Maryland
Department of the Environment

Water and Science Administration
1800 Washington Blvd.
Baltimore, MD 21230

Quality Assurance Project Plan

Maryland Nonpoint Source Best Management Practice Implementation Data for Water Quality Modeling

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A - Project Management and Information/Data Quality Objectives

A2 - Approval

Concurrence

Preparer/Author

Name: Gregorio Sandi Title: Project Lead Organization: MD Dept. of the Environment	Signature: Date: 2/19/2025
Name: Elizabeth Hoffman Title: Evaluation and Reporting Coordinator Organization: MD Dept. of Agriculture	Signature: Elizabeth Hoffman Date: 2/19/2025
Name: Alanna Crowley Title: Chesapeake Bay Watershed Forester Organization: MD Dept. of Natural Resources	Signature: Alanna B Crowley Date: Alanna B Crowley (Feb 20, 2025 10:17 EST)

Management/Supervisor

Name: Gregorio Sandi Title: Division Chief, Watershed Rest. Planning Organization: MD Dept. of the Environment	Signature: Date: 2/19/2025
Name: Alisha Mulkey Title: Manager, Program Planning & Eval. Organization: MD Dept. of Agriculture	Signature: Date: 2/19/2025
Name: Anne Hairston-Strang Title: Director and State Forester Organization: MD Dept. of Natural Resources	Signature: Date: Anne Hairston-Strang (Feb 20, 2025 13:56 EST)

Quality Assurance Officer

Name: Matt Stover Title: MDE WQ Standards Division Organization: MD Dept. of the Environment	Signature: Date: 3/5/2025

EPA Chesapeake Bay Program

Name: Auston Smith Title: R3 Delegated Project Manager Organization: EPA CBPO	Signature: David Auston Smith Date: 3-5-2025
Name: Holly Waldman Title: Project Officer Organization: EPA CBPO	Signature: Date:

Approval

EPA Chesapeake Bay Program

Name: Durga Ghosh Title: R3 Delegated Approving Official Organization: CBPO/USGS	Signature: Date: Digitally signed by DURGA GHOSH (Affiliate) Date: 2025.03.05 16:13:43 -05'00'
Name: Title: Organization:	Signature: Date:

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

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.

Document Control

This table shows the changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the Quality Manager.

Table 1: QAPP Versions

Document Control Number	History/Changes	Effective Date

DCN 240379	Updated to the new QAPP Standard guidance (CIO2105-S-02.1), rearranging some of the information to include the bulk of our verification process as an appendix, while describing more of our data QA/QC process in the primary document.	12.1.24
DCN 220078	Updated to the new EPA Heading and Signature page, Dairy Precision Feeding BMP documentation, reattached Appendix A, and included Data Source providers table in the Table of Contents.	1.30.23

A3 - Table of Contents

Appendices
Appendix A: Maryland's BMP Verification Protocols
Appendix B: MDE NEIEN XML Conversion and Submission SOP

A4 - Project Purpose, Problem Definition, and Background

The Maryland Department of the Environment (MDE) collects, tracks, provides quality control, and reports nonpoint source Best Management Practice (BMPs) implementation data for the Chesapeake Bay Program Office (CBPO) modeling efforts. These models assess Maryland's progress towards reducing Total Maximum Daily Loads (TMDLs) targets for nitrogen, phosphorus and sediment loads to the Chesapeake Bay and its tributaries, as well as the Conowingo Reservoir. The BMP data represent Maryland's nonpoint source pollution control efforts to reduce nutrient and sediment loads, which are translated to annual loading estimates via the Chesapeake Assessment and Scenario Tool (CAST). The purpose of this QAPP is to document procedures used annually to verify, process, and submit nonpoint source BMP data received from multiple entities to the National Environmental Information Exchange Network (NEIEN) to the CBPO for the previous state fiscal year.

A4.1 - Project Purpose and Problem Definition

Multiple federal, state, and local agencies are involved in tracking and reporting NPS BMP practices for submission to the CBPO. Three state agencies are responsible for the collection and accuracy of the BMP data. MDE's Water and Science Administration (WSA) is responsible for reporting urban, onsite waste, and wetland BMPs, Maryland Department of Agriculture is responsible for all agricultural BMPs, and Maryland Department of Natural Resources is responsible for forestry BMP reporting.

