UPPER SUSQUEHANNA COALITION QUALITY ASSURANCE PROJECT PLAN PROCEDURES FOR COLLECTING, REPORTING, AND VERIFYING AGRICULTURAL, STREAM, AND WETLAND DATA IN THE CHESAPEAKE BAY WATERSHED

OCTOBER 2019

Upper Susquehanna Coalition

TIOGA SOIL AND WATER CONSERVATION DISTRICT

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Upper Susquehanna Coalition
Quality Assurance Project Plan
Procedures for Collecting, Reporting, and Verifying Agricultural, Stream, and Wetland Data in the Chesapeake Bay Watershed

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VERSION TRACKING

This quality assurance project plan (QAPP) for nonpoint source (NPS) data replaces the March 4, 2016 version and complements the New York Department of Environmental Conservation (NYSDEC) QAPP for wastewater and developed sector data (*Quality Assurance Project Plan Procedures for Collecting, Reporting and Verifying Wastewater and Developed Sector Data in the Chesapeake Bay Watershed* November 2019).

QUALITY ASSURANCE PROJECT PLAN REQUIREMENT

New York State (NYS) is a recipient of Chesapeake Bay Regulatory and Accountability Program (CBRAP) and Chesapeake Bay Implementation Grant (CBIG) funds from the U.S. Environmental Protection Agency (EPA). CBRAP grants aid the six Chesapeake Bay watershed states and the District of Columbia in implementing and expanding their jurisdictions' regulatory, accountability, assessment, compliance, and enforcement capabilities in support of reducing nitrogen, phosphorus, and sediment loads delivered to the Bay to meet the Water Quality Goal of the *2014 Chesapeake Bay Watershed Agreement* and the Bay TMDL. CBIG funds are awarded for the purpose of implementing the management mechanisms established under the Chesapeake Bay Agreement, with particular emphasis on state programs for control and abatement of nonpoint source nutrient and sediment pollution (including atmospheric deposition as a NPS). Specifically, CBIG awards support the jurisdictions' implementation of the management strategies developed for each of the applicable outcomes identified in the *2014 Chesapeake Bay Watershed Agreement*.

All organizations conducting environmental programs funded by EPA are required to establish and implement a quality system. EPA also requires that all environmental data used in decision making be supported by an approved Quality Assurance Project Plan (QAPP). Activities supported by New York's CBRAP and CBIG funding that require quality assurance include the compilation, management, and reporting of information on wastewater treatment plants, best management practices (BMPs) for construction sites, stream corridor rehabilitation, wetland restoration, and agricultural BMPs.

QAPP OVERVIEW

The QAPP integrates all technical and quality aspects of a project, including planning, implementation, and assessment (USEPA 2006). The purpose of the QAPP is to document planning results for environmental data operations and to provide a project-specific "blueprint" for obtaining the type and quality of environmental data needed for a specific decision or use. The QAPP documents how quality assurance (QA) and quality control (QC) are applied to an environmental data operation to assure that the results obtained are of the type and quality needed and expected. The QAPP must be composed of standardized, recognizable elements covering the entire project from planning, through implementation, to assessment. These elements are presented in that order and have been arranged for convenience into four general groups. The four groups of elements and their intent are summarized as follows:

A. Project Management - The elements in this group address the basic area of project management, including the project history and objectives, roles and responsibilities of the participants, etc. These elements ensure that the project has a defined goal, that the participants understand the goal and the approach to be used, and that the planning outputs have been documented.
B. Data Generation and Acquisition - The elements in this group address all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are employed and are properly documented.
C. Assessment and Oversight - The elements in this group address the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of assessment is to ensure that the QA Project Plan is implemented as prescribed.
D. Data Validation and Usability - The elements in this group address the QA activities that occur after the data collection or generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the project objectives.

Quality assurance procedures for collection, reporting, and verification of NPS BMP implementation are described in this QAPP. The Upper Susquehanna Coalition (USC) will carry out BMP data collection and reporting in accordance with this QAPP to ensure that data reported are of acceptable quality to meet the needs of the Chesapeake Bay Program (CBP) as specified by the EPA's Chesapeake Bay Program Office (CBPO).

GROUP A – PROJECT MANAGEMENT

The elements in this group address the basic area of project management, including the project history and objectives, roles and responsibilities of the participants, etc. These elements ensure that the project has a defined goal, that the participants understand the goal and the approach to be used, and that the planning outputs have been documented.

A1 – TITLE AND APPROVAL SHEET

Plan Coverage: This *Quality Assurance Project Plan for New York Work Plan for the Chesapeake Bay Program* reflects the overall Quality Assurance Program framework and management systems necessary to assure that data reported by the USC are of acceptable quality to meet the needs of CBP.

Approved:

By: _____ Date: _____

Wendy Walsh, USC Watershed Coordinator / Tioga Co. SWCD District Manager

By: _____ Date: _____

Lauren Townley, Chesapeake Bay Watershed Program Coordinator / New York State Department of Environmental Conservation

By: _____ Date: _____

Carin Bisland, QA Officer / U.S. Environmental Protection Agency, Chesapeake Bay Program

By: _____ Date: _____

Holly Waldman, CBIG Grant Project Officer / U.S. Environmental Protection Agency, Chesapeake Bay Program Office

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A3: DISTRIBUTION LIST

- USC Watershed Coordinator – Wendy Walsh, walshw@co.tioga.ny.us
- USC Chairperson-Jeff Parker, jgparker@stny.rr.com
- USC Agricultural Team Leader – Amanda Barber, amanda.barber@cortlandswcd.org
- USC Agricultural Coordinator – Emily Dekar, dekare@co.tioga.ny.us
- USC Wetland Coordinator – Melissa Yearick, melissa@u-s-c.org
- USC Stream Team Leader – Mike Lovegreen, mike.lovegreen@u-s-c.org
- SWCD Technicians – All USC-member SWCD personnel

A4: PROJECT/TASK ORGANIZATION

A4.1: PROJECT SUMMARY

The USC currently collects data on agricultural, stream, and wetland best management practice (BMP) implementation in the New York portion of the Upper Susquehanna River watershed that drains into the Chesapeake Bay (Figure 1). The specific BMPs reported to EPA and addressed in this QAPP are shown in Table 1. Stream rehabilitation data are tracked and reported as of 2018 Progress (see A5.3). In addition, stream rehabilitation practices currently account for less than 5 percent of pollutant load reductions. The continued improvement of tracking, reporting and verification of stream rehabilitation will be a focus in the next 2 years. Wetland restoration is also tracked and reported. NYSDEC is taking the lead on reporting of wastewater and developed sector data and the verification process is outlined in a separate QAPP developed by NYSDEC. The relationship, or mapping, between these reported BMPs and BMPs implemented under New York's programs is described in section A.6 and shown in Table 4 of Appendix 1. Note that the list of BMPs in Table 4 of Appendix 1 will be updated to address all BMPs tracked and reported as we move forward. Data are aggregated at the county level and provided to the CBPO through the National Environmental Information Exchange Network (NEIEN) node.

We will continue update to our QAPP documents on an as needed basis to provide information regarding any changes that are made to our verification protocols.

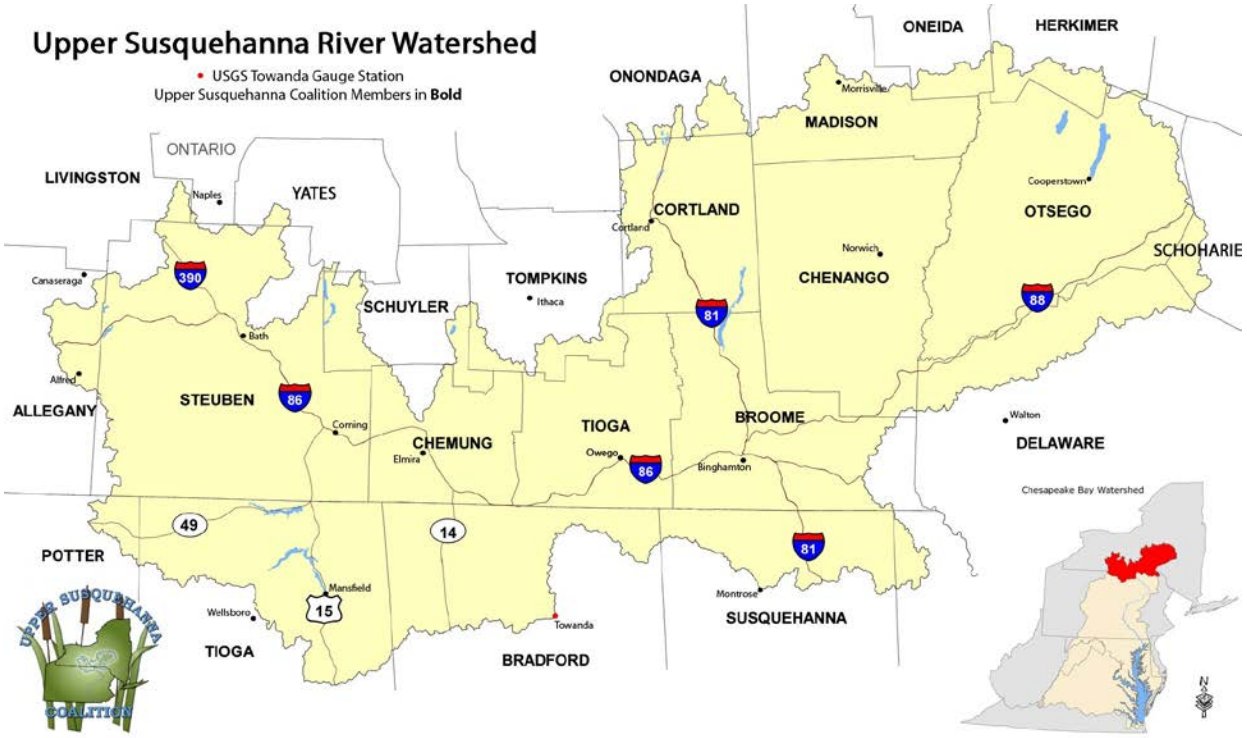


Figure 1. Upper Susquehanna River watershed

Table 1. Nonpoint source BMPs reported to EPA.

