# UPPER SUSQUEHANNA COALITION QUALITY ASSURANCE PROJECT PLAN PROCEDURES FOR COLLECTING, REPORTING, AND VERIFYING NONPOINT SOURCE DATA IN THE CHESAPEAKE BAY WATERSHED

*MARCH 4, 2016*

**Upper Susquehanna Coalition**

**TIOGA SOIL AND WATER CONSERVATION DISTRICT**

**183 CORPORATE DR.**

**OWEGO, NEW YORK 13827**

**607-687-3553**

# *UPPER SUSQUEHANNA COALITION*
# *QUALITY ASSURANCE PROJECT PLAN*
# *PROCEDURES FOR COLLECTING, REPORTING, AND VERIFYING NONPOINT SOURCE DATA IN THE CHESAPEAKE BAY WATERSHED*


USC Administrative Office:

Tioga Soil and Water Conservation District

183 Corporate Dr.

Owego, New York 13827

607-687-3553

USC Watershed Coordinator / Tioga Co. SWCD District Manager

Wendy Walsh

183 Corporate Dr.

Owego, New York 13827

607-687-3553

walshw@co.tioga.ny.us


Project Organization: Upper Susquehanna Coalition (USC)


Prepared by:

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

Amanda Barber, USC Agricultural Team Leader / Cortland Co. SWCD District Manager

Chris Yearick, USC GIS Specialist

# VERSION TRACKING

This quality assurance project plan (QAPP) for nonpoint source (NPS) data complements the New York Department of Environmental Conservation (DEC) QAPP for point source data (*Quality Assurance Project Plan Procedures for Collecting, Reporting and Verifying Point Source Data in the Chesapeake Bay Watershed* November 2015).

# 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: _____

Rich Batiuk, Associate Director for Science, EPA/ Chesapeake Bay Program

By: _____ Date: _____

Kevin DeBell, EPA/ Chesapeake Bay Program

By: _____ Date: _____

Mary Ellen Ley, QA Coordinator, USGS/Chesapeake Bay Program

## A2 – TABLE OF CONTENTS

## LIST OF FIGURES

## LIST OF TABLES

## A3: DISTRIBUTION LIST

- USC Watershed Coordinator – Wendy Walsh, walshw@co.tioga.ny.us
- USC GIS Specialist – Chris Yearick, cdy3@cornell.edu
- USC Chairperson-Jeff Parker, jgparker@stny.rr.com
- USC Agricultural Team Leader – Amanda Barber, amanda.barber@cortlandswcd.org
- USC Agricultural Coordinator – vacant
- 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*

New York State 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. Note that this list includes BMPs that we anticipate tracking for the Phase 6 CBP Watershed Model (WSM). Stream rehabilitation data are tracked but not currently reported because procedures are not finalized (see A5.3). In addition, stream rehabilitation practices currently account for less than 5 percent of pollutant load reductions. Improving tracking, reporting and verification of stream rehabilitation will be a focus in the next 2 years. Wetland restoration is tracked and reported. NYS does not currently track or report forest harvesting BMPs. Verification procedures for these practices have not been developed. 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 plan to update our QAPP documents in the future to provide information about practices not currently tracked or reported. In addition, EPA has given jurisdictions a 2-year timeframe to ramp up verification protocols and currently our protocols focus on agricultural practices that account for >5% of nutrient and sediment reductions. Moving forward during the pilot phase, we will evaluate those agricultural BMPs that account for ≤5% of the load reductions. Stream rehabilitation is an example of this.

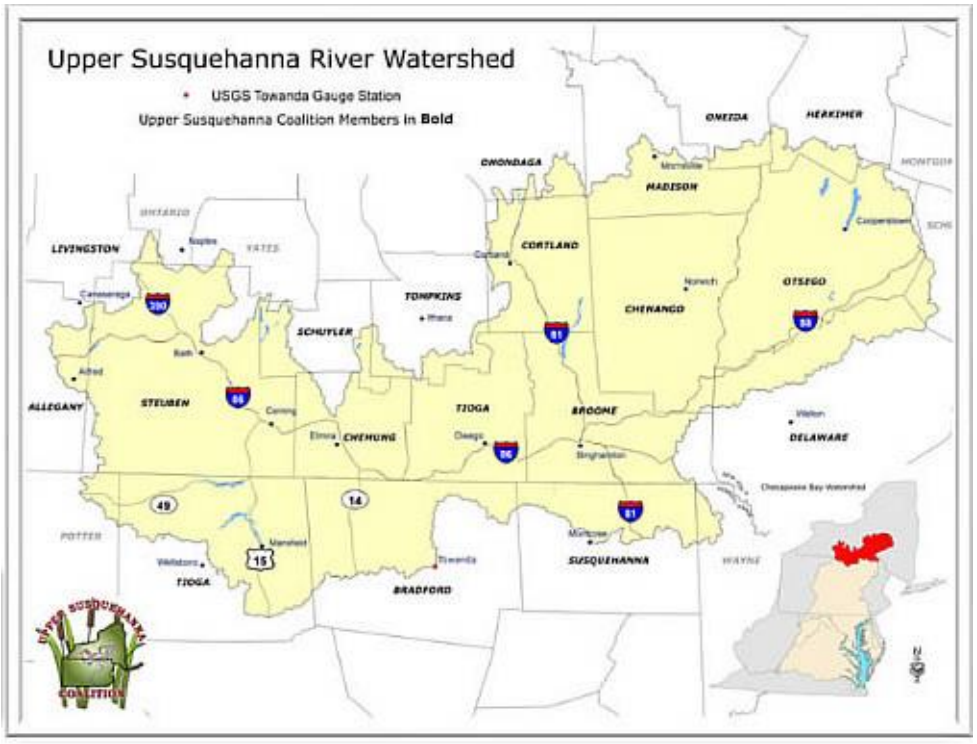



**Figure 1. Upper Susquehanna River watershed**

**Table 1. Nonpoint source BMPs reported to EPA.**

| BMP | Assessment Type |
|---|---|
| Animal Waste Management Systems | Visual Multi-Year |
| Barnyard Runoff Control | Visual Multi-Year |
| Loafing Lot Management System | Visual Multi-Year |
| Conservation Plans | Non-Visual Single-Year |
| Conservation Tillage | Visual Single-Year |
| Dairy Precision Feeding | Non-Visual Single-Year |
| Nutrient Management Plans | 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 Forest Buffer | Visual Multi-Year |
| Land Retirement | Visual Multi-Year |
| Prescribed Grazing | Visual Multi-Year |
| Horse Pasture Management | Visual Multi-Year |
| Cover Crops | Visual Single-Year |
| Stream Rehabilitation | Tracked but Not Yet Reported |
| Wetland Restoration | Not Yet Developed |
| Wetland Enhancement | Not Yet Developed |

## *A4.2: Data Collection Program and Key Project Staff*

To date all agricultural and wetland BMP implementation is reported to the CBPO through the USC. The USC is a network of 19 Soil and Water Conservation Districts (SWCDs) (16 in NY and 3 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 both 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 GIS Specialist – Chris Yearick, cdy3@cornell.edu
- USC Chairperson-Jeff Parker, jgparker@stny.rr.com
- USC Agricultural Team Leader – Amanda Barber, amanda.barber@cortlandswcd.org
- USC Agricultural Coordinator – vacant
- 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

**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 | Mike Lovegreen | Melissa Yearick |

USC Team personnel and USC Member SWCD technicians are all involved in the collection and reporting of data for all 3 focus areas.

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 collection is coordinated and overseen by the USC Stream Team Leader, and data are provided by the SWCD technicians.

Wetland BMP data collection is handled by the 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 Resources Conservation Service (NRCS), and documents all practices implemented in the watershed regardless of the funding mechanism.

Key project staff are collectively responsible for QA/QC of data management, tracking, verification, record reviews, and reporting. The technicians at the local level through member county SWCDs are the lead data collectors responsible for on-site inspections, data collection, and data entry.

# 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 (DEC'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 16 SWCDs in New York and 3 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 historical 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 DEC. The DEC manages reporting of data to the CBPO through the NEIEN node.

## *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 the New York State Phase II 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. The USC accesses the USDA federal cost-share practice data annually through a 1619 data-sharing agreement[1]. These USDA data are used only for QA purposes to ensure BMP data were not missed through AEM reporting. Any missing data would then be field verified and reported by the USC.

Data collection efforts are handled differently for the stream and wetland practices. For streams the USC Stream Team Leader provides a form 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. At this time the data are not provided to the CBPO because the USC still needs to find a way to document and capture this information with the online tool for reporting thru the NEIEN node.