WSA has been collecting and submitting annual implementation of BMPs to the CBPO since 2005. Known as the "Annual Progress Submission," these data were historically provided in a spreadsheet format transmitted via electronic mail to the CBPO. However, for annual progress year 2010, and subsequent years, the CBPO required submittals via a web service called the National Environmental Information Exchange Network (NEIEN). Here data are validated further by EPA for use in their suite of modeling tools.

In 2017, additional requirements to document how the State verified BMPs are active and operating within their design parameters was required. A document named "Maryland's Best Management Practices Verification Protocols" was created and then revised in 2023.

Other QA Documents

Table A4-1 . Other QA Planning Documents that have Relevant Requirements

Document Title	Directive #, DCN, or Revision	Effective Date	Pertinence to this QAPP
MDE Quality Management Plan (QMP)	DCN 200205.1	9.1.20	State agency QMP
Region 3 EPA QMP	R3QMP001-20200601	6.1.20	Federal agency QMP

Document Title	Directive #, DCN, or Revision	Effective Date	Pertinence to this QAPP
Maryland's BMP Verification Protocols	DCN 240379	12.1.24	Appendix A
MDE NEIEN XML Conversion and Submission SOP	DCN 240379	12.1.24	Appendix B

A4.2 - Project Background

Chesapeake Bay

MDE's WSA has served as Maryland's NPS BMP submission conduit since its inception in the 2010 CBPO annual progress submission. Because MDE was the lead on Maryland's Chesapeake Bay TMDL and Watershed Implementation Planning (WIP) and Conowingo Watershed Implementation Planning (CWIP) processes, it was logical to use WSA as a conduit for reporting information via the National Environmental Information Exchange Network (NEIEN).

Every year, WSA sends out requests to partner agencies, internal data suppliers, and WIP contacts with timelines for submitting BMP data for use in the annual Chesapeake Bay progress submission. The data are currently submitted from other units within MDE, Maryland Department of Agriculture (MDA), and Maryland Department of Natural Resources (DNR) via various formats to WSA's NEIEN Project Lead, currently Dylan Burgevin.

NEIEN is a partnership between the Bay jurisdictions and the CBPO for the secure, real-time exchange of BMP implementation information. The Network uses extensible markup language (XML), web services for geo-location, and common data standards to transmit data from the jurisdictions to the CBPO. Existing data management systems can remain in place and through the Network, data is transferred based on strict formatting methods, or a schema. The schema in use contains fields such as jurisdiction, data source, contact information, name of practice, practice components, unique ID for practices, location, unit of measure, quantity, status, and funding source.

Once WSA receives the BMP data from its partners, it conducts several formatting tests to ensure the information provided is complete and consistent with NEIEN submission formats. An additional limited QA/QC is conducted to check for duplicates, unusual levels of BMP reporting relative to expected levels, make sure dates are within reporting range, look for outliers that do not conform to practice types and ensure BMP names are consistent with existing CBPO values. If non-conforming data are identified, WSA reports results back to its partners for further modification within the constraints of the data reporting schedule. Aside from these checks, the data are assumed to have acceptable levels of quality assurance and quality control (QA/QC) performed by the data provider.

WSA then processes the data into a several datasets with a consistent format that conforms to the NEIEN schema as documented in Maryland's NEIEN XML Generation and Submission to

the Chesapeake Bay Program (Appendix B). The NEIEN XML data is then transmitted to the password protected Exchange Network web portal. The NEIEN submission is acknowledged by email and includes a summary of the individual BMPs processed by its Scenario Builder tool. MDE then can review and update the NEIEN submission prior to it being finalized.

Conowingo

MDE WSA is also the agency responsible for collecting, validating, and reporting NPS BMPs for efforts to reduce nutrients to the Conowingo reservoir. To date, no BMP data for implementing the CWIP have been reported to MDE, but a system is in place to ensure that there is no duplicate accounting for BMPs reported for the Chesapeake Bay WIP efforts.

MDE has been working with the Susquehanna River Basin Commission (SRBC) and Chesapeake Commons to implement and track BMPs that are reported for the CWIP. Through this process, those BMPs will have an identifier clearly labeling them as related to the CWIP effort. Annual reporting requirements for the CWIP have not been established and this QAPP will be updated annually to reflect any changes to this process.