BMP	Assessment Type
Animal Waste Management Systems	Visual Multi-Year
Barnyard Runoff Control & Loafing Lot Management System	Visual Multi-Year
Soil and Water Conservation Plans	Non-Visual Single-Year
Conservation Tillage - Tillage Practices (Conservation Tillage, High-Residue Tillage, Low-Residue Tillage)	Visual Single-Year
Dairy Precision Feeding	Non-Visual Single-Year
Nutrient Management Plans Nutrient Application Management (Core N, Core P, N Rate, N Placement, N Timing, P Rate, P Placement and P Timing	Non-Visual Single-Year
Cropland Forest Buffers	Visual Multi-Year
Cropland Grass Buffer	Visual Multi-Year
Exclusion Fence with Grass Buffer	Visual Multi-Year
Exclusion Fence with Grass Buffer Narrow	Visual Multi-Year
Exclusion Fence with Forest Buffer	Visual Multi-Year
Exclusion Fence with Forest Buffer Narrow	Visual Multi-Year
Land Retirement (Land Retirement to Ag Open Space, Land Retirement to Pasture, and Alternative Crops)	Visual Multi-Year
Prescribed Grazing	Visual Multi-Year
Horse Pasture Management	Visual Multi-Year
Cover Crops (Cover Crops, Cover Crops with Fall Nutrients, & Commodity Cover Crops)	Visual Single-Year

Manure Incorporation	Non-Visual Single Year
Ag Tree Planting	Visual Multi-Year
Pasture Alternative Watering	Visual Multi-Year
Stream Rehabilitation - Non-Urban Stream Restoration	Visual Multi-Year
Wetland Restoration	Visual Multi-Year
Wetland Enhancement	Visual Multi-Year
Urban Forest Buffer	Visual Multi-Year
Urban Forest Buffer Narrow	Visual Multi-Year

A4.2: Data Collection Program and Key Project Staff

To date all agricultural, non-urban stream restoration, urban buffers and wetland restoration BMP implementation are reported to the CBPO through the USC. The USC is a network of 22 Soil and Water Conservation Districts (SWCDs) (18 in NY and 4 in PA) that encompass the headwaters of the Chesapeake Bay and work together under a Memorandum of Understanding. The USC is the sole data collector of agricultural, wetland, and stream BMPs implemented in the New York portion of the watershed.

The USC relies on the New York State funded Agricultural Environmental Management (AEM) program (http://www.nys-soilandwater.org) as its framework for data collection, reporting, and verification of agricultural BMPs. AEM is the statewide "umbrella program" that provides a consistent format to efficiently identify and address environmental concerns through a comprehensive on-farm assessment. AEM utilizes a five-tiered process that includes inventory, assessment, plan development, implementation, and evaluation (http://www.nys-soilandwater.org/aem/index.html). The inventory and documentation of existing BMPs occurs during any one of the five tiers, depending on where each particular farm is in the process.

The USC also handles data collection and reporting for stream and wetland BMPs, but this may be accomplished outside of the AEM framework if the participant is not an agricultural producer. Often times these practices can be implemented by various entities in the watershed, including municipalities, state agencies, and rural landowners, many of which fall outside of the AEM program framework.

The USC has developed its own structure for data collection and reporting of agricultural, wetland, and stream BMPs to the Chesapeake Bay Program. To understand the approach used by USC, it is also important to understand the approach the USC takes toward implementation in the watershed. The USC has developed a "Multiple Barrier Approach" (MBA) for planning and implementing restoration projects on a watershed basis. The MBA addresses the issue at the **source** (e.g., headwaters), **across the landscape**, and in the **stream corridor**, as well as **programmatically** (e.g., regulations, training, and protection).

By developing multiple projects to address problems, progress can continue, and tangible results achieved even with smaller funding levels. The MBA approach can increase the probability of success and help capture stakeholder interest by demonstrating progress through implementation.

A successful MBA relies on a firm understanding of how each watershed functions in relation to its hydrological characteristics, drainage patterns, topography, land cover, land uses and misuses, precipitation events, and other parameters. Flooding, streambank erosion**,** gravel deposition, and nutrient loading are both common problems in the Upper Susquehanna River watershed and priority USC issues.

Based on this approach the USC has developed three key focus areas: environmentally and economically sustainable agriculture, stream corridor rehabilitation, and wetland restoration. The USC has supported the use of the MBA by the creation of "teams" for each of these focus areas (Table 2). Each team has a team leader and in some cases a program coordinator. Below is a listing of the key project staff identified for these teams.

Key Project Staff

- USC Watershed Coordinator – Wendy Walsh, walshw@co.tioga.ny.us
- USC Chairperson-Jeff Parker, jgparker@stny.rr.com
- USC Agricultural Team Leader – Amanda Barber, amanda.barber@cortlandswcd.org
- USC Agricultural Coordinator – Emily Dekar, dekare@co.tioga.ny.us
- USC Wetland Coordinator – Melissa Yearick, melissa@u-s-c.org
- USC Stream Team Leader – Mike Lovegreen, mike.lovegreen@u-s-c.org
- USC Buffer Coordinator – Lydia Brinkley, lbrinkley@u-s-c.org
- SWCD Technicians – All USC-member SWCD personnel

Table 2. Focus area team membership

Team Information	Focus Area		
	Environmentally and Economically Sustainable Agriculture	Stream Corridor Rehabilitation	Wetland Restoration
Team Name	Agricultural Team	Stream Team	Wetland Team
Point of Contact	Amanda Barber, Emily Dekar	Mike Lovegreen	Melissa Yearick

USC Team personnel and USC Member SWCD technicians are collectively responsible for QA/QC of data management, practice tracking, verification, record reviews, and reporting. AEM BMP data collection is administered by the USC Member SWCD technicians and is overseen by the USC Agricultural Team Leader and Agricultural Coordinator. Stream BMP data is coordinated and overseen by the USC Stream Team Leader, and Urban Buffer BMP data is coordinated and overseen by the USC Buffer Coordinator. Wetland BMP data is handled solely by the USC Wetland Coordinator as she is involved in all USC wetland implementation projects, has developed a relationship with the U.S. Department of Agriculture (USDA) Natural Resource Conservation Serve

(NRCS), and documents all practices implemented in the watershed regardless of the funding mechanism.

Once all BMP data has been collected by the respective team leader, coordinator, or USC Member SWCD technician, it is then reviewed by the USC Agricultural Coordinator providing another opportunity for QA/QC prior to submission.

A5: Problem Definition/Background

A5.1: USC History and BMP Involvement

EPA's Chesapeake Bay Total Maximum Daily Load (TMDL) requires New York to reduce nutrient and sediment pollutant loads to the Chesapeake Bay. As illustrated by Figure 1, the Susquehanna and Chemung rivers flow south from New York to the Chesapeake Bay. The USC has been New York State Department of Environmental Conservation's (NYSDEC's) primary local partner since New York formally joined the effort to restore the Chesapeake Bay in 2000. New York's efforts to meet its Chesapeake Bay restoration goals rely heavily on the work of the USC to implement BMPs to reduce pollutant loads and to collect data about BMPs that are implemented. Without the USC, New York cannot meet its Chesapeake Bay restoration goals and would be subject to regulatory penalties from EPA.

Established in 1992, the USC is a coalition of 18 SWCDs in New York and 4 SWCDs in Pennsylvania whose mission is to protect and improve water quality and natural resources in the Upper Susquehanna River watershed. Through a Memorandum of Understanding, the Tioga County SWCD is designated as the administrator and fiscal agent of the USC.

A5.2: Importance of Data Reporting

Even before it was formalized in 2000 when the AEM program was enacted into the New York State Agriculture and Markets Law, the USC's SWCDs from New York had begun efforts to collect BMP data. SWCDs have a long history of implementing agricultural NPS BMPs and retain extensive hard copies of their projects in cooperator files. Data were solicited from NRCS, USDA Farm Services Agency (FSA), and SWCD files since the period 1985 to 2005. This timeframe represents the baseline BMP data for New York State. All baseline data collection was completed by December 2005. Data collection has continued since 2006. In 2013, a new online AEM Data Management Application was developed to manage historic and future BMP data collection for reporting to the CBPO. The USC is the sole provider of county-level agricultural, stream, and wetland data reported to the NYSDEC. The NYSDEC manages reporting of data to the CBPO through the NEIEN node. However, with the permission of NYSDEC, the USC also has access to upload XML files directly to the NEIEN node for efficiency in testing XML's.

A5.3: General BMP Reporting Principles

The goal of BMP data collection is to provide information to the CBPO that will assist in a more accurate estimate of baseline practices and future conservation needs on agricultural lands in the New York portion of the Chesapeake Bay watershed. The data are reported in standardized formats and codes via the NEIEN node. The CBPO creates annual progress scenarios using the WSM to describe, assess, and report the status of the restoration efforts, including estimated reductions in

nitrogen, phosphorus and sediment loadings to Chesapeake Bay and its tidal tributaries. The CBPO uses these assessments to track progress toward meeting New York State's current Watershed Implementation Plan (WIP) target loads.

To facilitate accurate reporting of agricultural BMP data, the USC has developed an online AEM Data Management System tool for use by the SWCDs in reporting agricultural data directly from their offices to a server. The tool uses GIS (Geographic Information System) and mapping capabilities to identify and geographically reference BMPs to a specific farm. Annual reporting consists only of new BMPs implemented that particular year and BMPs that were identified that year but not previously captured. Annual or single-year BMPs are reported once they are verified for that year. Previously reported multi-year structural BMPs are only reported once. This is treated as historical data and the data on these multi-year structural BMPs are not re-entered even if the BMP name is changed by the CBPO. BMP units are field verified and reported directly in the units established by the CBPO.

Data collection efforts are handled differently for the stream, urban buffers and wetland practices. For all stream data, the USC Stream Team Leader provides a form (Appendix 11) for each District to log completed practices that were implemented within their county that year. The form is completed by SWCD staff and then sent back to the USC Stream Team Leader who acts as the repository for these practices. Stream data was reported to the CBPO for the first time during the 2018 Progress Submission.

Urban Buffer implementation is tracked by the USC Buffer Coordinator and USC Buffer Stewards. The USC Buffer Coordinator provides a form (Appendix 13) for each Buffer Steward to use for evaluation of implemented practices within their area. Evaluations of urban buffers will happen on an annual basis for the first 3 years following implementation; thereafter the verification protocols outlined in D2.10 – D2.12 will be followed. These data are provided the USC Ag Coordinator on a county by county basis for tracking purposes in the online tool. These data are then included with NYSDEC's submittal of the USC data through the NEIEN node.

Wetland implementation is tracked by the USC Wetland Coordinator, including USC, NRCS, and U.S. Fish and Wildlife Service (USFWS) implementation projects. These data are then provided to the USC Ag Coordinator on a county by county basis. The USC Ag Coordinator manually enters the data it into the online tool. These data are then included with NYSDEC's submittal of USC data through the NEIEN node.

It is important to mention that both cost-shared and non-cost shared practices are being implemented within the watershed. The USC tracks and reports these practices regardless of the implementation mechanism. Cost-shared practices meet CBP or NRCS conservation practice standards. Practices that are implemented without cost share often meet the CBP or NRCS conservation practice standards, but there are cases where such standards are not met despite providing similar environmental benefits. Practices that do not meet the conservation practice standard associated with our state and or federal cost-share programs but still provide a similar annual environmental benefit for water quality are called Resource Improvement (RI) BMPs. The USC will track and report RI practices in accordance with EPA's guidance on reporting and verifying

RI practice implementation (*Chesapeake Bay Program Resource Improvement Practice Definitions and Verification Visual Indicators Report* 2014). SWCD technicians will review and utilize Tier 2 AEM worksheets (see Appendix 2 for an example; others can be found at http://www.nys-soilandwater.org/aem/techtools.html) and complete a visual assessment of these practices in order to document and capture these RI practices in the online tool.

A6: Project Description – BMP Names, Definitions, and Reporting to NEIEN

Agricultural BMP definitions are found in the *USC BMP Data Entry & Verification Guide* which is attached as Appendix 3. Non-Agricultural BMP definitions are found in the Word Document "USC Non-Ag BMP Def.docx" which is attached as Appendix 12. USC BMP to Scenario Builder BMP Mapping is available in the Excel File "BMP Mapping USC-SB-NEIEN.xlsx." which is included as Appendix 4. The information in this worksheet represents the current BMP information, including units and all relationships between CBP BMP names and USC BMP names.

