menu.
4) Measurement Unit auto-populated based on the BMP name and measurement(s) selected
5) BMP Extent (0.00001 to 1,000,000 without commas)
6) At least one of the following location fields:
    a) Locality selected from dropdown menu
    b) Locality FIPS selected from dropdown menu
    c) HUC12 selected from dropdown menu
    d) VAHU6 selected from dropdown menu
    e) Latitude and Longitude coordinate pair (decimal degrees to 6 decimal places)

Additional MS4 required fields:

1) Impervious Acres Treated is a subset of the BMP Extent, so cannot be larger than the BMP Extent value
2) VAHU6 selected from dropdown menu
3) Latitude and Longitude coordinate pair (decimal degrees to 6 decimal places)
4) MS4 Service Area selected from dropdown menu
5) Ownership Type selected from dropdown menu

6) Maintenance Agreement selected from dropdown menu
7) Action Plan selected from dropdown menu

Additional logic has been programmed regarding the Most Recent Inspection Date, Inspection Status, and Inspection Maintenance Date fields. Specifically, a BMP cannot be inspected until chronologically on or after the installation date. An Inspection Maintenance Date cannot occur until chronologically on or after an inspection date. All inspection dates must have a status selected from a dropdown menu.

Other than validating that all the required fields have data and are in the correct format, the application compares each record that is to be uploaded against the data in the import database and does a duplicate record screening. Any record missing required data, any data out of acceptable format, or a potential duplicate is rejected by the application. All associated records in that template are also rejected. Validation is an iterative process; multiple upload attempts may be needed for all records to validate across all fields evaluated and duplicate record checks are completed.

Validation steps the BMP Warehouse application undergoes when uploading VACS data:

1) Acres Calculated Buffer Installed - required for Practice Code CRSL-6
2) Acres Calculated Buffer Installed - required for Practice Code CRWQ-1
3) Acres Calculated Buffer Installed - required for Practice Code SL-6
4) Acres Calculated Buffer Installed - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.
5) Average Buffer Width - Average Buffer Width Value and Average Buffer Width Unit are required for Practice Code WQ-1
6) Average Buffer Width - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.
7) Extent Benefitted - Extent Benefitted Value and Extent Benefitted Unit are required for Practice Code CRFR-3
8) Extent Benefitted - Extent Benefitted Value and Extent Benefitted Unit are required for Practice Code SL-15A
9) Extent Benefitted - Extent Benefitted Value and Extent Benefitted Unit are required for Practice Code SL-6
10) Extent Benefitted - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.

11) Extent Installed - Extent Installed Value and Extent Installed Unit are required for Practice Code CRSL-6
12) Extent Installed - Extent Installed Value and Extent Installed Unit are required for Practice Code SL-1
13) Extent Installed - Extent Installed Value and Extent Installed Unit are required for Practice Code WP-4B
14) Extent Installed - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.
15) Missing Hydrologic Unit Code, HU12 Code
16) Plant Fields - At least one of the fields Early Plant Rye, Standard Plant Rye, Early Plant Non-Rye, or Standard
17) Plant Non-Rye is required for Practice Code SL-8B
18) Plant Fields - The sum of the fields Early Plant Rye, Standard Plant Rye, Early Plant Non-Rye, and Standard Plant
19) Non-Rye must be equal to the Extent Installed value, for Practice Code SL-8B
20) Primary Animal Count - Value is outside the allowed range. Min value >= 0, max value <= 1,000,000.
21) Stream Bank Protected - Stream Bank Protected Value and Stream Bank Protected Unit are required for Practice Code WQ-1
22) Stream Bank Protected - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.
23) Waste Treated - Value is outside the allowed range. Min value >= 0.00005, max value <= 100,000,000.

Additional steps taken by DEQ BMP Warehouse Site Administrators:

- VACS QA/QC issues and procedures for BMP Warehouse acceptance and CBP reporting
- Export all Ag DCR records (excluding NM and Shoreline BMPs) from the import database of the Warehouse. Using the BMP ID (Data Provider ID) compare the VACS unique IDs already in the Warehouse import data to what is provided in the DCR data transferred in the tab containing all records. Rectify (inspection status of removed or fail) any situations where there is an ID in the Warehouse, but not in the DCR data transfer. Compare to tabs in the DCR data transfer related to changes and validation issues. Also, confirm new tab data is not already in the Warehouse.