Federal and State Grant Funded BMP Reporting

In Maryland, all BMPs funded through federal or State issued grants are required to be reported through existing BMP reporting avenues by the grant recipient. This includes sources such as the Infrastructure Investment and Jobs Act (IIJA), the Bipartisan Infrastructure Law (BIL), Chesapeake Bay Regulatory and Accountability Program (CBRAP), Chesapeake Bay Implementation Grant (CBIG), the 319 (h) Nonpoint Source grant, the Maryland Bay Restoration Fund (BRF), the Atlantic and Coastal Bays Trust Fund, and many more. Projects installed in agricultural areas will be reported by Soil Conservation Districts to the Maryland Dept. of Agriculture and then to MDE for NEIEN submission. All other project data will be submitted to MDE for annual TMDL implementation or stormwater permit reporting.

MD DNR received this funding for BMP implementation. The project scope is focused on Most Effective Basin (MEB) work and the following BMPs were implemented in 2024:

1) Eden Korean Green Retrofit to Reduce Flooding and Pollution in Rodgers Forge Neighborhood. (Bioretention structure in parking lot)
2) Ecological Restoration for Water Quality in the Little Antietam South Watershed. (958 linear feet of stream restoration, 2.83 acres riparian stream buffer, and 1.52 acres of wetland creation)

A5 - Project Task Description

BMP submissions are aggregated by state fiscal year, July 1st of year A to June 30th of year B (e.g. First submission was for the period July 1st, 2023 to June 30th, 2024). Each annual submission is a full refresh of the data known about nonpoint source BMPs in the State. This

includes accounting for inspections, maintenance, and failures to BMPs that will be reflected in the overall submission to NEIEN. This project acquires data from multiple local jurisdictions, federal and state agencies.

In Maryland, BMPs are routinely tracked at several levels of government. Locally, BMPs are tracked through Maryland Department of Agriculture's Conservation Tracker, MD DNR's Forestry database, MDE's Bay Restoration Fund database, and MDE's Municipal Separate Storm Sewer System permit reporting databases.

The individual agency information is then aggregated into spreadsheets and sent to the Project Lead for quality assurance validation to ensure data conforms to the NEIEN Appendix. BMPs, in general, are reported in one of three levels of geographic scale. Agricultural BMPs are generally reported in a summary table by county. Forestry BMPs are generally reported by county. Stormwater and other Developed Sector BMPs are mostly reported using spatial coordinates. MDE takes the tables of information from all sources and consolidates them. This data is then converted to XML and sent to the Chesapeake Bay Program Office (CBPO) via NEIEN where the CBPO modeling tools distribute them geographically for entry into the watershed model.

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

Details regarding the quality of the NPS BMP data reported by the MDE WSA to the CBPO for use in watershed modeling to estimate restoration progress are documented in the State's NPS BMP Verification Protocols document (Appendix A) updated in 2023. All efforts have been made to produce data that are comparable to data collected previously and currently by other Chesapeake Bay Program grant recipients and partners. Details on the NPS BMP Verification Protocols are included in Appendix A. All BMPs completed must be certified as complete and meeting appropriate standards as deemed by the authorized program.

A7 – Data Providers

The MDE Watershed Protection, Restoration, and Planning Program is the key data aggregator of this information, data providers for this QAPP include the following agencies by data type:

Table A7-1. Data Providers

Data Type	Data Provider
All Agricultural BMPs (Including ag forestry and wetland practices)	**Maryland Department of Agriculture**
Non-Agriculture Forestry BMPs	**Maryland Department of Natural Resources**
Urban Stormwater/Stream Restoration/Wetlands	**MDE Stormwater Dam Safety and Flood Management Program**
Non-Agricultural and non-stormwater related wetlands	**MDE Wetlands and Waterways Program**
Septic Data	**MDE Wastewater Pollution Prevention and Reclamation Program**
Wastewater Data	**MDE Compliance Program**

More information about which specific BMPs come from which agency can be found in MD NPS BMP Verification Protocols located in Appendix A.

Table A7-2. QAPP Distribution List

Organization	Individual
Maryland Department of the Environment	Gregorio Sandi, Christina Lyerly, Dylan Burgevin, Matt Stover (QAM)
Maryland Department of Agriculture	Alisha Mulkey, Elizabeth Hoffman
Maryland Department of Natural Resources	Anne Hairston-Strang, Alanna Crowley, Kara Skipper
US EPA Chesapeake Bay Program	Durga Ghosh, Ruth Cassilly, Auston Smith

A8 - Project Organization

NPS BMPs are funded and installed by numerous federal, state, and local agencies within Maryland including MDA, MDE, DNR, federal facilities, counties, and towns. The BMP data that are generated are maintained and undergo quality assurance procedures by the implementing organization, per Code of Maryland Regulations (COMAR), which includes periodic inspections and maintenance of installed BMPs.