Farms in each county are mapped in GIS. The data are then transferred (digitized) to GIS. USC and SWCD technicians then collect BMP data for each farm, tagging them with the latitude/longitude coordinates of the farm where the BMPs are applied. BMP data are tagged with a Chesapeake Bay identifier to indicate that the BMPs are geographically part of the Chesapeake Bay Watershed. Data are then aggregated by county and processed into the required XML data exchange files for the NEIEN. The NYS Agriculture and Markets Law requires that data be aggregated by county to protect farmer confidentially.

The wetland data is tracked by site using information from the various implementation representatives and compiled by the USC Wetland Coordinator into the Chesapeake Bay Wetland Workgroup tracking spreadsheet. Each site record is assigned a unique identifier and contains acreage, completion date, prior land use, and location information. Wetland data is provided to the USC Ag Coordinator on a county-by-county basis.

The non-urban stream data is tracked by site using information from the various implementation representatives and compiled by the USC Stream Coordinator into a tracking spreadsheet. Each site record is assigned a unique identifier and contains the number of feet of project area, completion date, and location information. Stream data is provided to the USC Ag Coordinator on a county-by-county basis.

The urban buffer data is tracked by site using information from the various implementation representatives and compiles by the USC Buffer Coordinator into a tracking spreadsheet. Each site record is assigned a unique identifier and contains the length, width, total acres, implementation date, prior land use and location information. Urban buffer data is provided to the USC Ag Coordinator on a county by county basis.

A7: Quality Objectives and Criteria

A7.1: Accuracy Objectives

BMP projections are made annually based on the WSM reduction requirements and projects scheduled for that year. These projections are compared to the actual BMPs reported at the end of the year. The USC generates county-level reports from the AEM Data Management System that allows for an end-of-year BMP report for the current year and a total of the historical data for comparison to previous years.

A7.2: Completeness Objectives

There is low potential for double counting BMPs, the inclusion of expired and non-functional BMPs, or failure to implement annual BMPs because the data are site specific. These issues are addressed in greater detail in section B.10.

Each USC-member SWCD collects BMP data throughout the year and data are submitted to the USC by July 31st. A single BMP data transfer XML file is created for each county, accounting for all years, 1985 through current. XML files are named identically as previous years files to overwrite the old data, when uploaded into the NEIEN to better track previously implemented practices that were found in the current year. All new BMPs reported are field verified by technicians. The verification of historic, expired, or annual practices is described in section D2.2.

A8: Training and Certification of Key Staff

The mission of the USC is to protect and improve water quality and natural resources in the Upper Susquehanna River Basin with the involvement of citizens and agencies through planning and implementation of conservation projects, education, and advocacy for water resources. Each of the 18 NY SWCDs that are USC members are designated as the "lead" for water quality issues in their county and each has over 60 years of experience working on water quality issues with local landowners, natural resource partners, municipalities, industries, and regulators.

The USC currently communicates to its 18 NY member Districts using existing infrastructure and well-established relationships and traditions. Furthermore, our strategies are shared through a basin-wide array of professional partnerships that are focused on the Chesapeake Bay watershed effort. Other communication tools include USC bi-monthly meetings and partnerships with crop consultants, nutrient management and CAFO (concentrated animal feeding operation) planners, New York Farm Bureau, and the Northeast Dairy Producers Association. Moreover, the USC has strong partnerships with NRCS, FSA, NYSDEC, NYS Department of Agriculture & Markets, and the Soil and Water Conservation Committee (SWCC) in New York. As a result, the USC is in a strong position to communicate our approach accurately and efficiently.

As described in section A4.2, the USC uses a "multiple barrier approach" for planning and implementation that addresses issues at the source, across the landscape, and in the stream corridor. At the basin-wide scale, the USC uses its success in soil and water conservation to be an active partner in the multi-state effort to restore the Chesapeake Bay. The USC is also the lead in

New York for developing the agricultural NPS implementation portion of the Phase I and Phase II WIPs.

While individual SWCDs implement BMPs across a wide variety of land uses, the USC focuses our efforts on three key focus areas: Environmentally and Economically Sustainable Agriculture, Stream Corridor Rehabilitation, and Wetland Restoration. Each focus area has a team leader and/or coordinator to facilitate effective and efficient implementation within each SWCD and across the basin to meet local and regional water quality goals. Central to the success of the USC is its 'vertical and horizontal' integration: the USC plans, designs, and implements using its own professional staff, technicians and equipment. The USC represents a basin-wide distribution of natural resources professionals that has established relationships and partnerships with stakeholders at every level (local, state, multi-state, and federal). The result has been a productive, decades-long history of strengthening and promoting environmental stewardship and protecting water quality at all scales.

Because the USC and SWCD members recognize the importance of training our resource professionals, each USC focus area has specific training and education opportunities as described below.

A8.1: Agricultural Team Training and Education

Training of resource professionals from the public and private sectors is a vital component of AEM. Training is regularly provided to SWCDs and their partners with NRCS, Cornell Cooperative Extension, Private AEM Certified Planners, Certified Crop Advisors (CCA), NRCS Technical Service Providers (TSP), and agri-businesses. Training is overseen by the AEM State-wide Interagency Committee that reports to the SWCC. It is guided by a Technical Development Curriculum developed by the Conservation Partnership and endorsed by the SWCC and the NYS Conservation Districts Employee's Association (CDEA). The curriculum has two tracks, one for planners who generally identify environmental concerns and opportunities and work with the farmer to plan solutions, and another for technicians who generally develop detailed designs of BMPs and oversee the installation. Training on the curriculum and related topics is provided annually at three venues:

- NYS Water Quality Symposium (WQS) – 3 days of concurrent training held annually in March. Over 300 participants attend including Conservation District staffs and conservation partners from NRCS, Cooperative Extension, AEM Certified Planners, DEC staff, some farmers, and agribusiness representatives. The WQS annually hosts the classroom component of the AEM Planner Certification requirements. The WQS has occurred annually since 1979 and is funded through state funds and participant registrations.
- NYS Conservation Skills Workshop (CSW) – 4.5 days of concurrent field training in support of the curriculum is held annually in October. Training at the CSW is often the field component of classroom training initiated at the WQS. The audience is similar to the WQS and averages 130 participants annually. The CSW has occurred annually since 1997 and is supported through participant registrations and contributions from CDEA, SWCC, and NRCS.
- Northeast Region Certified Crop Advisor Annual Training Session (NRCCA) – 3 days of concurrent training held annually in December for Certified Crop Advisors and all

conservation partners. Sessions are awareness oriented related to conservation programs, regulatory issues, current events, and new technology. Offerings at the NRCCA are coordinated with the Interagency Training Committee. The audience is predominantly CCAs from the public sector (Cooperative Extension, NRCS, and SWCD) and agri-businesses averaging around 150 participants annually. A training component for professional engineers (PEs) associated with AEM Certified Planners is often held in conjunction with the NRCCA or the WQS. The training is supported through participant registrations and has been held since 1992.

In addition to the three annual training events described above, numerous other statewide and regional sessions are offered through the AEM Interagency Training Committee as needed to support the curriculum, programs, and regulations, as well as address emerging needs, issues, and technology. Examples of training opportunities held annually that are available to the conservation partnership, CCAs, TSPs, and agribusiness include:

- AEM: Overview of Procedures and Tools for Inventory and Assessment
- AEM: Overview of Procedures and Tools for Conservation Planning
- AEM Communications Training Phase 1, 2, and 3
- Cropland Conservation Planning Field Session
- Farmstead Resource Concern Identification
- Nutrient Management and Groundwater
- Cover Crops Field Day
- Soil Health Training Course
- Conservation Planning on Pasture
- Cornell Cropware Nutrient Management Planning and RUSLE2 Training
- NRCS Phase 3 Conservation Planning Training

The USC takes a team approach to all of the agricultural issues within the Chesapeake Bay watershed, including BMP data collection. Key USC project staff identified in section A4.2 who are responsible for the BMP data collection efforts include a Watershed Coordinator, Agricultural Team Leader, Agricultural Coordinator and SWCD technicians. USC Staff and the USC-member SWCDs staff maintain a variety of professional certifications that include CCA, Certified Agricultural Environmental Management Planner (AEM Planner), Certified Professional in Erosion and Sediment Control (CPESC), and TSP. These resources are available to all USC-member counties.

A8.2: Stream Team Training and Education

The USC has developed a core group of individuals throughout the membership that enable the USC to address issues related to stream resources. The USC believes that it is critical to both expand that group to include others from member SWCDs as well as expand and continue the professional competency of those involved. Members of the USC Stream Team and SWCD continue to improve skills and knowledge through annual trainings including the WQS and the CSW which both have stream management tracks that our technicians attend. In addition, the USC also seeks out specific training for staff based on program initiatives and priorities, including HEC RAS modeling, Culvert Assessment, etc. The USC recently won the 2015 NYSDEC Environmental Excellence Award for stream training sessions we offer throughout the watershed. Our team is recognized by the state as

being the leader in stream corridor management and as such, offers opportunities for sharing that expertise with partners, agencies, and others as needed.

A8.3: Wetland Team Training and Education

The USC Wetland Team is also comprised of highly trained individuals who are leaders in their field. This is evidenced by the fact that the USC has been designated by the DEC as the official NY wetland data manager for the Chesapeake Bay Program and is responsible for New York's wetland goals in its Chesapeake Bay Tributary Strategy. In addition to that, the USC is the Chesapeake Bay Program's "Wetland Champion" nominated to promote accelerated wetland restoration in the Basin. Our staff attend training similar to the above but also attend NYS Wetlands Forum and other training opportunities throughout the year. The USC Wetlands Team has also been awarded for being leaders of our field, winning the NYSDEC Environmental Excellence Award in 2014 and winning the EPA Environmental Champion Award in 2015.

A9: Documentation and Records

A9.1: Data Collection Process and Data Management Systems

As mentioned in section A4.2, the USC teams and or SWCD members track and collect data for streams, urban buffers, wetlands, and agricultural BMPs implemented in the watershed. The USC Stream Team leader works with SWCD technicians to capture implemented stream rehabilitation projects that meet the CBP definitions. The form currently used to report stream projects is provided in Appendix 11, the information is then summarized by county for submission into the USC tracking database by our USC Ag Coordinator and then reported through the NEIEN node. The form currently used to report urban buffer projects is provided in Appendix 13, the information is then summarized by county for submission into the USC tracking database by our USC Ag Coordinator and then reported through the NEIEN node. Wetland implementation tracked by the USC Wetlands Coordinator includes projects constructed by the Wetlands Team, the USFWS and the NRCS. This information is tracked by project and summarized by county for submission into the USC tracking database by our USC Ag Coordinator, and then reported through the NEIEN node. The respective USC Team Leaders and/or Coordinators maintain hard copies of all implementation data.