Wetland implementation is tracked by the USC Wetland Coordinator, including NRCS implementation. These data are provided to the GIS Specialist on a county by county basis. The GIS Specialist then sums the wetland data implemented by each county and manually enters it into the online tool. These data are then included with DEC'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

BMP definitions are found in the Microsoft Word file "USC Ag BMP Deff6.15" which is attached as Appendix 3. On page 11 of that document is a spreadsheet table (NEIEN_NPS_BMP_CBP_Data_Flow_P6AppendixA_1_06092015.xlsx) showing USC BMP to Scenario Builder BMP Mapping. This information is also available in final form on worksheet "USC Names w NEIEN" of the Excel file "NEIEN_NPS_BMP_CBP_Data_Flow_P6Appendix_06252015 (USC).xlsx" which is included as Appendix 4. The information in this worksheet represents the current 2015 BMP information, including units and all relationships between CBP BMP names and USC BMP names. All BMPs are current, including the stream exclusion fencing BMP which was changed by

[1]By signing a 1619 Conservation Cooperator Agreement with NRCS and FSA, New York is granted access to the USDA's datasets while maintaining data confidentiality as required by Section 1619 of the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill).

EPA and is included in the NEIEN table. The USC is requesting a new Scenario Builder BMP for cover crop BMPs highlighted in yellow in rows 15 and 18 of the "USC Names w NEIEN" worksheet in the Excel file "NEIEN_NPS_BMP_CBP_Data_Flow_P6Appendix_06252015 (USC).xlsx".

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 are aggregated when collected and provided to the GIS Specialist on a county-by-county basis. The USC is currently working on how to report collected stream rehabilitation project data into the tracking system as well.

## 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 is in the process of generating county-level reports from the AEM Data Management System that will allow 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 by October first. A single BMP data transfer XML file is created for each county, for each year. This creates a data calendar year that starts on October first and ends on October first of the following year. All new BMPs reported are field verified by technicians. The verification of historical, expired, or annual practices (BMP data are coded by year of implementation) is under development and 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 16 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 16 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, DEC, 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 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 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, GIS Specialist, 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, 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 USC Stream Team and GIS Specialist are working with a consultant to develop a way to enter these data into our online tool in order to submit this information to the CBPO through the NEIEN node. Wetland implementation tracked by the USC Wetlands Coordinator includes projects constructed by the Wetlands Team and the partner NRCS. This information is tracked by county, entered into the summary table by our GIS Specialist, and then reported through the NEIEN node. Both the USC GIS Specialist and the USC Wetlands Coordinator keep hard copies of the wetland implementation data. Similarly, both the USC Stream Team Leader and GIS Specialist keep stream implementation records.

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 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 an SWCD Technician uses 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 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 to document and review the list of USDA cost-shared projects. All of these data are 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 are entered into the online AEM data management application the USC GIS Specialist 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 servers located at the Southern Tier Central Regional Planning and Development Board. The SQL databases are backed up internally daily. The server is set up with RAID 5 and has an extra drive installed. That extra drive will have data written to it if a drive fails. Backup copies are created on RD1000 tape media periodically depending on new data installed or created.

### *A9.3: BMP Inspection Forms*

Inspection forms are currently being considered and investigated by the USC Agricultural Team working with the USC Agricultural Committee, which includes additional partners and experts. This process is under development and included in the BMP verification program in Section D. 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, and historical 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 and the GIS Specialist are 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. The USC is currently tracking the practices and plans to develop a procedure for reporting these data in the future.

2) **Wetland Data:** The Wetland Coordinator is responsible for collecting, verifying, and reporting to the GIS Specialist all wetland implementation in the watershed. This information is aggregated at the county level for reporting to the GIS Specialist. The GIS Specialist then enters the data into the database after the information is aggregated from the AEM online tool. 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 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.

### *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.

The AEM Data Management System is housed on servers located at the Southern Tier Central Regional Planning and Development Board. The SQL databases are backed up internally daily. The server is set up with RAID 5 and has an extra drive installed. That extra drive will have data written to it if a drive fails. Backup copies are created on RD1000 tape media periodically depending on new data installed or created.

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

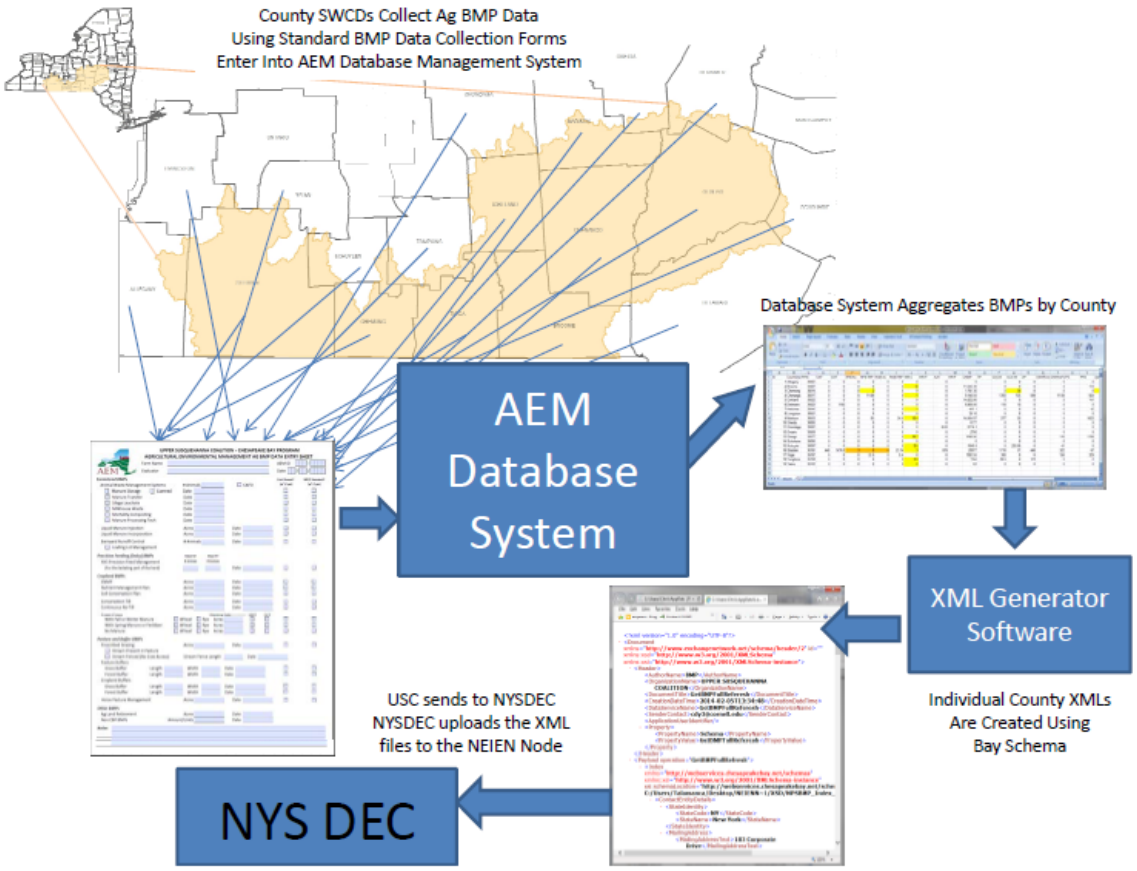



**Figure 2. AEM Database System work-flow diagram**

### *B10.3: Basic File Structure and Data Aggregation*

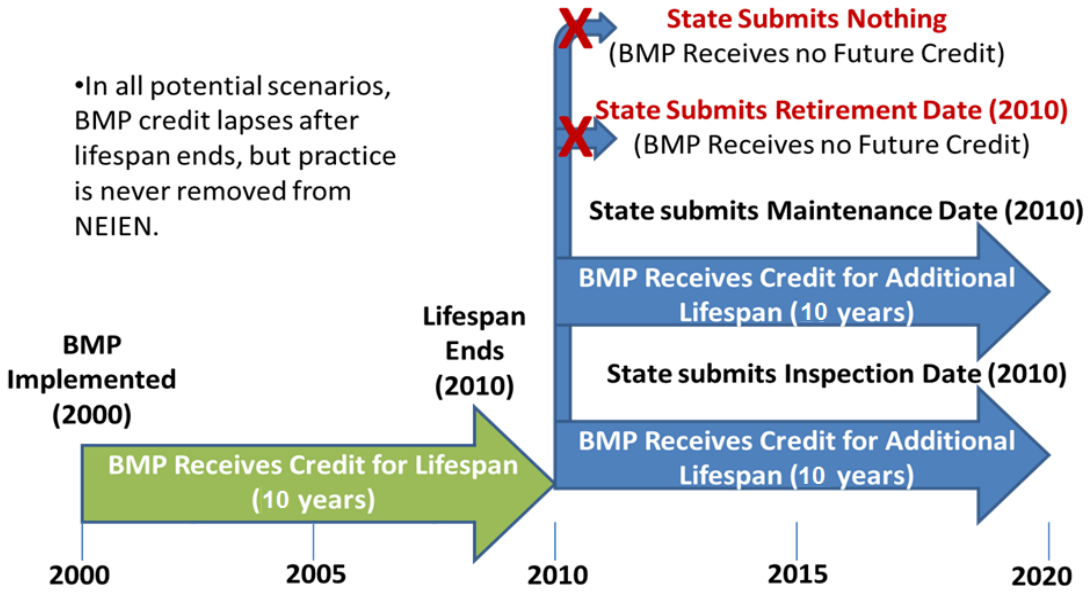
All BMP data are tagged to the latitude and longitude coordinates of the farm where the BMPs are applied. BMP data are also tagged with a Chesapeake Bay identifier to indicate that the BMPs are geographically part of the Chesapeake Bay Watershed. Each farm is referenced by a unique AEM ID number.