- Manually exclude records missing all the following location information: VAHU6, HUC12, and FIPS values.
- Sort data on Average Buffer Width field (largest to smallest), comparing the value of that field to the Extent Installed field value. Confirm Average Buffer Width (ABW) field value is <40% of the length (Extent Installed) value. All records where the ABW is equal to or greater than 40% of the length are to be removed and returned to DCR for verification or correction of the ABW value.

ABW is assumed to be 35 feet, unless the BMP is designated narrow (WP-2N, SL-6N, CCI-SL-6N, CCI-WP-2N, CCI-SL6NRI, CCI-WP2NRI) and then the setback is assumed to be 10 feet. All records designated with a practice code mapped to Exclusion with Grass Buffer must have a minimum ABW value of 35 feet or CAST will reject the record. Similarly, any practice code indicating a narrow buffer, but has an ABW of 35 feet or greater will also be rejected by CAST. Remove all such instances and return the records to DCR or recode the practice code corresponding to the value in the average buffer width field.

For BMPs that require a calculated buffer area, reject record if value is missing or calculate buffer area if length and average width values are available and logical.

BMP specific validation required fields:

- **Buffer Practices** (FR-3, CRFR-3, SL-6, CRSL-6, SL-6W, CRWP-2, WP-2, WP-2W, LE-1, LE-1T, LE-2, WQ-1, CRWQ-1)
    - For practices that create a buffer area having acres calculated buffer installed, or an extent installed, and average buffer width is needed. CBP will accept Length Fenced (FEET), Livestock (AU), Acres (ACRE), Length (FEET), Width (FEET). For the SL-6N and WP-2N codes the application provides 10 feet for all records.
- **Exclusion Practices** (SL-6, CRSL-6, SL-6N, SL-6W, CRWP-2, WP-2, WP-2N, WP-2W, LE-1, LE-1T, LE-2)
    - SL-6, CRSL-6, SL-6N, SL-6W, VSL-6, LE-1, LE-1T, and LE-2 are multi-BMP systems that are converted to CBP exclusion with grassed buffer unless a forested buffer is associated with the practice, plus a presumed upland area of pasture receiving prescribed grazing and alternative water BMPs. Prescribed grazing and alternative water acres are calculated using the acres calculated buffer installed field value subtracted from the

extent benefited field value. Therefore, if the acres calculated of buffer is larger than extent benefited, a negative value is calculated and zero prescribed grazing and alternative water acres are to be reported. If the acres calculated buffer field is blank, this calculation cannot occur.

  - CRWP-2, WP-2, WP-2N, WP-2W, VWP-2, VWP-2W are converted to CBP exclusion with grassed buffer or exclusion with narrow grassed buffer unless a forested buffer is associated with the practice.
  - There are instances where the extent installed reported by the SWCD is illogical. For example, the extent installed for SL-6 and variants is in linear feet, rather than systems. Therefore, a value of 1 is illogical and the record should be rejected by DEQ. All values less than 100 feet are examined and possibly returned to DCR for correction.

- **Cover Crop Practices** (SL-8, SL-8A, SL-8B, SL-8C, SL8H, VSL-8, VSL-8B, VSL-8D, VSL-8H)
  - SL-8B reporting to CBP is tied to the extent installed field, standard plant non-rye field, standard plant rye field, early plant non-rye field, early plant rye field, and on-farm manure field. The sum of standard plant non-rye, standard plant rye, early plant non-rye, and early plant rye fields must equal the value in the extent installed field. Similarly, the on-farm manure field cannot exceed the extent installed field.
- **CCI Practices** (CCI-FRB-1, CCI-FRB1RI, CCI-HRB-1, CCI-HRB1RI, CCI-SE-1, CCI-SE1RI, CCI-SE1WP2, CCI-SL-6N, CCI-SL6NRI, CCI-SL-6W, CCI-SL6WRI, CCI-WP-2N, CCI-WP2NRI, CCI-WP-2W, CCI-WP2WRI)
  - Codes must be added to the VACS data before upload. All CCI BMPs that are related to a previous installation, as listed in the related BMP fields in the data provided by DCR, should be coded with appropriate related CCI-code (CCI-SL-6W, CCI-WP-2N, etc.). All CCI practices without a previously related VACS practice are to be reported as a resource improvement or RI practice (CCI-SL6WRI, CCI-WP2RI, etc.). For the 2021 progress scenario, several records were recoded to correct illogical situations such as a narrow buffer code with an average width >35 feet. These were recoded to the applicable normal width practice code (i.e., WP-2N converted to a WP-2 code). Or vice versa depending on the recorded average buffer width for the record.