The USC Agricultural team and USC member SWCDs are the agricultural data providers. As described in section A4.2, they use the NYS AEM Program as its framework. Each county uses the highly interactive AEM on-farm framework and has resource professionals and peers working with the farmer throughout the process. This framework and associated process are designed to increase farmer awareness of the impact that farm activities have on the environment. Further, it encourages farmer participation and seeks behavioral change, both of which are important overall goals. AEM utilizes the NRCS Planning Process as enhanced by its five-tiered framework. Initial BMP data collection starts with the AEM Tier 1 worksheet which is included as Appendix 5.

USC staff or a SWCD Technician uses the AEM Tier 1 to collect farm contact information; inventories farm infrastructure, land use, and livestock; determines the farm's future plans; informs the farmer of their watershed(s) and watershed concerns; and identifies potential environmental concerns and

opportunities (see http://www.agriculture.ny.gov/SoilWater/aem/techtools.html for details). This information is kept confidential and coded with an individual farm AEM ID.

BMP data collection can be conducted throughout any of the five AEM Tiers by using the USC CBP *Agricultural Environmental Management Ag BMP Data Entry Sheet* which is included as Appendix 6. All relevant agricultural BMP data that will be reported to the CBPO can be captured on this sheet in a form ready for data entry to the online AEM Data Management System. Each SWCD keeps track of BMPs installed under different contracts associated with NYS Agriculture and Markets grants or other non-federal cost share funding. Each District will meet with NRCS and FSA staff at the local level to document and review the list of USDA cost-shared projects. All of this data is then compiled and entered into the AEM Data Management System.

A9.2: Data Retention Time and Loss Prevention

Each SWCD keeps a back-up copy of its own data in a hard copy, Excel spreadsheet, or Access database. These copies are stored in Cooperator Files and/or stored on the SWCD servers. Backup procedures are determined by the District. Once the BMP data is entered into the online AEM data management application, the USC Ag Coordinator can provide data feedback reports about the data to the individual SWCDs and other entities.

AEM plans, on-farm surveys, and assessments filed with the Department of Agriculture and Markets or filed with or prepared by county SWCDs are considered confidential and not subject to public disclosure, except such documents will not be considered confidential as deemed necessary by the Agricultural Commissioner or the SWCDs to implement the purposes of confidentiality. AEM and SWCDs cooperator files are retained permanently.

The AEM Database Management system is housed on virtual servers located at Tioga County. The SQL databases are backed up internally daily. The server is attached to a SAN (storage area network) for hard drive capacity. The virtual server management software along with the SAN tools are creating backups of the server and database daily, weekly, and monthly. Copies of these backups are also stored off site.

A9.3: BMP Inspection Forms

Inspection forms were created utilizing the AEM program template for practice and plan evaluation. The USC Agricultural Team completed this work with the USC Agricultural Committee, which includes additional partners and experts. These forms along with the BMP Data Entry Guide and Verification Guide are reviewed annually by the USC Ag Coordinator and distributed to the USC Ag Team Members. The *USC BMP Data Entry and Verification Guide* can be found in Appendix 3. The BMP information is captured using the AEM Tier 2 (available at http://www.nys-soilandwater.org/aem/techtools.html) and USC CBP Ag BMP Data Entry Sheet (Appendix 6) under the current process.

GROUP B: DATA GENERATION AND ACQUISITION

The elements in this group address all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are employed and are properly documented.

Sections B1 through B8 of an EPA-required QAPP (USEPA 2006) 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. For example, soil samples are taken during the development of a nutrient management plan to determine appropriate fertilizer and manure application rates. Likewise, manure is sampled to determine nutrient content. Details regarding any sampling protocols related to evaluation of NPS BMPs will be incorporated in future versions of this QAPP.

B9: NON-DIRECT MEASUREMENTS

All data used to record and report on agricultural, stream, and wetland BMP implementation in New York's portion of the Upper Susquehanna River watershed is collected directly. There is no reliance on non-measurement sources such as computer data bases, programs, literature files or historic data bases.

B10: Data Management (TRACKING AND REPORTING PROCEDURES)

B10.1: ROLES AND RESPONSIBILITIES

AEM BMP data collection is administered by the USC Agricultural Team. The Agricultural Coordinator is responsible for QA/QC of data management, tracking, verification, record reviews, and reporting. Technicians at the local level through USC-member SWCDs are the lead data collectors responsible for on-site inspections, data collection, and data entry.

1) **Stream Data**: As described previously, stream data are requested via the USC Stream Team Leader and are provided by each SWCD with project implementation data. These data are tracked by county in a spreadsheet format. This information is aggregated at the county level for reporting to the USC Ag Coordinator. The USC Ag Coordinator then enters the data into the database and the stream practices are reported via the NEIEN node along with the agricultural practices.
2) **Wetland Data:** The Wetland Coordinator is responsible for collecting, verifying, and reporting all wetland implementation in the watershed. This information is aggregated at the county level for reporting to the USC Ag Coordinator. The USC Ag Coordinator then enters the data into the database and the wetland practices are reported via the NEIEN node with the agricultural practices.
3) **Agricultural Data**: Each SWCD is responsible for collecting, verifying, and entering agricultural BMP data in their county. Each SWCD keeps track of BMPs installed under different contracts associated with NYS Agriculture and Markets grants or other non-federal

cost-share funding. Each District meets with NRCS and FSA staff at the local level and reviews the list of USDA cost-shared projects. The SWCD staff also participates in DEC CAFO visits and reviews previous year CAFO reporting as another means of ensuring that all BMPs are reported. All of these data are compiled and entered into the AEM Data Management System using a standardized USC CBP Agricultural BMP Data Entry Sheet. Additional details of how BMP data are obtained are provided in section A9.1.

4) **Urban Buffer Data:** The USC Buffer coordinator is responsible for collecting, verifying and reporting of all urban buffer implementation that the USC is involved with the installation of such projects. This data is aggregated at the county level for reporting to the USC Ag Coordinator, who then enters the data into the database and is reported via the NEIEN node with the agricultural practices.

B10.2: Data Management System and Work-Flow Diagram

The AEM Data Management System is an online tool developed using ESRI's ArcServer Software and Microsoft Silverlight. The tool allows for a common database standard that is directly formatted to match the Chesapeake Bay Program's WSM schema. The database is created using SQL Server software and is designed as a multi-tiered relational database.

Figure 2 (also Appendix 7) is a simplified work-flow diagram showing the data flow for BMPs.

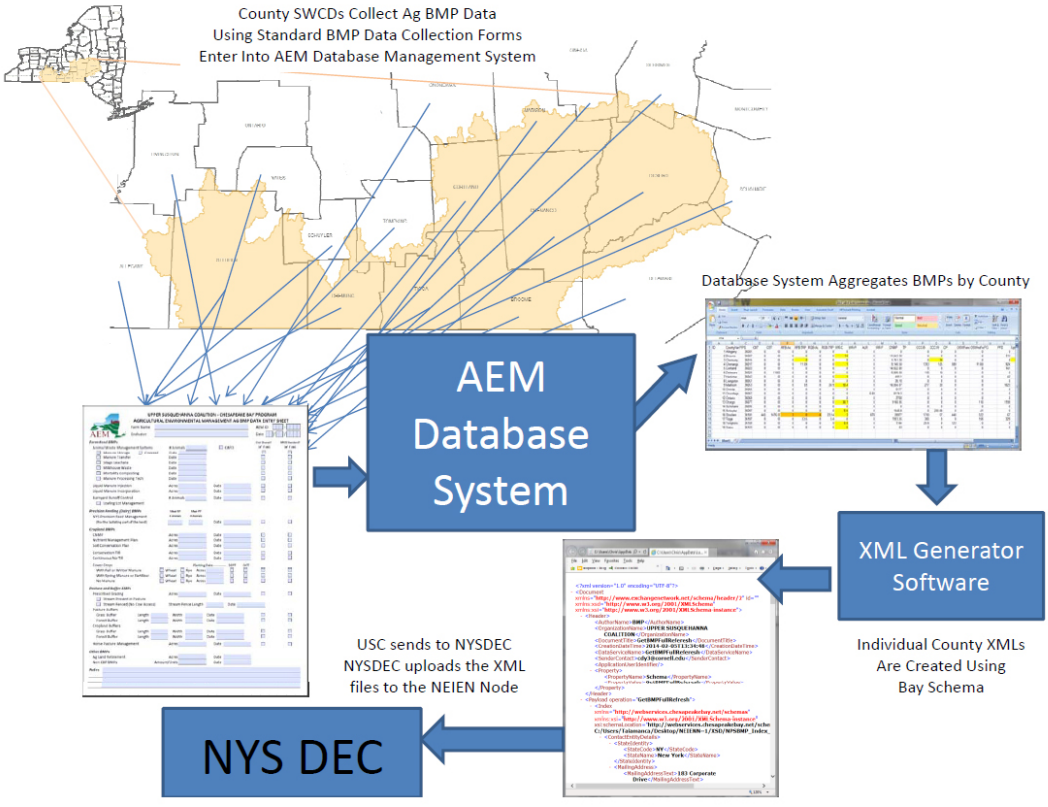


Figure 2. AEM Database System work-flow diagram

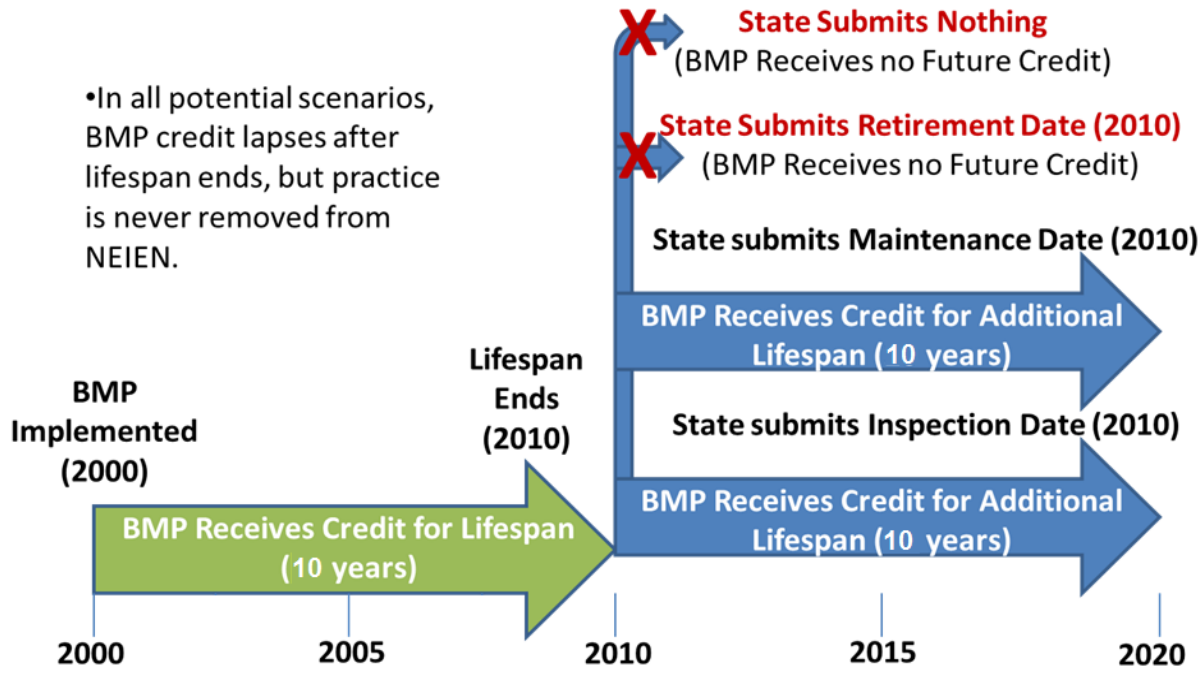
B10.3: Basic File Structure and Data Aggregation

All BMP data are tagged to the latitude and longitude coordinates of the farm where the BMPs are applied. BMP data are also tagged with a Chesapeake Bay identifier to indicate that the BMPs are geographically part of the Chesapeake Bay Watershed. Each farm is referenced by a unique AEM ID number for SWCD tracking, however this AEM ID is not included as part of the information reported through the NEIEN.