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 Agricultural Team and Agricultural Committee are currently developing the capability to run an annual query of the AEM Data Management System and generate county reports identifying all BMPs that will expire

during that year. This process is to be included as part of the BMP verification program described further in section D.




| *USC BMP Name (NEW MAPPING)* | *Credit Duration* |
|---|---|
| Animal Waste Management Systems | 15 |
| Waste Storage Facility | 15 |
| Barnyard Runoff Controls | 10 |
| Loafing Lot Management System | 10 |
| Conservation Tillage | 1 |
| Cover Crops | 1 |
| Comprehensive Nutrient Management | 1 |
| Conservation Plans | 10 |
| Precision Feed Management Dairy | 1 |
| Horse Pasture Management | 10 |
| Prescribed Grazing | 10 |
| Cropland Forest Buffer | 10 |
| Cropland Grass Buffer | 10 |
| Narrow Cropland Forest Buffer | 10 |
| Narrow Cropland Grass Buffer | 10 |
| Exclusion Fence with Grass Buffer | 5 |
| Exclusion Fence with Forest Buffer | 5 |
| Exclusion Fence with Narrow Grass Buffer | 5 |
| Exclusion Fence with Narrow Forest Buffer | 5 |
| Ag Land Retirement | 10 |
| Wetland Restoration | 15 |

**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. In addition, the AEM Data Management System user guide (*User Guide for Agricultural Environmental Management Web Application*) is provided to all USC staff and USC-member SWCD staff. This guide is used as part of annual training and updated annually as changes are made to the AEM Data Management System.

Each year, SWCD staff review BMP implementation data with NRCS and FSA staff in each county to verify that all federally-funded BMPs are included and that none are double-counted or missed. After all data are entered each year, the USC requests summary BMP implementation data from NRCS and FSA headquarters to compare to the data in the database for quality control. 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 DEC to be uploaded into the NEIEN through the DEC NEIEN network node located in Albany. An Excel file (NEIEN_NPS_BMP_CBP_Data_Flow_P6Appendix_06252015 (USC).xlsx) (Appendix 4) is the final version of the NEIEN NPS BMP CBP Data Exchange Table.

### *B10.7: DATABASE UPGRADE*

The USC created the AEM Data Management System during the infancy of the CBP to track practice implementation progress and record livestock numbers in the watershed. As a result, our database will need a significant upgrade to address the verification process outlined in section D. This will include entry of practice lifespans, practice maintenance dates, and other information needed to document verification. This will be a significant and costly endeavor for which the USC will need to secure funds.

# 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, the Watershed Coordinator and GIS Specialist. 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 the USC has historically used are identified in section A6 and the appendices referred to therein. It is the goal of the USC to fully verify all historical BMP data that has been entered into the WSM through 2015. The USC completed an historical databased cleanup in 2015. All newly implemented BMPs will be field verified and entered for the year of completion. The USC has identified the BMPs identified in section A6 based on the ability to collect associated implementation data and input that data to the WSM. The BMPs were not specifically or thoroughly investigated to account for the greatest nutrient and sediment pollutant load reductions. A new effort is underway in 2016 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 new Phase 6 WSM. The USC Wetland, Stream, and Agricultural Teams are working 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, Team Leaders and the GIS Specialist 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 agricultural BMPs. Verification for BMPs collected by the USC from other source sectors (e.g., wetlands, stream rehabilitation) is not currently developed. 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 2013 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 for the Phase 6 WSM. 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 Reduction for 2013 vs. No-Action | | |
|---|---|---|---|
| | N (%) | P (%) | Sediment (%) |
| Animal Waste Management Systems | 28.6 | 30.8 | - |
| Land Retirement | 15.9 | 4.9 | 13.0 |
| Enhanced Nutrient Management | 14.1 | 8.1 | - |
| Trampled Riparian Pasture | 14.0 | 26.1 | 29.3 |
| Forest Buffers | 8.0 | 2.5 | 7.9 |
| Conservation Plans | 3.6 | 5.5 | 14.5 |
| Pasture Fencing | 3.1 | 5.4 | 8.2 |
| Grass Buffers | 2.8 | - | 2.3 |
| Conservation Tillage | 2.6 | 2.8 | 12.4 |
| Wetland Restoration | 2.4 | - | 4.1 |
| Precision Rotation Grazing | - | 4.4 | 5.6 |
| Barnyard Runoff Control | - | 2.8 | - |
| Dairy Precision Feeding | - | 2.1 | - |
| Tree Planting | - | - | 1.9 |

In accordance with the Verification Framework, the nine (9) 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. Note that wetland restoration is currently not verified because verification procedures have not been fully developed. 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%) that required by the Verification Framework. Approximately 50 percent of CAFO-permitted farms are inspected by DEC 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: 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 whether or not 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. We will use the pilot phase of the new BMP verification protocols to test and further refine these methods.

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 specific tiers of nutrient management in Scenario Builder for reporting purposes. 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.

All verification is performed by County Conservation Districts, NRCS Staff, Certified AEM Planners, and DEC 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 DEC staff during inspections. Additional information regarding how the USC will address lifespans can be found in section B10.4.

In 2013, a new online AEM Data Management Application was developed to manage historical and future BMP data collection for reporting to the CBPO. The USC completed an initiative to verify all historical practices in 2015. The verification of historical, expired, or annual practices (BMP data are coded by year of implementation) is under further development. It is the goal of the USC to fully verify all historical BMP data that has been entered into the WSM through 2015.

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

**Table 6. Summary of proposed 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, DEC 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 | DEC 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 DEC 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: 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 is 100% field checked. No data are accepted from other sources or entered into the system without initial verification. The Agricultural Coordinator and GIS Specialist are 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.

Several changes and upgrades to procedures and the data management system are required in response to Verification Framework requirements. New effort will be required to document and manage the sunset and re-verification of CAFO practices in our system as this is not presently done. Our newly developed follow-up assessment and sunset/lifespan protocols for all BMPs will also require changes to our data management system and other forms and documents. We will need to update data collection sheets to include inspection dates and narrative. For BMPs requiring maintenance, 1 year compliance-event status compliance codes need to be added along with maintenance dates. BMP lifespan/sunset will be tracked using an expiration date that will need to be added. We also will incorporate a retirement status in our on-line tool to record expiring, non-maintained, or destroyed/discontinued practices.

Once we have followed our verification approach and sunset dates/lifespans are added, the capability to add re-verification dates is added, inspections dates are incorporated including follow-up, and a retirement/expired function is added to our data management system, we will have adequate systems to address expired BMPs.

We will be working to institutionalize the follow-up verification process throughout the watershed in 2016 and 2017. The implementation of these new procedures and the changes to the Data Management System, on-line tool, and forms and worksheets used to collect data cannot be completed with current funding levels. USC will continue to work with DEC and CBP partners to address this issue.

# 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.

# REFERENCES

Chesapeake Bay Program. 2014. *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.* Accessed March 2, 2016. http://www.chesapeakebay.net/publications/title/strengthening_verification_of_best_management_practices_implemented_in_the

USEPA (U.S. Environmental Protection Agency). 2006. *Requirements for Quality Assurance Project Plans.* (EPA QA/R-5, EPA/240/B-01/003. U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC, March 2001 [Reissued May 2006]). Accessed March 2, 2016. http://www.epa.gov/sites/production/files/2015-07/documents/r5-final.pdf

# APPENDICES

# Appendix 1.
# Statistical Sampling Approach to Agricultural BMP Verification in New York State

## Purpose

This document outlines an adaptive management approach for selecting sites to inspect for verification that agricultural BMPs are on the ground (or otherwise continue to be implemented) and performing as expected based on performance criteria, NRCS standards, engineering specifications or other applicable criteria. Techniques used to inspect BMPs at selected sites and record and track findings are described in *Upper Susquehanna Coalition (USC) Quality Assurance Project Plan for New York Work Plan for the Chesapeake Bay Program* (2015)**.**

## Overview

The expected coverage of BMPs for agricultural verification protocols described in the agricultural verification guidance (Appendix B of *Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basinwide Framework*, October 2014) is summarized in Table 1.