Data are aggregated from multiple sources and reported to their respective State agency for tracking purposes. Each agency provides Quality Assurance controls consistent with requirements for the respective BMP type. This is documented in our BMP Verification Protocols in Appendix A.

- The Chesapeake Bay Program Office is the approval authority for this QAPP

- The Watershed Protection, Restoration, and Planning Program Manager, Jeff White, (senior manager) is responsible for providing knowledgeable personnel, funding, materials, supplies, and time.
- The Watershed Restoration Planning Division Chief, Gregorio Sandi, (project operations manager) is responsible for providing access to Federal, State, and local Best Management Practice data and allocating the personnel time to ensure the QAPP is followed.
- The Water Quality Standards Division Chief, Matt Stover, (Quality Assurance Manager) is temporarily assigned to ensure data is valid and comply with QAPP expectations. They have authority to access and discuss quality-related issues with the organization's senior manager outside of their direct supervisory chain as necessary
- QAPP Maintenance: Christina Lyerly (Chesapeake Restoration Section Manager), Dylan Burgevin (Planner), and a new hire in 2025 (planner TBD).
- Dylan Burgevin (Planner) is the primary lead on assembling and putting data through R assessment tools which automate Quality Assurance controls.
- Stormwater Data: Brian Cooper (Planner), stormwater permit reviewer and annual permit geodatabase developer/maintenance that provides us with annual permit report data for BMPs related to the Developed sector.
- Wetlands Data: Denise Clearwater (Planner), provides wetland creation data from our Wetlands and Waterways Program.
- Onsite Wastewater: MDE's wastewater program maintains a database of data which is required by State law to show installation dates and maintenance dates. WPRPP personnel query the database for information.

Data Contributors will be responsible for the following activities:

- Provide BMP data in templates
- Provide MDE with BMP data that has been verified, validated, and compiled according to the procedures cited in Appendix A.
- Provide updates and corrections to data as needed

Partners will be responsible for the following activities:

- Documenting and implementing a sector-specific QAPP for data provided to MDE
- Aiding when questions arise
- Assuring that the reported BMP data has been verified, validated and compiled according to the procedures cited in Appendix A
- Providing updates and corrections to data as needed

A9 - Project Quality Assurance Manager Independence

The Project Quality Assurance Manager (QAM) is within MDE's Water Quality Standards division, which is independent of environmental information operations. Staff within that division

report to separate managers, but remain in the same overall MDE Watershed Protection, Restoration, and Planning Program (WPRPP). WPRPP management does not get involved in the work detailed in this QAPP. The Operations 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 Operations Manager or designee.

A10 - Project Organization Chart and Communications

The Maryland Department of the Environment is responsible for managing the collection, QA, and submission of Best Management Practice data for the State of Maryland.