All BMP and farm point data collected under the AEM program is protected under NYS Department of Agriculture and Markets Law and confidentiality law. Data are aggregated by county in accordance with this law and processed into the required XML data exchange files for the NEIEN.

B10.4: BMP Lifespans and Tracking

BMP lifespans will be tracked using the implementation date or an updated verification date as illustrated in Figure 3. Lifespans used for BMPs are those set by the CBP. The USC Ag Coordinator has the ability to query data and build customized reports at the counties request. Annual reports identifying practices that are set to expire are produced for the counties each year to allow for practice verification to occur prior to a practice's expiration date.



USC BMP Name	*Credit Duration*
Waste Management Systems	15
Barnyard & Runoff Management	10
Soil Conservation Plants	10
Tillage Practices (Conservation Tillage, High-Residue Tillage, Low-Residue Tillage)	1
Dairy Precision Feeding	1
Nutrient Management (Core N, Core P, NRate, N Placement, N Timing, P Rate, P Placement and P Timing	1
Cropland Forest Buffers (Regular & Narrow)	10
Cropland Grass Buffer (Regular & Narrow)	10
Exclusion Fence with Grass Buffer	10
Exclusion Fence with Grass Buffer Narrow	10
Exclusion Fence with Forest Buffer	10
Exclusion Fence with Forest Buffer Narrow	10
Ag Land Retirement (Land Retirement to Ag Open Space, Land Retirement to Pasture, and Alternative Crops)	10
Prescribed Grazing	10
Horse Pasture Management	10
Cover Crops (Cover Crops, Cover Crops with Fall Nutrients, & Commodity Cover Crops)	1
Manure Incorporation	1
Ag Tree Planting	10
Pasture Alternative Watering	10
Non-Urban Stream Restoration	10
Wetland Restoration	15
Urban Forest Buffer	10
Urban Forest Buffer Narrow	10

Figure 3. BMP lifespan tracking approach

B10.5: Quality Assurance and Quality Control

The USC database is a comprehensive source of agricultural BMP implementation in New York, including BMPs funded by both state and federal programs. The online application of the AEM Data Management System has numerous security measures in place. Staff from USC-member SWCDs are the only people who enter data into the USC database, and all users are issued a unique password and credentials for their assigned geographic extent.

Each year, SWCD staff review BMP implementation data with NRCS and FSA staff at the local level in each county to verify that all federally-funded BMPs are included and that none are double-counted or missed. Once these data entry and quality control processes are complete each year, the USC database becomes the sole source of agricultural BMP information used for New York's annual Progress Reporting.

B10.6: Reporting to the NEIEN

Because USC is not a state entity, the XML files generated are sent to NYSDEC to be uploaded into the NEIEN through the NYSDEC NEIEN network node located in Albany. However, with the

permission of NYSDEC, the USC also has access to upload XML files directly to the NEIEN node for efficiency in testing XML's.

GROUP C: ASSESSMENT AND OVERSIGHT

The elements in this group address the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of assessment is to ensure that the QA Project Plan is implemented as prescribed.

C1: ASSESSMENT AND RESPONSE ACTION

C1.1: STRUCTURE OF ASSESSMENT PROTOCOL

The USC assesses data acquisition and verifications annually, led by the USC Program and Team Leaders and the Watershed Coordinator. The USC member SWCDs are informed of new information concerning BMP data, definitions, collection procedures, entry procedures, and projected timelines for their BMP data management goals. There is an established infrastructure for communication which includes bi-monthly USC meetings, monthly Team conference calls, and a Team e-mail list. Each of these elements offers a mechanism to provide new information, assess progress, answer questions, and have general discussions about all aspects of the BMP data management system. In addition, there are multiple trainings available as described in section A8 and a mandatory annual training for the BMP data management system.

As described in section B10.1, the data providers are SWCD technicians, and all collected data must meet the specifications outlined in sections A9 and B10. The AEM Data Management System also helps to control data quality by limiting data entry to only those data that are suitable for reporting. The data will be verified according to the procedures in Section D.

C1.2: BMP VERIFICATION

The BMPs and definitions that the USC has historically used are identified in section A6 and the appendices referred to therein. The USC continues to assess the current BMPs, definitions, and detailed coding practices to ensure that the highest priority practices are reported, and nutrient and sediment pollutant load reductions are fully accounted for by the Phase 6 WSM. The USC completed a major historical data cleanup in 2015 and continues to review historic data on an annual basis. All newly implemented BMPs are field verified and entered based on the actual year of implementation. The USC has identified the BMPs defined in Appendix 3 and Appendix 12, based on the ability to collect and input associated implementation data into the WSM. The USC Wetland, Stream, and Agricultural Teams continue to work with our partners and experts to achieve these goals while the BMP verification program outlined in Section D is further developed and piloted.

C2: COMMUNICATION AND REPORTS TO MANAGEMENT

Key project staff of the USC (see section A4.2) will be kept informed of project oversight, assessment activities, and findings by the communication infrastructure, which includes bi-monthly USC meetings, monthly and quarterly Team conference calls, and a Team e-mail distribution list.

USC Program Coordinators and Team Leaders complete monthly activity reports that are provided to the USC Watershed Coordinator and sent out to the USC Executive Board for review. USC key project staff will develop other reports as required.

GROUP D: DATA VALIDATION AND USABILITY

The elements in this group address the QA activities that occur after the data collection or generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the project objectives.

D1: DATA REVIEW, VERIFICATION, AND VALIDATION

D1.1: CBPO VERIFICATION PRINCIPLES

The Chesapeake Bay Program has called for increased transparency and scientific rigor in the verification of the BMPs that are implemented as part of the states' WIPs and the Chesapeake Bay TMDL. To respond to this request, *Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework - Report and Documentation from the Chesapeake Bay Program Water Quality Goal Implementation Team's BMP Verification Committee* (Verification Framework) (Chesapeake Bay Program 2014), was developed. The Verification Framework is intended to serve as a guide for the states to document the methodology for verification of BMP installation, function, and continued effectiveness of practices over time. This Verification Framework provides the requirements for reporting and documentation of practice verification for the states to follow. Specific guidance is provided for each of the source sectors (agriculture, forestry, urban stormwater, wastewater, wetlands, and streams).

Verification is formally defined by the Chesapeake Bay Program partners as "the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly." The Chesapeake Bay Program partnership's Principals' Staff Committee formally adopted five verification principles in December 2012; these are described in Table 3. The USC is committed to adhering to these verification principles in the collection and reporting of BMP implementation data.

Table 3. Verification principles adopted by the Principals' Staff Committee

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	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.

D1.2: Initial and Follow-Up Verification Requirements

While it is the goal to verify implementation of all BMPs implemented within the Chesapeake Bay watershed, resource constraints dictate that priorities be set to focus on those BMPs of greatest contribution to achieving each jurisdiction's pollutant load reduction goals. This reality is reflected in Table 4 which summarizes the expected coverage of BMPs for agricultural verification protocols described in the agricultural verification guidance (Appendix B of the Verification Framework). Note that all practices are to be verified at installation or startup. Follow-up verification requirements vary based on program type and practice type, with a range of 5 to 20 percent annually.

Table 4. Summary of verification coverage requirements

Program Type	Practice Type	Initial Verification	Follow-Up or Re-Verification
Non-Cost-Shared BMPs (including Resource Improvement Practices)	Annual	100% BUT sub-sampling allowed for single year BMPs (e.g., tillage practices) that are visually assessed.	Annual survey (using performance criteria and performed by qualified personnel) will determine the total number of annual BMPs. Based on the totals, the number of whole farm verification visits will be determined to achieve follow-up verification of at least 10% of those annual BMPs that account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).
	Multi-Year	100%	10% of those multi-year BMPs which account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).
Cost-Shared BMPs	Annual	100% BUT sub-sampling allowed for single year BMPs (e.g., tillage practices) that are visually assessed.	Annual survey (using performance criteria and performed by qualified personnel) will determine the total number of annual BMPs. Based on the totals, the number of whole farm verification visits will be determined to achieve follow-up verification of at least 10% of those annual BMPs that account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).
	Multi-Year	100%	10% of those multi-year BMPs which account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).
Permit-Based BMPs	Annual	100% BUT sub-sampling allowed for single year BMPs (e.g., tillage practices) that are visually assessed.	At least 20% during annual CAFO inspections.
	Multi-Year	100%	At least 20% during annual CAFO inspections.

D2: Verification and Validation Methods

This section summarizes the approach the USC will use to perform both initial and follow-up verification for both agricultural BMPs and wetlands. Initial verification for stream rehabilitation BMPs is described in sections D2.7-D2.9. Follow up verification will follow the same protocol as other BMP's similar to Wetlands. Over time as practices are changed and reported to the CBPO, additional verification and usability protocols will be developed as needed or as funds become available.

D2.1: Selection of Farms and Practices

New York will meet or exceed the verification frequency requirements in Table 4 for both initial and follow-up verification. New York State performs initial verification of all agricultural BMPs on farms participating in its AEM program, farms with contracts, and CAFO permitted facilities. Follow-up verification frequencies will be based on both the requirements in Table 4 and the relative contribution of BMPs to N, P, and sediment load reductions as supported by Attachment A in Appendix B (*Relative Influence of BMPs in Agriculture Sector*) of the Verification Framework.

Recent efforts of the USC and its partners have focused on the development of the sampling approach for follow-up verification of BMPs. Appendix 1 (*Statistical Sampling Approach to Agricultural BMP Verification in New York State*) describes New York's adaptive management approach for prioritizing BMPs and selecting inspection sites for verification that implemented BMPs are performing as expected based on performance criteria, NRCS practice standards and specifications, engineering specifications, or other applicable criteria.

Our approach is to first evaluate the latest model load reductions from WSM progress runs as a basis for selection of BMPs and determining the required level of verification. BMPs considered the highest priority for developing verification procedures are those that are generally projected to contribute at least 5 percent of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario. In Appendix B of the agricultural verification guidance document, load reductions were compared between a 2018 progress scenario and a *No-Action* scenario. The results for New York are summarized in Table 5. Differences in the BMPs found in Table 5 and those in Table 1 of section A4.1 are due largely to the updated list of BMPs reported for the 2019 progress year. These differences will be resolved as we move forward.