**Table 1. 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 | At least 20% during annual CAFO inspections. |

| | | | |
|---|---|---|---|
| | | practices) that are visually assessed. | |
| | Multi-Year | 100% | At least 20% during annual CAFO inspections. |

The overall approach for meeting the targets in Table 1 is summarized in Table 2. New York State performs initial verification of all agricultural BMPs on farms participating in its Agricultural Environmental Management program (AEM), farms with contracts, and CAFO permitted facilities. This document focuses on how the follow-up checks described in Table 2 will be used to meet the re-verification targets in Table 1.

**Table 2. Summary of proposed verification approach.**

| **Verification Element** | **BMP Implementation Mechanism** | | | |
|---|---|---|---|---|
| | ***Non Cost Shared BMPs*** | ***Cost Shared BMPs*** | ***Regulatory Programs[1]*** | ***Permit Issuing Programs*** |
| **Initial Inspection** | | | | |
| ***Method*** | Farm Inventory:<br>On Site Visual Assessment | Farm Inventory:<br>On Site Visual Assessment | | Farm Inventory:<br>On Site Visual 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 Assessment | Annual and Multi-year BMPs: Farm Inventory: On-site Visual Assessment | | Annual and Multi-year BMPs: On-site Visual 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 | Random selection of ≥10% of farms with active contracts in order to verify at least 10% of those BMPs that | | 50% of all farms w/ active permits. |

| | | | | |
|---|---|---|---|---|
| | 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). | 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). | | |
| ***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[2]** | 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 DEC 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]Lifespan to be addressed in accordance with CBP lifespan criteria, including those for Resource Improvement practices.

## Selecting Sites to Inspect for Follow-Up Verification

The AEM program is the umbrella agricultural program in New York supporting farmers in their efforts to protect water quality and conserve natural resources, while enhancing farm viability. State and Federal programs are coordinated through AEM to work together to efficiently provide technical and financial assistance to priority farms and priority environmental issues.

New York's Concentrated Animal Feeding Operation (CAFO) and AEM programs cover 95 percent of the dairies in the New York portion of the Chesapeake Bay watershed. This includes permitting of 65 CAFOs (11 large, 54 medium) with over 45 percent of the total dairy animals. New York does not have significant numbers of poultry or swine. There are currently 2,832 farms included in Tier 1 of the AEM database. Tier 1 consists of basic information such as farm contact information, farm inventories, and potential environmental concerns and opportunities. A subset of these farms has BMPs.

A comparison of Tables 1 and 2 shows that follow-up inspections of BMPs at CAFOs will be 2.5 times (50% vs. 20%) that required by the Chesapeake Bay Program. Approximately 50 percent of CAFO-permitted farms are inspected by NYS DEC and/or US EPA annually (or 100 percent every two years; essentially verification by census). During those inspections, follow-up BMP inspections are performed to verify all BMPs submitted for annual progress reporting. Any BMPs not meeting performance criteria will be improved according to permit compliance policy or removed from reported BMPs.

Cost-shared and non-cost-shared BMPs all have 100 percent initial verification before annual progress reporting. Conservation partners working to advance AEM in NYS have long held planning, implementation of high impact BMPs, and on-going operation and maintenance as high priority. Therefore the partnership sought to develop follow-up verification methods that would first be of value to the farmer and for conservation and second collect data for progress reporting according to the new Basinwide Verification Framework. The resulting method proposes a whole farm approach, rather than a per-BMP approach to achieve the required sampling rates for all BMPs reported for annual progress. The 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. An adaptive management approach described below will allow adjustments to the sampling method over time to ensure that the expectations summarized in Table 1 are met as the blend of BMPs, on-farm conditions, and conservation goals change.

## Steps for Selecting Sites to Inspect for Follow Up Verification

**Step 1 – Summarize percent load reduction per BMP from the latest progress scenario**

The first step in the site selection process is to identify the BMPs that account for >5 percent of agricultural sector nutrient and/or sediment load reductions as estimated in the most recent progress scenario, as well as those BMPs associated with ≤5 percent of the load reductions. The agricultural verification guidance illustrates this with Attachment A in Appendix B (*Relative Influence of BMPs in Agriculture Sector*). In Appendix B of the agricultural verification guidance document, load reductions were compared between a 2013 progress scenario and a *No-Action* scenario. The results for New York are summarized in Table 3. The data presented in the following steps will be updated for future sampling goals as new progress scenarios and BMP information is generated over time.

Table 3. BMP-specific load reductions for 2013 vs. no-action scenarios for New York.

| BMP | Share of Total Agricultural Load Reduction for 2013 vs. No-Action | | |
|---|---|---|---|
| | N (%) | P (%) | Sediment (%) |
| Animal Waste Management Systems | 28.6 | 30.8 | - |
| Land Retirement | 15.9 | 4.9 | 13.0 |
| Enhanced Nutrient Management | 14.1 | 8.1 | - |
| Trampled Riparian Pasture | 14.0 | 26.1 | 29.3 |
| Forest Buffers | 8.0 | 2.5 | 7.9 |
| Conservation Plans | 3.6 | 5.5 | 14.5 |
| Pasture Fencing | 3.1 | 5.4 | 8.2 |
| Grass Buffers | 2.8 | - | 2.3 |
| Conservation Tillage | 2.6 | 2.8 | 12.4 |
| Wetland Restoration | 2.4 | - | 4.1 |
| Precision Rotation Grazing | - | 4.4 | 5.6 |
| Barnyard Runoff Control | - | 2.8 | - |
| Dairy Precision Feeding | - | 2.1 | - |

| | | | |
|---|---|---|---|
| Tree Planting | - | - | 1.9 |

The nine (9) BMPs highlighted in Table 3 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.

**Step 2 – Determine approaches for re-verification on CAFO and on non-CAFO farms**

The next step is to determine how to inspect the BMPs. New York State will perform re-verification on a whole farm basis rather than on a BMP-by-BMP basis, so the protocol is designed to ensure that site selection on a farm basis will yield satisfactory re-verification rates on a BMP basis. This will result in coverage of additional BMPs beyond the minimum requirements in Table 1.

New York inspects 50 percent of CAFO-permitted farms each year. The 50 percent not sampled during a year will be sampled the next year to ensure that 100 percent of CAFO-permitted farms are inspected every two years. This approach to CAFO re-verification will result in easily meeting the target of 20 percent for permit-based BMPs (Table 1).

For re-verification of BMPs on non-CAFO-permitted farms, a random 10 percent sample of these farms would be suitable if each farm implemented these BMPs, but this scenario is unlikely for the complete set of BMPs that need to be re-verified. For this reason, more than 10 percent of the farms would likely be targeted.

The sampling approach described in *Statistical Sampling Approach for Initial and Follow-Up BMP Verification* in the Basinwide Verification Framework provides an equation for determining sample size based on the following variables:

- An initial estimate of both the percent of BMPs still in place and the percent of BMPs still performing as expected. This can be based on previous studies or assumed to be 50% (p=0.5) for a conservative (high) estimate of sample size.
- An allowable error (e.g. ±10% or 0.10). This error (d) can be different for different BMPs based on considerations of BMP importance, risk of BMP abandonment, failure, cost, or other factors.
- A confidence level (e.g., 90% or α=0.10). This is used to determine the 2-sided Z score from the standard normal distribution ($Z_{1-\alpha/2}$), e.g., $Z_{1-\alpha/2}$ is equal to 1.645 for $\alpha = 0.10$. For example, an α=0.10 indicates that the actual proportion of BMPs still in place has a 10 percent chance of being outside the allowable error or calculated confidence interval.
- An estimate of the total population (N) from which the sample is taken (e.g., how many BMPs were installed). This can be based on records of BMP implementation.

Using available data and reasonable assumptions, the sampling size equation for binary distributions (pass/fail) was used to determine the best sampling approach for New York farms within the Chesapeake Bay Watershed. The best approach will satisfy the requirements summarized in Table 1 and address the following additional important factors:

- allow for conservation professionals to perform productive whole farm BMP evaluations with farmers while also collecting verification data for progress reporting;
- work load balance across all counties involved;
- re-verification of sun-setting BMPs;
- time period over which sampling approach is evaluated (e.g., 2 yr, 5 yr, 10 yr);
- BMP lifespans;
- independent verification requirements;
- inspection methods (e.g., visual); and
- other logistics constraints.