Download current VACS template from the application. Make sure the fields in the data provided in the DCR VACS data dump align with the template fields. Copy resulting rectified data from DCR data file

that is new to the BMP Warehouse and/or needs updating via an upload overwrite to the template and assign a name to the file (VACS_upload_MMDDYYYY.xlsx).

Any cell containing NULL (empty cell) will need the word NULL removed and the cell left empty. Use Find and Replace function in Excel to replace all instances.

Try uploading the template. If the template times out, use the Excel tools split command to split the template into smaller sub-templates. If the template validates, all records have passed the systems QA processes that includes the following:

1) Extent installed must be >0
2) Extent benefited must be >0
3) Completion Date (date of installation) - required
4) Practice Code – required
5) DCR BMP ID – required

DCR reported manure transport BMP is compared to the DEQ manure transport data for the same reporting period looking for similar source and destination counties and tonnage transported on the same dates. Any potential duplicate is removed from one of the data.

The following steps are taken to prepare USDA practice code 313 Waste Storage Facility BMP data. NEIEN requires either the number of systems or animal units (AUs) by animal type be reported. USDA provides number of systems and animal type, but does not provide number of animals or AUs treated by the number of systems. Conversion factors downloaded from CAST Detailed-SourceData-Animals are used, specifically the number of animals per animal unit by animal type and year from the ManureLBSPerAnimalAndAU tab, and average number of animals per system values from the AnimalDetails tab. Additionally, to reduce the possibility of duplication, all poultry and swine animal records are removed from the reporting as these are being provided in the DEQ animal permit information as described in D1. Dairy and beef records are converted from number of systems to animal units using the values from CAST (Table 1).

Table 1: CAST Conversion Values

Animal Type	Average Animal Count Per System	AU per Animal	AUs per System
beef	22.00000000	1.14000000	19.29824561
dairy	84.00000000	0.74000000	113.5135135

Appendix 7 – DEQ SOP for VPDES in the Chesapeake Bay Watershed

Section 1: Organization/Agency Information

- Organization name: Virginia Department of Environmental Quality (DEQ)
- Organization address: 1111 East Main Street, Suite 1400, Richmond, VA 23219
- Organization website: https://www.deq.virginia.gov/permits/water/surface-waters-vpdes

Table 1: DEQ Staff Point of Contacts

Staff Contact	Title	E-mail	Phone
Joseph Bryan	VPDES Permit Supervisor	Joseph.Bryan@deq.virginia.gov	(804) 659-2659
Erica Duncan	Manager, Office of VPDES Permits	Erica.Duncan@deq.virginia.gov	(804) 337-5407

Section 2: Project/Task Description

DEQ has prepared this Scope of Procedures (SOP) to document the quality assurance/ quality control (QA/QC) procedures associated with the annual submission of Virginia Pollutant Discharge Elimination System (VPDES) permitted nutrient point source data to the Chesapeake Bay Program (CBP).

Section 3: Reporting Requirements

Virginia will annually submit significant wastewater facility Discharge Monitoring Report (DMR) data located within the Chesapeake Bay watershed to the CBP. A Virginia facility is considered a significant discharger if:

1) the design flow of the facility is equal to or greater than 0.5 million gallons per day (MGD) west of the fall line or 0.1 MGD east of the fall line or

2) is an industrial facility discharging an equivalent nutrient load.