Table 5. BMP-specific load reductions for 2013 vs. no-action scenarios for New York

BMP	Share of Total Agricultural Load Reductions for 2018 vs. No-Action		
	N (%)	P (%)	Sediment (%)
Animal Waste Management System	42.9%	15.6%	0.0%
Barnyard Runoff Control	1.8%	0.6%	0.1%
Cover Crops (Cover Crops, Commodity Cover Crops, Cover Crops w/Fall Nutrients)	4.1%	0.1%	0.4%
Dairy Precision Feeding and/or Forage Management	1.3%	0.5%	0.1%
Forest Buffer	2.6%	0.6%	1.6%
Urban Forest Buffer	0.0%	0.0%	0.1%
Forest Buffer-Streamside with Exclusion Fencing	18.0%	47.2%	43.3%
Grass Buffer	0.8%	0.0%	0.7%
Grass Buffer-Streamside with Exclusion Fencing	8.8%	23.8%	22.2%
Horse Pasture Management	0.0%	0.0%	0.0%
Land Retirement to Ag Open Space	0.6%	-0.2%	0.7%
Non-Urban Stream Restoration	0.0%	0.4%	1.5%
Nutrient Management Core N	3.7%	0.1%	0.0%
Nutrient Management Core P	0.0%	1.8%	0.0%
Nutrient Management N Placement	1.3%	0.0%	0.0%
Nutrient Management N Rate	2.0%	0.0%	0.0%
Nutrient Management N Timing	2.5%	0.0%	0.0%
Nutrient Management P Placement	0.0%	1.3%	0.0%
Nutrient Management P Rate	0.0%	0.5%	0.0%
Nutrient Management P Timing	0.0%	0.3%	0.0%
Precision Intensive Rotational/Prescribed Grazing	1.6%	1.8%	0.0%
Soil Conservation and Water Quality Plans	5.3%	4.0%	16.9%
Tillage Practices (Conservation Tillage, High Residue Tillage, Low Residue Tillage)	1.8%	1.3%	11.9%
Wetland Restoration - Floodplain	0.9%	0.3%	0.7%

In accordance with the Verification Framework, the five (5) BMPs highlighted in Table 5 would require re-verification at a 10 percent rate and the remaining BMPs with ≤5 percent load reduction contribution could be sampled at a 5 percent rate. Per an adaptive verification approach, these sampling rates may be adjusted to address factors such as the risk of BMPs not being maintained and the relative importance of BMPs in the future.

Conservation partners working to advance AEM in NYS have long held planning, implementation of high impact BMPs, and on-going operation and maintenance (O&M) as high priorities. Therefore, the partnership also sought to develop follow-up verification methods that would primarily be of value to the farmer and for conservation and secondarily serve to collect data for progress

reporting as required by the Verification Framework. For this reason, a whole-farm approach was preferred over a BMP-based approach to achieve the required sampling rates for all reported BMPs. This method is designed to avoid artificial and confusing aspects of visiting farms to capture data on a single BMP when other BMPs are likely present (as well as repeat visits to verify independent BMPs) and should better match how farmers see their farms: as whole systems. It is anticipated that a whole-farm approach to verification will lead to more meaningful interactions with farmers about performance of current BMPs and potential for further BMP implementation, as has been the case during AEM Tier 5B evaluations and annual CAFO updates in NYS.

Follow-up verification of the permit-based (CAFO) BMPs has been on-going since 2004. The whole-farm approach has been successful, but full implementation of the planned additional procedures will be even more labor intensive.

The specific method for selecting farms to achieve these sampling frequencies is described in detail in Appendix 1. This method incorporates random sampling of farms to achieve target sampling frequencies within a framework designed to both minimize overall cost and balance workload across NY USC member counties. As found on page 4 of Appendix 1, follow-up inspections of BMPs at CAFOs will be 2.5 times (50 vs. 20 percent) that required by the Verification Framework. Approximately 50 percent of CAFO-permitted farms are inspected by NYSDEC or EPA annually (or 100 percent every two years; essentially verification by census). In addition, preliminary results show that the method achieves the minimum selection targets for BMPs using a farm-based approach (see Table 5 and Figure 3 of Appendix 1).

D2.2: Agricultural BMP Verification Methods

New York will use on-site visual assessments and on-site record reviews for all verification during a BMP's lifespan. On-site assessments for Visual–Multi-Year BMPs are employed to determine if the BMP meets the NRCS practice standards and specifications or the WSM practice definition and is performing as intended. These visual inspections are supported by AEM Tier 2 Worksheets (available at http://www.nys-soilandwater.org/aem/techtools.html), AEM Tier 5B Checklists (Appendix 8 and 9), NRCS practice standards, and any management records. A similar approach is used for Visual–Single-Year BMPs, except that the inspection is timed to occur when the BMP can be visually observed (e.g., late fall through spring for cover crops). On-site assessments for Non-Visual–Single-Year BMPs are also used to determine if the BMP meets the NRCS practice standards and specifications or the WSM practice definition and is performing as intended. These assessments consist of a review of farm management records and further assessment with AEM Tier 2 Worksheets (available at http://www.nys-soilandwater.org/aem/techtools.html), AEM Tier 5B Checklists (Appendix 8 and 9), and NRCS practice standards.

The on-site, non-visual assessment for nutrient management is similar to the verification of other non-visual, single-year BMPs and determines if the BMP(s) was implemented according to the farm's plan (i.e., a current plan based on NRCS definitions for that management area) or BMP definitions from Scenario Builder documentation. For nutrient management in NYS, the plan is based on the NRCS 590 Nutrient Management Standard (either stand-alone or as a part of a broader-based CNMP) and the plan criteria are linked to the different categories reportable for

Nutrient Application Management BMPs. The assessment of whether nutrient applications and other management practices were performed in accordance with the farm's 590 nutrient management plan is based on discussion with the farmer and a review of the 590 plan, nutrient application records, soil and manure analyses, manure application setbacks, and crop rotation records. SWCD technicians use the *USC BMP Data Entry & Verification Guide* (see Appendix 3) as their reference for what to look for within the plan and record keeping documents. Since Nutrient Management is primarily a management practice, if the practice is found to be satisfactory and pass our verification process then the implementation date for that practice will be continued through the verification year. (Example: Original implementation date of 1/1/2017, verification occurred on 5/5/2018 recorded as field verified on this date and passed, implementation date for current progress year would be recorded as 1/1/2018.)

Additional agricultural BMP's submitted with 2019 progress will include Manure Incorporation, Ag Tree Planting, Alternative Crops, Pasture Alternative Watering and Livestock Stream Exclusion. These practices will be 100% verified for 2019 progress and will be incorporated into the Site/Farm Verification Selection Protocol as outlined in section D2.1 for future verification.

All verification is performed by County Conservation Districts, NRCS Staff, Certified AEM Planners, and NYSDEC inspectors (CAFOs). The USC will document verification of non-cost-shared BMPs through confirmation via PE signoff or SWCD evaluation that they meet appropriate government or CBP practice standards. Cost-shared BMPs and those implemented under permit issuing programs are documented by BMP certification or PE sign off.

Re-verification of non-cost-shared and cost-shared BMPs will be performed by SWCD personnel or AEM planners. A farm inventory will be conducted if a practice sunsets within 2 years of the most recent on-site visual inspection. For BMPs implemented under permit issuing programs, re-verification will be performed by SWCD personnel or NYSDEC staff during inspections. Additional information regarding how the USC will address lifespans can be found in section B10.4.

The overall approach for meeting the agricultural BMP verification targets in Table 4 is summarized in Table 6.

Table 6. Summary of proposed agricultural BMP verification approach

Verification Element	BMP Implementation Mechanism[1]		
	Non-Cost-Shared BMPs	***Cost-Shared BMPs***	***Permit Issuing Programs***
Initial Inspection			
Method	Farm Inventory: On Site Visual[2] or Non-Visual[3] Assessment	Farm Inventory: On Site Visual[2] or Non-Visual[3] Assessment	Farm Inventory: On Site Visual[2] or Non-Visual[3] Assessment
Frequency	100% of farms participating in AEM	100% of All farms under contract	100% of all CAFO permitted facilities
Who Inspects	County Conservation Districts, NRCS Staff and Certified AEM Planners	County Conservation Districts, NRCS Staff and Certified AEM Planners	County Conservation Districts, NRCS Staff and Certified AEM Planners, NYSDEC inspectors
Documentation	BMPs meet appropriate government and/or CBP practice standard (PE sign off and/or SWCD evaluation)	BMP certification and/or PE sign off	BMP certification and/or PE Sign off
Follow-Up Check			
Follow-Up Inspection	Annual and Multi-year BMPs: Farm Inventory: On-site Visual[2] or Non-Visual[3] Assessment	Annual and Multi-year BMPs: Farm Inventory: On-site Visual[2] or Non-Visual[3] Assessment	Annual and Multi-year BMPs: On-site Visual[2] or Non-Visual[3] Assessment
Statistical Sub-Sample	Random selection of ≥10% of all farms participating in AEM in order to verify at least 10% of those BMPs that account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).	Random selection of ≥10% of farms with active contracts in order to verify at least 10% of those BMPs that account for >5% of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario (and 5% of those BMPs contributing ≤5% of the load reduction).	50% of all farms w/ active permits.
Response if Problem	Bring into compliance within one year or remove from reported BMPs	Cost Share Program Contract Compliance Policy	NYSDEC CAFO Permit Compliance Policy
Lifespan/Sunset[4]	Re-verification by SWCD personnel and/or AEM planners. If practice sunsets within 2 years of on-site visual inspection a farm inventory will be conducted.		Re-verification by SWCD personnel and/or NYSDEC staff during inspections.

[1]New York State does not employ a Regulatory Program for BMP implementation as defined in the Chesapeake Bay Program Basinwide Framework. All farms under regulation operate within Permit Issuing Programs.

[2]For animal waste management systems, barnyard runoff control, conservation tillage, forest buffers, grass buffers, grass buffers TRP, land retirement, precision rotation grazing, and wetlands (for Initial Inspection only).

[3]For conservation plans, dairy precision feeding, and enhanced nutrient management.

[4]Lifespan to be addressed in accordance with CBP lifespan criteria, including those for Resource Improvement practices.

D2.3: Agricultural BMP Data Validation

In 2015 the USC endeavored to document and further develop the USC data validation and usability protocols. The USC sector teams along with SWCD technicians, additional partners, experts, and outside consultants have been working to document existing and modify new data management practices and procedures to meet the Verification Framework requirements.

Initial validation and verification occur now through our existing data collection and management process. SWCD technicians and partners field verify initial implementation of all BMPs, both those funded through state and federal sources and those funded by landowners independently. Because only SWCD technicians with personal knowledge of practices report data to the data management system, no double counting of BMPs can occur. Initial verification of all BMP's is 100 percent field checked. No data are accepted from other sources or entered into the system without initial verification. The USC Agricultural Coordinator is responsible for QA/QC. Additionally, the on-line data entry tool provides limitations and prompts for reporting that would prevent double counting. See section A9.1 and Group B for more details.

Data collection procedures are described further in sections A5.3, A6, A9, and B10.1 Data management procedures are described further in sections B10.2 through B10.6.

During 2016 and 2017 upgrades were made to the data management system to incorporate the BMP verification framework. These upgrades allow SWCD staff to record inspection dates, and a practice status for each BMP. The retirement/expired function was also updated in our system to incorporate individual BMP lifespans. The USC and SWCD staff completed and will continue to complete on farm BMP verification visits throughout the watershed on an annual basis. Farms are selected annually for BMP Verification using the protocols in Section D2.1. Implementation of the BMP verification process continues to be a substantial time commitment for SWCD staff and the USC Ag Coordinator.