**Step 3 – Determine the whole-farm follow-up sampling strategy for non-CAFO farms**

The data set from the USC AEM Data Management System was analyzed for this the current sampling protocol and included a non-CAFO farm table and a BMP implementation table. The non-CAFO farm table has 2,200 observations. The BMP table contains 3,192 observations. There are more observations in the BMP table because each farm can have multiple occurrences of BMP implementation, including multiple occurrences of the same BMP.

**Step 3A – Summarize number of practices, number of non-CAFO farms, and link practices from database to names used for progress reporting through NEIEN**

Table 4 presents the distribution of database BMPs implemented by non-CAFOs. For example, the database reported 26 instances of Agricultural Land Retirement. After aggregating by operation, it is found that 22 non-CAFOs have implemented Agricultural Land Retirement. The rightmost column in Table 4 presents the cross walk to the reported BMPs.

Table 4. Distribution of database practices implemented by non-CAFOs and cross walk to reported practice.

| Database Practice | Number of Practices Implemented by Non-CAFOs | Number of Non-CAFOs Implementing Practice | Reported Practice |
|---|---|---|---|
| Agricultural Land Retirement | 26 | 22 | Land Retirement |
| Barn Yard Runoff Control | 160 | 146 | Barnyard Runoff Control |
| CNMP | 376 | 250 | Enhanced Nutrient |
| Conservation Till | 58 | 33 | Conservation Tillage |
| Continuous No Till | 27 | 19 | NA |
| Cover Crops No Manure | 27 | 15 | NA |
| Cover Crops With Fall or Winter Manure | 100 | 63 | NA |
| Cover Crops With Spring Manure or | 8 | 8 | NA |
| Crop Land Forest Buffer | 34 | 24 | Forest Buffers |
| Crop Land Grass Buffer | 16 | 14 | Grass Buffer |
| Horse Pasture Management | 11 | 11 | Precision Rotation Grazing |
| Liquid Manure Incorporation | 1 | 1 | NA |
| Liquid Manure Injection | 3 | 2 | NA |
| Manure Processing Technology | 1 | 1 | Animal Waste Management |
| Manure Storage | 93 | 86 | Animal Waste Management |
| Manure Transfer | 44 | 41 | Animal Waste Management |
| Milk House Waste | 86 | 82 | Animal Waste Management |
| Mortality Composting | 13 | 13 | Animal Waste Management |
| Nutrient Management | 71 | 41 | Enhanced Nutrient |
| NYS Precision Feed Management | 6 | 6 | Dairy Precision Feeding |
| Off Stream Water | 96 | 84 | NA |
| Precision Feeding Dairy | 80 | 42 | Dairy Precision Feeding |
| Prescribed Grazing Implementation | 762 | 444 | Precision Rotation Grazing |
| Silage Leachate | 31 | 31 | Animal Waste Management |
| Soil Conservation | 634 | 353 | Conservation Plans |
| Stream Fence | 161 | 148 | NA |
| Stream Forest Buffer | 126 | 106 | Forest Buffers |
| Stream Grass Buffer | 141 | 114 | Grass Buffers TRP |
| **TOTAL** | **3,192** | **2,200** | |

**Step 3B – Summarize reported practices for non-CAFO farms and minimum selection targets**

Table 5 summarizes the number of non-CAFO farms implementing each of the reported BMPs. For example 146 non-CAFO farms implemented barnyard runoff controls. The total number of non-CAFO farms implementing practices in Table 5 (i.e., 1,711) is the total of unique combinations of practices and operations. In other words, non-CAFO farms can be counted multiple times because they can implement more than one practice. The last two columns on the right present the target percentage of operations to select for each BMP (from Table 3) and the actual minimum number of operations to select for verification. Continuing the barnyard runoff example, 146 x 0.05 = 7.3, rounded up to 8.

**Table 5. Distribution of reported practices implemented by non-CAFOs and minimum selection target.**

| Reported Practice | Number of non-CAFOs Implementing Practice | Minimum Selection Target (%) | Minimum Selection Target |
|---|---|---|---|
| Animal Waste Management Systems | 146 | 10% | 15 |
| Barnyard Runoff Control | 146 | 5% | 8 |
| Conservation Plans | 353 | 10% | 36 |
| Conservation Tillage | 33 | 10% | 4 |
| Dairy Precision Feeding | 42 | 5% | 3 |
| Enhanced Nutrient Management | 267 | 10% | 27 |
| Forest Buffers | 123 | 10% | 13 |
| Grass Buffer | 14 | 5% | 1 |
| Grass Buffers TRP | 114 | 10% | 12 |
| Land Retirement | 22 | 10% | 3 |
| Precision Rotation Grazing | 451 | 5% | 23 |
| | **1,711** | | **145** |

**Step 3C – Distribute minimum BMP targets per county**

An important refinement to the chosen approach was to address workload balance across counties. Table 6 presents the distribution of reported practices by non-CAFOs. The 1,711 practices from Table 5 are shown in Table 6 to be implemented by 813 non-CAFO operations. In other words, there is an average of about 2 practices per non-CAFO operation (1,711/813 ≈ 2). Steuben, Madison, and Tioga have the largest percentage of non-CAFO operations implementing practices. The rightmost column in Table 6 presents the maximum number of operations per county that may be evaluated to balance workload. For example, in Delaware County, 63 x 0.10 = 6.3, rounded up to 7.

The selection process is constrained to randomly selecting non-CAFO operations by meeting the minimum selection targets identified in Table 5 and not exceeding the maximum number of operations per county identified in Table 6. The selection process is initiated by randomly selecting one operation from each county (excluding Ontario and Schoharie counties which had no practices implemented by non-CAFOs). This "one-county, one operation" approach was employed, because preliminary selection results had shown that multiple counties would not have any operations selected if this step was not taken.

Table 6. County distribution of implemented practices by non-CAFOs and upper thresholds considered to balance workload.

| County | Number of Reported Practices Implemented by Non-CAFOs (after aggregation) | Number of Non-CAFOs Implementing Reported Practices | Percentage of Non-CAFOs Implementing Reported Practices | Maximum Number of Non-CAFOs to Verify |
|---|---|---|---|---|
| Allegany | 4 | 3 | 0.37 | 1 |
| Broome | 162 | 57 | 7.01 | 6 |
| Chemung | 113 | 45 | 5.54 | 5 |
| Chenango | 158 | 75 | 9.23 | 8 |
| Cortland | 95 | 56 | 6.89 | 6 |
| Delaware | 164 | 63 | 7.75 | 7 |
| Herkimer | 34 | 29 | 3.57 | 3 |
| Madison | 327 | 124 | 15.25 | 13 |
| Oneida | 26 | 7 | 0.86 | 1 |
| Onondaga | 65 | 26 | 3.2 | 3 |
| Ontario | NA | NA | NA | 0 |
| Otsego | 26 | 22 | 2.71 | 3 |
| Schoharie | NA | NA | NA | 0 |
| Schuyler | 12 | 9 | 1.11 | 1 |
| Steuben | 272 | 199 | 24.48 | 20 |
| Tioga | 243 | 94 | 11.56 | 10 |
| Tompkins | 10 | 4 | 0.49 | 1 |
| **TOTAL** | **1,711** | **813** | **100** | **88** |

**Step 3D – Iterative sampling rounds to achieve BMP selection targets**

After the one-county, one-operation selection is completed, tallies (including all practices at the selected operations) are updated to indicate progress toward achieving the minimum selection targets in Table 5 while not exceeding the maximum number of operations per county in Table 6. After the tallies are updated, the practice that provides the least flexibility (or number of options) is identified. We define flexibility as the difference between the number of non-CAFOs implementing a particular practice (that had not already been selected) and the remaining number of operations that still need to be selected for a given practice. A smaller difference denotes less flexibility. Once the practice with the least flexibility is identified, all non-CAFOs that implement that practice (minus those already selected) are identified. From this list, one operation is chosen at random. The process of updating the tallies, identifying the least flexible practice, and randomly selecting an operation is repeated until all minimum selection targets in Table 5 are met.

Results from of this protocol run based on current data from the USC AEM Data Management System are appended at the end of this document.

This procedure for selecting farms for follow-up verification would ensure that 10 percent or more of each BMP implemented on non-CAFO operations is verified annually (or at least 5% of those BMPs contributing ≤5% of the load reduction from the latest progress scenario). This procedure includes an approach to balance the work load across counties. CAFOs were excluded from the procedure because they are all inspected over a two-year period.