The equivalent nutrient load is defined in 9VAC25-820-10 of Virginia's Administrative Code as:

- 2,300 pounds per year of total nitrogen or 300 pounds per year of total phosphorus discharged by an industrial facility are considered equivalent to the load discharged from sewage treatment works with a design capacity of 0.04 million gallons per day,

- 5,700 pounds per year of total nitrogen or 760 pounds per year of total phosphorus discharged by an industrial facility are considered equivalent to the load discharged from sewage treatment works with a design capacity of 0.1 million gallons per day, and

- 28,500 pounds per year of total nitrogen or 3,800 pounds per year of total phosphorus discharged by an industrial facility are considered equivalent to the load discharged from sewage treatment works with a design capacity of 0.5 million gallons per day.

In addition to currently identified significant VPDES nutrient point source facilities, DEQ will also update CBP staff when new or expanded dischargers begin reporting nutrient data through requirements of the VPDES Watershed General Permit. These additional facilities include:

1) new dischargers treating domestic sewage with design flows greater than 1,000 gallons per day

2) any expanding facility with design flows 40,000 gallons per day or more from a sewage treatment works or equivalent industrial load.

Virginia is committed to submitting annual DMR data to the CBP for the annual progress reporting year which extends from July 1 through June 30. The reporting year closes the last day of June prior to the December 2 final submittal date. Virginia will submit the parameters listed in Table 2.

Table 2: Virginia DMR Data Parameters

Parameter Name	Statistical Base Codes
Dissolved Oxygen	Minimum Concentration (mg/L)
Total Nitrogen	Monthly Average Concentration (mg/L); Monthly Load (lbs./mo.)
Ammonia Nitrogen	Monthly Average Concentration (mg/L)
Total Kieldahl Nitrogen	Monthly Average Concentration (mg/L)
Nitrate & Nitrite	Monthly Average Concentration (mg/L)
Total Phosphorus	Monthly Average Concentration (mg/L); Monthly Load (lbs./mo.)
Orthophosphate (PO4)	Monthly Average Concentration (mg/L) - Calculated
Total Organic Phosphorus (TOP)	Monthly Average Concentration (mg/L) – Calculated
Flow	Average Monthly (MGD)

Parameter Name	Statistical Base Codes
BOD_5 / CBOD	Monthly Average Concentration (mg/L)
Total Suspended Solids	Monthly Average Concentration (mg/L)

Section 4: QA/QC Procedures

Virginia's data submittal includes a series of QA/QC procedures as follows.

4.1 Facility Data Collection

Each facility is required to collect samples and measurements that are representative of the monitored activity.

a.) Monitoring shall be conducted according to procedures approved under Title 40 Code of Federal Regulations Part 136 or alternative methods approved by the U.S. Environmental Protection Agency (EPA), unless other procedures have been specified in the permit.

b.) The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements.

c.) Samples taken shall be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

Compliance with the above requirements is ensured by regular facility inspections by DEQ Wastewater Inspectors.

4.2 Reporting Monitoring Results to DEQ

Facilities are required to submit information including:

a.) The date, exact place, and time of sampling or measurements;

b.) The individual(s) who performed the sampling or measurements;

c.) The date(s) and time(s) analyses were performed;

d.) The individual(s) who performed the analyses;

e.) The analytical techniques or methods used; and

f.) The results of such analyses.

Reporting requirements include:

a.) The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after the required monitoring period, unless another reporting schedule is specified elsewhere in this permit;

b.) Monitoring results shall be submitted to the appropriate regional office;

c.) Monitoring results shall be reported on a Discharge Monitoring Report (DMR) or on forms provided, approved or specified by DEQ; and

d.) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the facility's permit.

4.3 Monitoring Results Received by DEQ

Most facilities report monitoring results to DEQ via electronic DMRs (eDMR). DEQ's eDMR system has been designed with the following QA/QC validations.

a.) Permittees must complete all data fields in an eDMR form before the form may be submitted;

b.) An eDMR form cannot be submitted until a "preparer" and a "certifier" each certifies the information provided is complete and correct. This step requires that each party enter an assigned personal identification number (PIN) prior to the system accepting an eDMR;

c.) The eDMR system transfers data directly, as submitted by facilities, into DEQ's Comprehensive Environmental Data System (CEDS); and

d.) Once transferred to the CEDS system, data is then uploaded directly to the EPA's Integrated Compliance Information System (ICIS). The transfer of data from CEDS to ICIS is governed by validations and mapping that further ensures data quality. Data that does not transfer directly to ICIS from CEDS is retuned on a report to DEQ compliance staff. DEQ compliance staff is then tasked with determining and correcting the detailed data issues. The corrected data is reentered into CEDS and is then again transferred to ICIS.