D2.4: Selection of Wetland BMP Verification Sites

New York will meet or exceed the verification frequency requirements in Table 4 for both initial and follow-up verification of wetland BMPs. New York State and implementation partners at NRCS and USFWS perform initial verification of all wetland BMPs reported to the Chesapeake Bay Program. Follow-up verification frequencies for wetland BMPs will be at least 5 percent. The sampling approach described in Appendix 1 will be applied to all wetlands, resulting in at least 5 percent verification of wetlands installed under all programs. A number of these wetlands selected via the approach in Appendix 1 will be verified by NRCS based on its monitoring protocols which are described in Section D2.5. The remaining selected wetlands not implemented by NRCS will be verified by USC or USFWS as described in Section D2.5. Because NRCS annually verifies 20 percent or more of wetlands it installs under the Wetland Reserve Easement (WRE), the coupling of the 5 percent sampling by USC per Appendix 1 with additional NRCS verification will always result in annual verification of at least 5 percent of wetland BMPs.

D2.5: WETLAND BMP VERIFICATION METHODS

The New York Wetland BMP Verification Methods incorporate all wetland related BMPs that are implemented and accounted for within New York's WIP, including wetland restorations and creations. This information is also available in the Excel File "BMP Mapping USC-SB-NEIEN.xlsx." which is included as Appendix 4. Details regarding verification and validation procedures for these practices are contained in Table 7 and summarized herein.

Programs involved in verification include:

- Wetland restoration is funded and implemented primarily by **NRCS** and **FSA** under the Agricultural Conservation Easement Program (ACEP) - Wetland Reserve Easement (WRE) component, formerly known as Wetlands Reserve Protection (WRP). Through the easement program, all wetland practices are initially inspected upon completion, and follow a rigorous monitoring schedule for the duration of the easement. Because these lands are now considered federal "stewardship lands," they must meet certain criteria as described below.
- The **USFWS** partners with NRCS in many of their projects to provide technical assistance. For the projects for which they are partners, NRCS takes the lead on the initial and follow-up verification. However, USFWS also implements wetland restoration on their own; FWS will follow their most current verification protocol as we proceed with this verification process, and where FWS projects are selected by the New York Statistical Sampling approach, USC Wetland Team monitors will assist as needed in performing wetland verification using the NRCS WRP Monitoring worksheet (Appendix 10) to ensure consistency in monitoring data.
- The **USC** often partners with NRCS, USFWS or both to implement wetland restoration projects. For those projects with which USC partners with NRCS, NRCS takes the lead on the initial and follow-up verification. However, USC also implements wetland restoration on its own. In these cases, USC will follow the wetland BMP verification approach outlined in Table 7, including 100 percent initial verification and 5 percent annual field verification of randomly selected sites. Field visits will be completed using the NRCS WRP Monitoring worksheet (Appendix 10) to ensure consistency in monitoring data.
- **Other Groups** including Ducks Unlimited (DU) and various local conservation partners may also implement wetland restoration projects throughout the watershed. For those projects that are reported to the Wetland Coordinator, USC will follow the wetland BMP verification approach outlined in Table 7 including 100 percent initial verification, and 5 percent annual field verification of randomly selected sites. Field visits will be completed using the NRCS WRP Monitoring worksheet (Appendix 10) to ensure consistency in monitoring data.

<u>NRCS WRE Monitoring Methodology</u>

Wetland restoration projects implemented by NRCS are monitored using methodology outlined in the WRP manual which can be found here: http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=17111. This methodology has been approved by the CBP wetland workgroup (Chesapeake Bay Program 2014).

Inspection and maintenance are routinely performed as part of federal agricultural financial assistance programs. With the exception of post-construction monitoring frequency (which still meets the verification requirement of 5 percent annually), New York monitoring of all wetland projects will conform to the following guidelines set forth by NRCS:

- WRE projects are monitored annually for three years, followed by an ownership review in the fourth year, then three years of remote sensing review. Onsite monitoring should occur every five years after that. Monitoring may be more frequent if there are violations or if compatible uses of the wetland have been approved. Note that rehabilitation projects in existing wetlands do not receive nutrient or sediment reduction credit at this time.
- CRP/CREP projects are verified for correct installation. Annual monitoring is required for 10 percent of all active contracts. All of these projects are implemented on private lands where landowners typically inspect the sites a few times throughout the year. Landowners contact NRCS regarding any problems noted during these inspections.

During the monitoring process, the evaluator will record observations based on the questions found on the *NRCS Wetlands Reserve Program (WRP) Monitoring Worksheet* (Appendix 10). The WRP Monitoring Worksheet aims to ensure restoration requirements are being met, evaluate progress, determine what restoration repairs or enhancements may be needed, and maintain contact with the landowner. Photographs are also taken and stored with site visit information. Each implementing agency uses the following checklist for field verification:

- Is the landowner present during the review?
- Has the landowner changed?
- Is the restoration boundary clearly marked and identifiable?
- Are the contract and agreement conditions being met?
- Are restoration practices being properly operated and maintained? (If not, what maintenance is needed? Fill in maintenance practice and cost worksheet.)
- Is the planned hydrology (i.e. saturation or inundation) present? (If no, what actions are needed?)
- Are maximum wildlife habitat objectives being achieved? (e.g. adequate hydrology, nesting cover, etc.)
- Are planned vegetation restoration goals being achieved (e.g. is desired vegetation being established, are invasive or noxious species a problem)? (If no, what modifications are necessary?)
- Are restoration practices being properly operated and maintained? (If no, what maintenance is needed?)
- Are there opportunities to enhance wildlife habitat components?
- Does the landowner have any concerns or suggestions for improvement of the project site?
- Identify concerns or suggestions from partners involved with the restoration and management of the restoration project.
- Additional observations or comments.

Table 7. Summary of proposed wetland BMP verification approach

Verification Element	Wetland BMP Implementation Mechanism Description
Initial Inspection	
Method	**NRCS Easements:** On-site inspection and follow-up off-site/landowner contact **All Other Projects:** On-site inspection through completion of construction
Frequency	**NRCS Easements:** 100% on-site inspection and annually thereafter (on-site, off-site, landowner contact) **All Other Projects:** 100% on-site inspection at installation
Who Inspects	**NRCS Easements:** Technical Specialist, County Conservation Districts or TSP **US FWS Projects:** USFWS Trained Biologist or USC Trained Biologists **USC and Other Voluntary Projects:** USC Trained Biologists or County Conservation District Staff
Documentation	**NRCS Easements:** Reports to District Conservationist and inclusion of a summary of completed spot checks to State NRCS Easement Programs Coordinator who provides documentation to the USC Wetlands Coordinator **US FWS Projects:** USFWS or USC Biologists provides Wetland Coordinator inspection information alongside construction data for the annual data call **USC and Other Voluntary Projects:** USC Wetland Team provides Wetland Coordinator inspection information alongside construction data for the annual data call
Follow-up Check	
Follow-up Inspection	**NRCS Easements:** On-site, off-site, and landowner contact as per the Monitoring Schedule (exceeds 5%) **All Other Projects:** On-site inspection at 5% of all projects including NRCS
Statistical Sub-sample	**NRCS WRP/WRE Easements:** Monitored annually for three years, followed by an ownership review in the fourth year, then three years of remote sensing review. Onsite monitoring occurs every five years after that. Monitoring may be more frequent if there are violations or if compatible uses of the wetland have been approved **NRCS CRP/CREP Easements:** 10% of sites monitored annually for the duration of the easement **All Other Projects:** Field-based site visits selected based on randomized site selection protocol for 5% of reported sites annually
Response if Problem	**NRCS Easements:** Cost-share program Contract compliance policy implemented **All other Projects:** All sites should be brought into compliance within one year or removed from reported BMPs
Lifespan/ Sunset	Re-verification by NRCS, SWCD, or USC personnel throughout the 15-year lifespan determined for the Chesapeake Bay. If practice no longer exists or is no longer functional, the data are to be removed from NEIEN

D2.6: WETLAND DATA VALIDATION

Initial validation and verification occur through USC's existing data collection and management process. Implementation partners and district technicians from throughout the watershed verify initial implementation of all wetlands, both those funded through state and federal sources and those funded by landowners independently. Because only SWCD technicians and federal agency staff with personal knowledge of practices report data to the data management system, no double counting of BMPs can occur. No data are accepted from other sources or entered into the system without initial verification, and the moderate number of sites reported annually allows the Wetland Coordinator to crosscheck each site and ensure that no project is reported twice. The Wetland Coordinator and USC Ag Coordinator are responsible for QA/QC.

Data collection procedures are described further in sections A5.3, A6, A9, and B10.1 Data management procedures are described further in sections B10.2 through B10.6.

During 2016 and 2017 upgrades were made to the data management system to incorporate the BMP verification framework. These upgrades allow for the ability to record inspection dates, and a practice status for each BMP. The retirement/expired function was also updated in our system to incorporate individual BMP lifespans. Wetland Practice BMP verification visits will continue throughout the watershed on an annual basis. Wetland Sites are selected annually for BMP Verification using the protocols in Section D2.1. Implementation of the BMP verification process continues to be a substantial time commitment for SWCD staff, the USC Wetland Coordinator, USC Buffer Coordinator, USC Stream Team Leader and the USC Ag Coordinator.

D2.7: SELECTION OF STREAM RESTORATION BMP VERIFICATION SITES

New York will meet or exceed the verification frequency requirements in Table 4 for both initial and follow-up verification of urban and non-urban stream restoration BMPs. New York State and implementation partners at NRCS perform initial verification of all stream rehabilitation and restoration BMPs reported to the Chesapeake Bay Program. The sampling approach described in Appendix 1 will be applied to provide for a follow-up verification frequency of 5 percent.

D2.8: STREAM RESTORATION BMP VERIFICATION METHODS

The New York stream project verification methods will address all stream restoration BMPs that are implemented and accounted for within New York's WIP. Non-urban stream restoration is a visual assessment-multi-year BMP that can be verified and inventoried by trained/certified personnel (Chesapeake Bay Program 2014). Details regarding verification and validation procedures for these practices are provided here and summarized later in Table 9. SWCD Technicians can also utilize *A Guide to USC Stream Reporting* (see Appendix 15) as an easy to use field document, when verifying stream projects.

The USC's design and implementation of stream restoration BMPs in the watershed will be performed in accordance with the following guiding principles:

1. Stream issues will be approached in a systemic manner considering whole watershed condition and impact

2. When possible, stream issues will be monitored to determine rate and status of observed or perceived impairments
3. Stream issues will be approached wherever possible with clearly identified restoration objectives as opposed to a stabilization approach
4. Restoration includes consideration of geomorphic, hydrologic, habitat, water quality, riparian, social, and economic values
5. Stream issues will be approached in a pragmatic manner with the realization that funding, materials, and other resources are limited
6. The education and involvement of landowners, municipal officials, maintenance personnel, land use planners, etc. is of primary importance in order to effect cultural change in how we manage our streams and watersheds and addressing the assurance of both the success and long-term maintenance of BMPs identified
7. Creative, cost effective approaches to stream restoration are encouraged in management, regulation, and actual in-channel work
8. Lessons learned in our region regarding stream restoration (what works and what doesn't work) will be shared and networked
9. Local empowerment through education, training, actual experience, etc. is a primary objective (use of local designers, contractors, material suppliers)
10. Further research of regional stream system elements is needed to better understand the complexity of local streams
11. All practitioners of stream rehabilitation and restoration will be adequately trained and supervised under the appropriate qualified authority
12. All stream BMPs designed and installed will have plans that clearly identify responsible parties for the inspection, functional verification, and operation and maintenance procedures.