## Adaptive Management Approach

Regardless of the initial sampling method used, an adaptive management approach to re-verification will be applied to ensure that sampling rates remain on or within reasonable range of the targets in Table 1. As implementation of BMPs in the watershed progresses, BMP goals may be exceeded in some cases and not achieved in others. This would result in different contributions of individual BMPs to load reductions based on the most recent progress scenario. Therefore, NYS will use the whole-farm follow-up verification steps outlined, above, to update the sampling targets for non-CAFO farms on an annual basis in line with Table 1 and the BMP load reduction data from the most recent progress scenario. Such updates may shift the focus of re-verification to a slightly different set of BMPs. Similarly, an improvement or decline in compliance rates may result in a need to change the sample size. The AEM Data Management System provides opportunities for tracking important information such as the geographic distribution and age of re-verified BMPs. This and other information will be used to help assess the need to alter the sampling approach. Adjustments will be made as necessary to ensure that re-verification goals are met.

## Results Appendix

Figure 1 presents the total number operations selected by running the above simulation 500 times. The yearly total workload for all counties ranges from 50-71 operations.

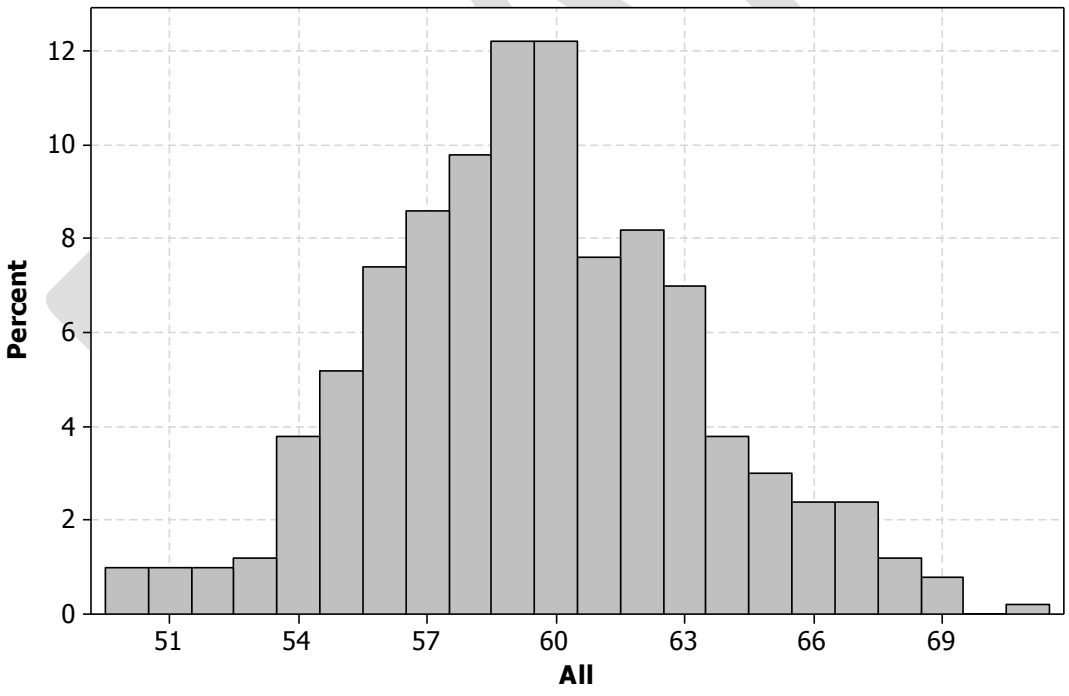



Figure 1. Distribution of overall workload.

Figure 2 presents the number of operations by county selected by running the above simulation 500 times. While the range varies among the simulations, no results exceed the maximum number of operations per county in Table 6.

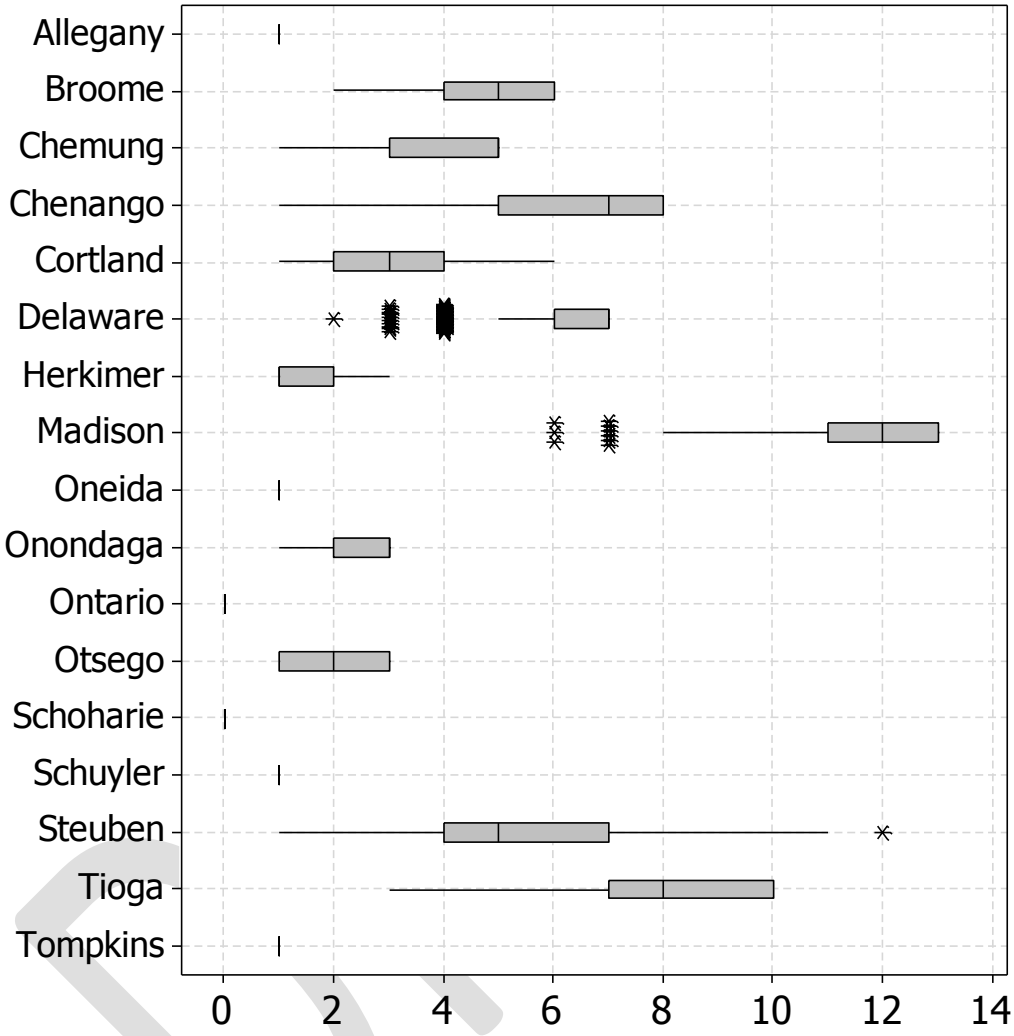



Figure 2. Number of operations selected by county during 500 simulations.

Figure 3 presents the number of operations by practice selected by running the above simulation 500 times. While the range varies among the simulations, no result is less than minimum selection targets in Table 5.