- The Watershed Protection, Restoration, and Planning Program Manager, Jeff White, (senior manager) is responsible for providing knowledgeable personnel, funding, materials, supplies, and time.
- The Watershed Restoration Planning Division Chief, Gregorio Sandi, (project operations manager) is responsible for providing access to Federal, State, and local Best Management Practice data and allocating the personnel time to ensure the QAPP is followed.
- The Water Quality Standards Division Chief, Matt Stover, (Quality Assurance Manager) is temporarily assigned to ensure data is valid and comply with QAPP expectations. They have authority to access and discuss quality-related issues with the organization's senior manager outside of their direct supervisory chain as necessary
- QAPP Maintenance: Christina Lyerly (Chesapeake Restoration Section Manager), Dylan Burgevin (Planner), and a new hire in 2025 (planner TBD).
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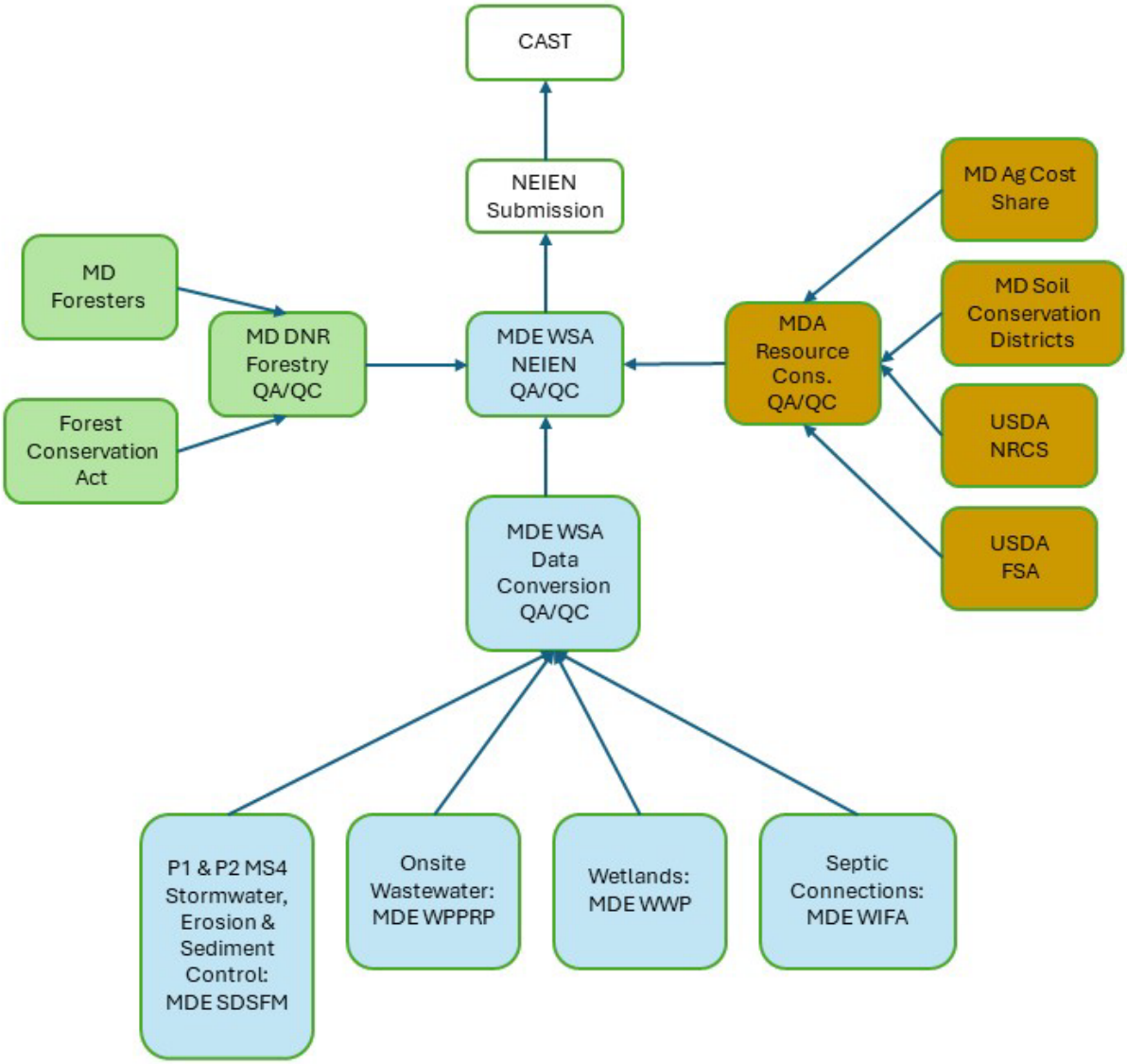
- Onsite Wastewater: MDE's wastewater program maintains a database of data which is required by State law to show installation dates and maintenance dates. WPRPP personnel query the database for information.

Data is collected year-round as permit annual reports are required at different times of the year. The project lead will begin to reach out to data providers in the summer and begin QA of the data after that. As the project lead finds inconsistent or invalid BMP data, it is pulled from the submission and placed into a validation report to send back to the data provider highlighting invalid data.

A10.1 - The Project Organization Chart



A10.2 - Communications

Annual NPS BMP data calls go out to the reporting agencies in September of each year from the Project Lead. As data comes in, the Project Lead will run the data through the QA/QC processes for NEIEN and if there are deficiencies will work with the reporting agencies to correct the information provided.

MDE WSA also communicates with EPA to ensure our data submission is correct and final at the various milestones in the annual NPS BMP submission process.

A11 - Personnel Training/Certification

Any special training or certification required to implement or inspect NPS BMPs is determined and overseen by the implementing organization. Additionally, individuals involved with NPS BMP data management and data quality assurance and control procedures are not required to have special certification. However, to perform these functions effectively training in spreadsheets, databases, geographic information systems (GIS), computer programming such as the R software suite may be necessary.