The Urban Stream Restoration BMP Expert Panel (USRBMPEP 2014) recommends a watershed-based approach for screening and prioritizing stream restoration projects. The USRBMPEP also specified the following basic qualifying conditions for allowing stream restoration project credit (USRBMPEP 2014):

1. Stream restoration projects that are primarily designed to protect public infrastructure by bank armoring or rip rap **do not qualify for a credit**.
2. The stream reach must be greater than 100 feet in length and be still actively enlarging or degrading in response to upstream development or adjustment to previous disturbances in the watershed (e.g., a road crossing and failing dams). Most projects will be located on first- to third-order streams, but if larger fourth and fifth order streams are found to contribute significant and uncontrolled amounts of sediment and nutrients to downstream waters, consideration for this BMP would be appropriate, recognizing that multiple and/or larger scale projects may be needed or warranted to achieve desired watershed treatment goals.
3. The project must utilize a comprehensive approach to stream restoration design, addressing long-term stability of the channel, banks, and floodplain.

4. Special consideration is given to projects that are explicitly designed to reconnect the stream with its floodplain or create wetlands and instream habitat features known to promote nutrient uptake or denitrification.
5. In addition, there may be certain project design conditions that must be satisfied in order to be eligible for credit under one or more of the specific protocols described in Section 5.

USC satisfies these requirements through its reliance on available USDA NRCS practice standards and specifications as well as private professional engineers to plan and implement stream channel and corridor rehabilitation and restoration projects in the watershed. Practices for stream restoration are implemented in accordance with engineering principles and processes specified in the National Engineering Handbook Part 654, Stream Restoration Design. This includes establishment of goals and objectives, site assessment and investigation, a stream restoration design process, sediment impact assessments, project implementation, and maintenance and monitoring.

Quality assurance measures for designed and constructed practices will be based on application of NRCS practice standards and specifications and/or engineered designs for stream restoration and riparian land best management practices. Based on the standard applicable to the practice installed, the appropriate units and measurements will be tracked for each practice at each site.

The USC, its member Soil and Water Conservation Districts, and all partners engaged in any and all projects associated with stream channel and corridor BMP identification, design and implementation, recognize the need for quality, engineering based approach. As such, any BMP will adhere to both the standards and specifications for such practices as identified by the Engineering Field Manual developed and adopted by the NRCS. In the absence of practice specific standards and specifications for a specific BMP needed to address a stream corridor/channel need, acceptable engineering practices and standards will be used and certified by a licensed engineer

The Stream Team is most comfortable using the BEHI (Bank Erosion Hazard Index) to determine potential sediment loading from the site but may explore additional methods. The BEHI estimates sediment loading, and nitrogen and phosphorus loads are usually calculated using standard soil nutrient content values from NRCS. The USC started reporting non-urban stream restoration in "length of restoration", using measurement units of feet for 2018 Progress. The USC expects the implementation numbers to increase in future years as verification of stream practices that were previously implemented but were not yet reported into the database system are entered into the system for tracking and reporting.

Table 8. Summary of proposed stream restoration BMP verification approach

Verification Element	Stream Restoration BMP Implementation Mechanism Description
Initial Inspection	
Method	**NRCS Projects:** Operation and maintenance and inspection protocols **All Other Projects:** On-site inspection through completion of construction
Frequency	100% on-site inspection
Who Inspects	NRCS and USC
Documentation	USC Stream Team Leader provides a form (Appendix 11) for each District to log completed practices that were implemented within their county that year. The form is completed by SWCD staff and then sent back to the USC Stream Team Leader who acts as the repository for these practices.
Follow-up Check	
Follow-up Inspection	Annual on-site inspection of a randomly selected 5% subset of all projects
Response if Problem	**NRCS:** Cost-share program Contract compliance policy implemented **All other Projects:** All sites should be brought into compliance within one year or removed from reported BMPs
Lifespan/ Sunset	Re-verification by NRCS, SWCD, or USC personnel throughout the project lifespan as determined for the Chesapeake Bay. If practice no longer exists or is no longer functional, the data are to be removed from NEIEN

D2.9: Stream Restoration BMP Data Validation

Initial validation and verification occur through USC's existing data collection and management process. Implementation partners and district technicians from throughout the watershed verify initial implementation of all stream restoration projects, both those funded through state and federal sources and those funded by landowners independently. Because only SWCD technicians and federal agency staff with personal knowledge of practices report data to the data management system, no double counting of BMPs can occur. No data are accepted from other sources or entered into the system without initial verification, and the moderate number of sites reported annually allows the Stream Team Leader to crosscheck each site and ensure that no project is reported twice. The USC Stream Team Leader and Stream Team are responsible for initial QA/QC. Final QA/QC is performed by the USC Agricultural Coordinator prior to submission.

Data collection procedures are described further in sections A5.3, A6, A9, and B10.1 Data management procedures are described further in sections B10.2 through B10.6.

D2.10: Selection of Urban Buffer BMP Verification Sites

New York will meet or exceed the verification frequency requirements in Table 4 for both initial and follow-up verification of Urban Buffer BMPs. The USC Buffer Coordinator and staff perform

initial verification of all urban buffer BMPs reported to the Chesapeake Bay Program. The sampling approach described in Appendix 1 will be applied to provide for a follow-up verification frequency of 5 percent.

D2.11: Urban Buffer BMP Verification Methods

The New York urban buffer verification methods will address all urban buffer BMPs that are implemented and accounted for within New York's WIP. Urban buffer is a visual assessment-multi-year BMP that can be verified by trained and certified personnel (Chesapeake Bay Program 2014). Details regarding verification and validation procedures for these practices are provided in Appendix 14 (USC Forest Buffer Monitoring Protocol) and summarized later in Table 10.

Urban Buffers are typically small in size and located in public areas, therefore the USC Buffer Coordinator and staff monitor and evaluate these urban buffer practices on an annual basis for 3 years following implementation. The USC has developed a monitoring worksheet attached in Appendix 13 (Riparian Buffer Assessment Sheet 2017). After the initial 3 years of monitoring and evaluation, all urban buffers will be verified at a minimum frequency of 5 percent.

Table 9. Summary of proposed Urban Buffer BMP verification approach

Verification Element	Urban Buffer BMP Implementation Mechanism Description
Initial Inspection	
Method	**NRCS Projects:** Operation and maintenance and inspection protocols **All Other Projects:** On-site inspection through completion of establishment
Frequency	100% on-site inspection for first 3 years
Who Inspects	USC Buffer Coordinator and USC Buffer Stewards
Documentation	USC Buffer Coordinator provides a form (Appendix 13) for all Buffer Stewards to log completed practices that were implemented within their county that year. The form is completed by Buffer Stewards and then sent back to the USC Buffer Coordinator who acts as the repository for these practices.
Follow-up Check	
Follow-up Inspection	Annual on-site inspection of a randomly selected 5% subset of all projects
Response if Problem	All sites should be brought into compliance within one year or removed from reported BMPs
Lifespan/ Sunset	Re-verification by USC personnel throughout the project lifespan as determined for the Chesapeake Bay. If practice no longer exists or is no longer functional, the data are to be removed from NEIEN

D2.12: URBAN BUFFER BMP DATA VALIDATION

Initial validation and verification occur through USC's existing data collection and management process. USC Buffer Coordinator and additional buffer stewards throughout the watershed verify initial implementation of all urban buffer projects, both those funded through state and federal sources and those funded by landowners independently. Because only USC or SWCD technicians with personal knowledge of practices report data to the data management system, no double counting of BMPs can occur. No data are accepted from other sources or entered into the system without initial verification, and the moderate number of sites reported annually allows the USC Buffer Coordinator to crosscheck each site and ensure that no project is reported twice. The USC Buffer Coordinator and USC Ag Coordinator are responsible for QA/QC.

Data collection procedures are described further in sections A5.3, A6, A9, and B10.1 Data management procedures are described further in sections B10.2 through B10.6.

ACRONYMS

AEM – Agricultural Environmental Management program of NYS

BMP – Best Management Practices

CAFO – Concentrated Animal Feeding Operation

CBIG – Chesapeake Bay Implementation Grant

CBP – Chesapeake Bay Program

CBPO – Chesapeake Bay Program Office

CBRAP – Chesapeake Bay Regulatory and Accountability Program

CCA – Certified Crop Advisor

CDEA – New York's Conservation Districts Employee's Association

CPESC – Certified Professional in Erosion and Sediment Control

CSW – Conservation Skills Workshop

DEC – New York State Department of Environmental Conservation

EPA – U.S. Environmental Protection Agency

ESRI – Environmental Systems Research Institute

FSA – USDA Farm Services Agency

GIS – Geographic Information System

MBA – Multiple Barrier Approach

N - Nitrogen

NEIEN – National Environmental Information Exchange Network

NPS – Nonpoint Source

NRCCA – Northeast Region Certified Crop Advisor

NRCS – USDA's Natural Resources Conservation Service

NY – New York

NYS – New York State

O&M – Operation and Maintenance

P - Phosphorus

PE – Professional Engineer

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

QC – Quality Control

RAID 5 – Redundant Array of Independent (or Inexpensive) Disks. RAID 5 is the most common RAID configuration for business servers and enterprise NAS (network-attached storage) devices. A RAID-enabled system uses two or more hard disks to improve the performance or provide some level of fault tolerance for a machine—typically a NAS or server. Fault tolerance simply

means providing a safety net for failed hardware by ensuring that the machine with the failed component, usually a hard drive, can still operate. Fault tolerance lessens interruptions in productivity, and it also decreases the chance of data loss.

RI – Resource Improvement

RUSLE2 – Revised Universal Soil Loss Equation Version 2

SQL – Structured Query Language. This is a special-purpose programming language designed for managing data held in a relational database management system, or for stream processing in a relational data stream management system.

SWCD – Soil and Water Conservation District

TMDL – Total Maximum Daily Load

TSP – Technical Service Provider for NRCS

USC – Upper Susquehanna Coalition

USDA – U.S. Department of Agriculture

WIP – Watershed Implementation Plan

WQS – Water Quality Symposium

WSM – Chesapeake Bay Program Watershed Model

XML – EXtensible Markup Language. XML was designed to store and transport data.

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Principles for Verifying Stream Restoration Projects: http://www.chesapeakebay.net/channel_files/20794/attachment4b._principles_for_verifying_stream_restoration_project_june_6-2013_ver_final_draft-track_changes.docx

U4. Urban Stream Restoration Fact Sheet:
http://www.chesapeakebay.net/documents/U4._Urban_Stream_Restoration_Fact_Sheet_in_Chesapeake_Bay_Watershed.pdf

APPENDICES