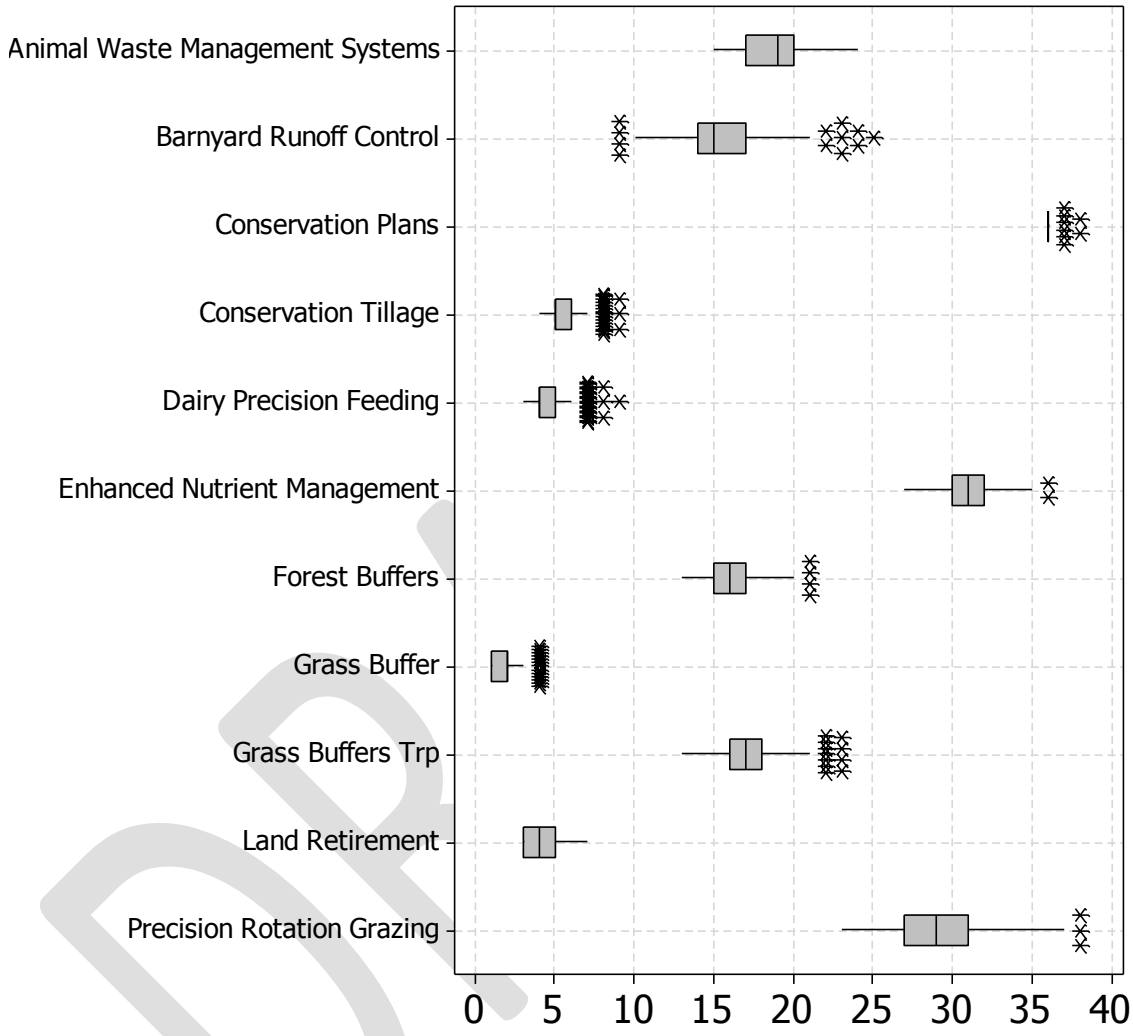



**Figure 2. Number of operations selected by practice during 500 simulations.**

# AEM Tier 2 Worksheet
## Nutrient Management: Manure and Fertilizer

## Glossary

**Animal Unit:** One animal unit equals 1,000 lbs. of live animal body weight, and correlates to the amount of manure produced.

**Concentrated Flow:** Flow of water, greater than ½ inch that carries potential pollutants across a vegetative buffer.

**Field Runoff Potential:** Measurement of risk derived from soil characteristics and topography that estimates the potential for surface loss of nutrients.

**Eutrophication:** The process of nutrient enrichment and excess algae or plant growth in a waterbody.

**Nitrogen Management Tests:** Soil and plant tests such as the Pre-Sidedress Nitrate Test (PSNT), Corn Stalk Nitrate Test (CSNT), Illinois Soil Nitrogen Test (ISNT), etc.

**Vegetative Buffer:** A permanent strip of dense, vigorous perennial vegetation of at least 35 feet in width established and maintained along a watercourse or stream. See NRCS Standards NY 393 (Filter Strip), NY 390 (Riparian Herbaceous Buffer), and NY 391 (Riparian Forest Buffer).

**Watercourse:** Water flowing over a non-vegetated channel to a waterbody.

# Background

Nutrient management using soil tests, crop needs based on realistic yields, and effective application of manure and fertilizer can enhance crop productivity and farm profitability while decreasing farm operating costs. Proper application method, rate, and timing optimize the uptake of nutrients by the crop and minimize nutrient loss to the environment.

If used properly, manure is an excellent crop nutrient source and soil conditioner. Bacterial and protozoan pathogens in manure can pose a human health risk when found in drinking and recreational waters. Nitrate can leach to groundwater, creating potential human and animal health risks. Nitrate, ammonia and phosphorus can also reach surface waters, stimulating undesirable algae and plant growth, and consequently damaging recreational and drinking water uses. Phosphorus is usually the limiting nutrient for plant growth in fresh water and regardless of source can accelerate eutrophication.

Nutrients in fertilizers can also leach to groundwater or be carried by runoff into surface water, degrading water quality. Excessive nitrate concentrations in drinking water can negatively affect human and animal health. In addition to the concerns associated with phosphorus, excess potassium in feed or water can cause animal health problems.

A sound and comprehensive nutrient management plan should account for nutrients from all sources, including prior nutrient applications, soil and crops; incorporate conservation practices that control erosion and manage runoff; and deliver recommendations to minimize losses to the environment through efficient nutrient use by crops.

### AEM Principle

Nutrients for crop production used by farms should be applied to land in a manner that optimizes the nutrient value and soil conditioning benefits while protecting surface and ground water resources.

| **AEM Tier 2 Worksheet:**<br>**Manure and Fertilizer Management**<br>**Table 1: General** | | **Potential Concern** | | |
|---|---|---|---|---|
| **Factors Needing Assessment** | **Lower**<br>**1** | **2** | **3** | **Higher**<br>**4** |
| **Do you follow an up to date nutrient management plan based on soil tests, crop needs and nutrient sources?** | | | | |
| **How many acres typically receive manure application?** | | | | |
| **How many animal units do you have? (Complete calculation on page 4)** | | | | |
| **If manure is exported off the farm, what percentage is exported?** | | | | |
| **Based on the above information, how many animal units do you have per acre of land to which manure is applied?** | | | | |
| **How often do you soil test?** | All fields are soil tested at least every 1 or 2 years. | All fields are soil tested at least every 3 years. | Fields are soil tested regularly, but less often than every 3 years. | Soil testing is not done regularly on fields. |
| **Does your farm manage soils for optimum pH levels?** | Soils are tested for pH and amended with lime to maintain optimum pH. | | Lime is applied, but not based on soil test results. | Soils are not amended with consideration of pH levels. |
| **How often do you test manure for nutrient content?** | There is a history of manure testing that characterizes variability throughout the year.<br>**AND**<br>Manure is tested every year. | | Manure is tested at least every other year. | |

| **AEM Tier 2 Worksheet:**<br>**Manure and Fertilizer Management**<br>**Table 1: General** | | **Potential Concern** | | |
|---|---|---|---|---|
| **Factors Needing Assessment** | **Lower**<br>**1** | **2** | **3** | **Higher**<br>**4** |
| **Does your farm regularly use nitrogen management tests (e.g. PSNT, CSNT, ISNT) to adjust nitrogen rates?** | | | | |
| **Do you keep records of nutrient applications to fields?** | Records are kept indicating the amount applied, source, yields, rotations, and fertilizer applications for each field. | | Records are kept indicating the amount applied, only. | No records of amount applied, yields, and rotations for each field. |
| **Do you calibrate manure and fertilizer application equipment?** | All nutrient application equipment is calibrated yearly to determine the amount applied per acre. | | Nutrient application equipment is calibrated occasionally to determine the amount applied per acre. | Nutrient application equipment is not calibrated. |
| **How is the rate of manure and fertilizer application determined?** | Nutrients are applied based on land grant guidelines.<br>**AND**<br>Commercial fertilizer applications are adjusted in order to meet crop needs. | Manure is applied based on crop needs, with nitrogen as the priority nutrient.<br>**AND**<br>Commercial fertilizer applications are adjusted in order to meet crop needs. | Manure is occasionally applied in rates that exceed the nitrogen needs of the crop.<br>**OR**<br>Commercial fertilizer applications only partially take into account nutrients in manure. | Manure is often applied at rates that exceed the nitrogen needs of the crop.<br>**OR**<br>Commercial fertilizer applications do not take into account nutrients in manure. |
| **How is nitrogen application determined?** | Account for past and current manure application rates, soil nitrogen supply potential, and crop history.<br>**AND**<br>Routinely conduct field by field nitrogen management tests. | | Some consideration of previous manure application rates, soil nitrogen supply potential, or crop history. | No accounting of previous manure application rates, soil nitrogen supply potential, or crop history. |