Some specialized training required to successfully complete this project includes the use of Altova's MapForce and XML Spy software. The use of these products to produce Maryland's NEIEN XML Submission to the Chesapeake Bay Program is required. Any training (MDE internal) is documented, and these records are maintained in the Baltimore office. As future training or retraining needs are identified, Program staff will address them appropriately.

A12 - Documents and Records

Implementing organizations will maintain NPS BMP data sets. These data sets are needed for the NEIEN schemas and are transmitted via established NEIEN protocols for inclusion in the annual progress run input deck. Data included in EPA-CBPO annual reports will be retained electronically in Extensible Markup Language (XML) format by WSA in perpetuity. WSA will send the nonpoint source QAPP electronically to all individuals on the distribution list each year for annual review and comment. Any edits to reflect changes in status or procedure will be incorporated into the final document submitted to the EPA-CBPO on or before December 1st each year. The final, EPA-CBPO approved QAPP will be electronically distributed to the same individuals and will be retained in electronic format on MDE's website and within state of Maryland archiving systems.

B - Implementing Environmental Information Operations

Sections B1 through B7 of this QAPP are not directly applicable to NPS BMP data tracking and reporting. Situations where implementing organizations generate data through sampling to answer research questions do occur but are not included within the boundaries of the data delivery documented in this QAPP. Individual institutions within Maryland will maintain separate

QAPPs for Environmental Information obtained through the sampling and analyses of physical media.

B1 - Identification of Project Environmental Information Operations

B2 - Methods for Environmental Information Acquisition

B3 - Integrity of Environmental Information

B4 - Quality Control

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

B6 - Inspection/Acceptance of Supplies and Services

B7 - Environmental information Management

Please see Appendix B section A4.1 for information on QA/QC processes for Maryland's NEIEN BMP Submission. Data Source Providers are included in section A7 of this document.

C - Assessment, Response Actions, and Oversight

C.1 - Assessments and Response Actions

Assessments are done by the project lead in coordination with the project operations manager. Regular "check-in" meetings are held bi-weekly to discuss data trends and results. At the end of the submission, there is a comparison with previous years to determine if the number of valid records changes over the years and results in more implementation or just increased the number of records because of changed policies (e.g. reporting a single septic pumpout v. an aggregation of pumpouts).

C2 - Oversight and Reports to Management

Status and trends assessments of BMP implementation levels by the Project Lead are done annually as data are submitted, prepared, and reported to the EPA-CBPO. If anomalies, errors, or questionable levels of implementation are suspected, the Project Lead will work directly with implementing organizations to verify and validate reported data.

D - Elements for Environmental Information Review and Usability Determination

D1 - Environmental Information Review

A variety of assessments are performed, using the R suite of software, on the NPS BMP data that are reported to the EPA-CBPO for inclusion in model scenario runs. Some of the data validations that are performed include:

- Duplicate Record Check using R statistical software
- Chesapeake Bay Partnership (NEIEN appendix) acceptance check
- Incomplete Data review
- Valid Implementation and Inspection Dates
- Geocoding of individual practices with jurisdictional boundaries
- Whether or not the BMP is in the correct jurisdiction
- Data formatting to be consistent with NEIEN requirements
- Data validity

Please see Appendix B for additional information on the validation process.

Due to the volume of data received, Maryland overwrites its previous BMP submission annually by providing a quality assured set of BMP data from all data sources, including annual practices. When data is found to be insufficient error reports are generated for data providers, and it is not reported to EPA CBPO. If data can be corrected by the provider in sufficient time, then MDE will do its best to include that information in the submission, but it is not guaranteed. If that data is corrected in subsequent data submissions, MDE will process in a similar manner and if it passes our procedures, it will be submitted via NEIEN, we do not go back record by record to determine what has changed in the most recent data submission. In the same manner, if data is valid one year it will be submitted via NEIEN but if it is not valid in a subsequent year it will not be submitted via NEIEN.

D2 - Useability Determination

Maryland's Verification Protocols, Appendix A, document the methods and processes the various NPS BMP data providers use to ensure that the information sent to the CBPO is valid and up to date.

Appendix A: Maryland's BMP Verification Protocols

Appendix B: MDE's data validation sequence & code

NPS BMP Data-NEIEN QAPP 2024_Final_2.19.2025_eah

Final Audit Report 2025-02-20

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