4.4 DEQ Staff QA/QC of Data

DEQ Staff adheres to the following procedures when reviewing the monitoring results prior to submittal to the CBP.

a.) Data is mined directly from the CEDS database using the Tableau data analysis tool (Tableau). The Tableau report used to mine the data from CEDS was specifically built to retrieve CBP-specific data from CEDS and return the data to the DEQ user exactly as entered by the facility in the eDMR form. This allows DEQ staff to verify the accuracy of the data and determine that the data has not been altered by rounding or other operations. The Logi report was also built to return any non-numeric characters that may have been incorrectly entered into eDMR;

b.) DEQ staff utilizes a function within Tableau to directly export the DMR data to an Excel spreadsheet. The Excel spreadsheet is utilized by DEQ staff to visually verify that the data has been correctly submitted by the permittees and utilizes basic QA/QC calculations to test the accuracy of the submitted data (including permissible monthly, annual, and historical data range variations). At this point DEQ staff verifies the dischargers in the Excel spreadsheet matches the previous year's facility list provided to CBP. Any new facilities are reported to CBP. If any facilities are determined to be missing DEQ staff performs a CEDS database search to determine why the facility is missing and corrects the database as needed. If it is determined that a facility has ceased discharging, DEQ staff reports the information to CBP;

c.) When DEQ staff discovers questionable, missing, or incomplete data, the cell in the spreadsheet is highlighted and a comment is inserted with the rationale as to why the data is in question. The spreadsheet is then sorted into applicable DEQ regions based on facility location and the spreadsheet is distributed to DEQ regional compliance staff with a request to contact facilities to verify the data in question. If regional staff determines that data inconsistencies are due to a discharge change (facility off-line), DEQ staff will report this change to CBP;

d.) Corrections to any data are typically performed by permittees directly through the eDMR system. The corrected eDMR data is directly uploaded to CEDS and DEQ staff once again can mine this data through the use of the Tableau tool. Each Tableau report run by DEQ staff is saved in a file for reference and dated to keep the files organized; and

e.) Any missing data, that is not required to be submitted by permittees or is not submitted by permittees within the CBP data deadline, is calculated by DEQ staff using predetermined default values or calculations and entered into the Excel spreadsheet (Table 3, Table 4).

Table 3: Values for <QL or missing data

BOD5	DO	NH3	NO23	TN	TP	TSS	Source
2		0.2	0.2			1	Below Detection Limit – No Detection - B
4	8					8.97	Default
		TKN/2		TKN+NO23; or Average	Average		Calculated

Table 4: Values for PO4, TON, and TOP parameters

PO4	TON	TOP	Source
IF((([TP]*0.9427)-0.1647)<0,0,(([TP]*0.9427)-0.1647))	TN – NO23 – NH3	IF((TP-PO4)<0,0,(TP-PO4)	Calculated

f.) Once DEQ staff has verified that the data is as correct and complete as possible (including no negative values or missing data), the data is submitted to CBP staff via the online Point Source application.

g.) Within the Point Source application, DEQ staff runs a series of built-in QA/QC checks on the data and makes any necessary changes.

h.) If CBP staff determines that any data is questionable or missing, DEQ staff responds as quickly as possible and attempts to remedy the issues.

i.) For non-significant dischargers, the nutrient loads were derived by using 62% of the TMDL WLA. This method used assumed concentrations of 18.7 mg/L for total nitrogen and 2.5 mg/L for total phosphorus for municipals facilities, while the assumed loads for non-significant industrial dischargers were provided by a contractor. DEQ is in the process of evaluating DMR data for non-significant dischargers to be used in future data uploads.