AEM ID: _____ Date: _____

**Formula for Calculating Animal Units**

| Animal Type | Number (from Tier 1) | × | Average Weight (lbs; from Tier 1) | = | Total Weight (lbs) | ÷ | 1000 lbs/Animal Unit | = | Number of Animal Units |
|---|---|---|---|---|---|---|---|---|---|
| | | × | | = | | ÷ | 1000 lbs/AU | = | |
| | | × | | = | | ÷ | 1000 lbs/AU | = | |
| | | × | | = | | ÷ | 1000 lbs/AU | = | |
| | | × | | = | | ÷ | 1000 lbs/AU | = | |
| | | × | | = | | ÷ | 1000 lbs/AU | = | |
| | | | | | | | | + | |
| | | | | | | | | Total Animal Units for the Farm | |

| **AEM Tier 2 Worksheet: Manure and Fertilizer Management Table 2: Manure Application** | | **Potential Concern** | | |
|---|---|---|---|---|
| **Factors Needing Assessment** | **Lower 1** | **2** | **3** | **Higher 4** |
| **Have there been any concerns about manure contamination of wells on or near the farm?** | | | | |
| **Are field runoff potentials considered in scheduling manure applications?** | Manure is never spread when fields:<br>-- are saturated or frozen<br>-- are prone to flood; or<br>-- when runoff risk is high<br>**AND**<br>Manure is applied just prior to planting or to a growing crop. | Manure is never spread when fields:<br>-- are saturated or frozen<br>-- are prone to flood; or<br>-- when runoff risk is high<br>**AND**<br>Manure is applied during the growing season to fields with the highest runoff potential and outside the growing season to fields with the lowest runoff potential. | Manure is sometimes spread on fields that:<br>-- are saturated or frozen<br>-- are prone to flood; or<br>-- when runoff risk is high<br>**AND**<br>Manure is applied outside the growing season to fields with the lowest runoff potential. | Manure is sometimes spread on fields that:<br>-- are saturated or frozen<br>-- are prone to flood; or<br>-- when runoff risk is high<br>**AND**<br>Fields are not prioritized based on runoff potential. |
| **How close is manure spread to wellheads or springs?** | Manure is not spread within 200 ft. from any wellhead or spring. | Manure is not spread within 100 ft. from any wellhead or spring. | Manure is not spread within 50 ft. from any wellhead or spring. | Manure is spread less than 50 ft. from any wellhead or spring. |
| **Are vegetative buffers maintained along watercourses in fields receiving manure?** | A vegetative buffer that meets NRCS Standards is maintained along water courses in fields receiving manure. | A naturally occurring buffer of at least 35ft. exists along watercourses adjacent to fields. | A naturally occurring buffer of at least 10ft. exists along watercourses adjacent to fields. | Little or no vegetation exists along watercourses in fields receiving manure. |
| **How close is manure spread to surface waters?** | Manure is not spread within 100ft. of surface water.<br>**OR**<br>Manure is not spread within 35ft. of surface water where a vegetative buffer meeting NRCS Standards exists. | Manure is not spread within 35ft. of surface water where a vegetative buffer meeting NRCS Standards exists. | Manure is spread less than 100ft. from surface water where no vegetative buffer exists. | No manure spreading setbacks are used. |

| **AEM Tier 2 Worksheet:**<br>**Manure and Fertilizer Management**<br>**Table 2: Manure Application** | | **Potential Concern** | | |
|---|---|---|---|---|
| **Factors Needing Assessment** | **Lower**<br>**1** | **2** | **3** | **Higher**<br>**4** |
| **How is manure incorporated after spreading?** | | | | |
| **If the farm has soils shallow to bedrock or with a high leaching potential, how is manure spread?** | Manure is never spread when fields:<br>- are saturated or frozen or,<br>- when runoff risk is high<br>**AND**<br>Manure is applied just prior to planting or to a growing crop. | Manure is never spread when fields:<br>- are saturated or frozen or,<br>- when runoff risk is high<br>**AND**<br>Manure is applied during the growing season to fields with the highest leaching risk and outside the growing season to fields with the lowest leaching risk. | Manure is never spread when fields:<br>- are saturated or frozen or,<br>- when runoff risk is high<br>**AND**<br>Manure is applied outside the growing season to fields with the lowest leaching risk. | Manure is never spread when fields:<br>- are saturated or frozen or,<br>- when runoff risk is high<br>**AND**<br>Fields are not prioritized based on leaching risks. |

| **AEM Tier 2 Worksheet:**<br>**Manure and Fertilizer Management**<br>**Table 3: Fertilizer Application** | | **Potential Concern** | | |
|---|---|---|---|---|
| **Factors Needing Assessment** | **Lower**<br>**1** | **2** | **3** | **Higher**<br>**4** |
| **How is the rate of fertilizer application determined?** | Fertilizer rate is based on land grant university guidance and, for P and K, by an appropriate soil test lab.<br>**AND**<br>Soil tests are within the past 3 years. All other nutrient sources are accounted for (e.g. crop residues and manure).<br>**AND**<br>Proper soil pH is maintained. | | | Fertilizer rate is not based on soil tests.<br>**OR**<br>Other nutrient sources are unaccounted for.<br>**OR**<br>Proper pH is not maintained. |
| **What is the timing of application?** | Nutrients are applied as close to the period of maximum nutrient uptake as possible. | | | Fertilizer is applied outside the growing season. |
| **Is fertilizer spread on soils shallow to bedrock or with a high leaching potential?** | | | | |
| **Does your farm import other sources of nutrients (e.g. manure, poultry litter, whey, or other food waste, bio solids) and are they accounted for in your applications to fields?** | | | | |
| Benefits to other resources can also be possible while working toward improved water quality. Taking stock of how existing and future management affect **soil, water, air, plants, animals, energy, greenhouse gases, people, and economics** can result in more effective plans and additional benefits to farms and communities both now and into the future.<br><br>**Additional Comments:** | | | | |

**USC BMP Definitions - Agricultural Best Management Practices (including NEIEN Code Id)**

Animal Waste Management Systems or Waste Storage Facility (840, 23)
Practices designed for proper handling, storage, and utilization of wastes generated from confined animal operations. Reduced storage and handling loss is conserved in the manure and available for land application.
To get credit a system must include manure storage and provide effective treatment of animal waste produced on the farm. Other component data that are collected are manure transfer, silage leachate treatment, milkhouse waste treatment, manure processing technology and if the manure storage facility is covered with a floating or rigid cover, (does not include a natural crust).

No additional credit will be applied as other components are added. The animal waste management system is farm specific, so different farms will have different components.

Animal waste management systems can be recorded as number of systems AND the ANIMAL UNITS treated by the system or as the number of systems. If no animal units are recorded then the animal waste management systems are assigned the default of 145 animal units for each system by the model.

Barnyard Runoff Controls (27, 28)
Includes the installation of practices to control runoff from barnyard areas. This includes practices such as roof runoff control, diversion of clean water from entering the barnyard and control of runoff from barnyard areas. Different efficiencies exist if controls are installed on an operation with manure storage or if the controls are installed on a loafing lot without a manure storage facility.

Barnyard runoff control systems can be either recorded as number of systems AND the NUMBER OF ANIMALS treated by the system, or as the number of systems. If no animal units are recorded then the barnyard runoff control systems are assigned the default of 145 animal units for each system by the model.

If the system includes heavy use area protection practices (e.g., surfacing to stabilize the heavy use area or water control structures surrounding a heavy use area), then credit can also be given for loafing lot management systems.

Loafing Lot Management System (639, 638)
The stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, surfacing with suitable materials, and/or installing needed structures. This BMP can be used in conjunction with barnyard runoff control systems or as stand-alone practices.

Loafing lot management systems can be either recorded as number of systems AND the ANIMAL UNITS treated by the system, or as the number of systems. If no animal units are recorded then the barnyard runoff control systems are assigned the default of 145 animal units for each system by the model.

Precision Feed Management Dairy (552)
Dairy Precision Feeding is focused on nitrogen (N) and phosphorus (P) management for the lactating portion of a dairy herd. Dairy precision feeding reduces the quantity of phosphorus and nitrogen fed to livestock by formulating diets within 110% of Nutritional Research Council recommended level in order to minimize the excretion of nutrients without negatively affecting milk production.

Credit for this BMP is applied for the lactating portion of a dairy herd that is engaged in NYS Precision Feed Management (PFM), including PFM Benchmarking and implementation of a Feed Management Plan. Key benchmark indicators for CBP modeling purposes are MUN concentrations within a recommended range and ration P within 110% of NRC recommendation.

Precision feeding is recorded in ANIMAL UNITS.

Comprehensive Nutrient Management Plans (542)
Comprehensive Nutrient Management Plans (CNMPs) are defined as a plan to manage manure, process wastewater, fertilizer, and soil conservation across the farmstead facilities and fields of a farm. NYS CNMPs qualify as Enhanced Nutrient Management Planning for Bay Model purposes. Based on research, nutrient management rates of nitrogen application are set approximately 35% higher than what a crop needs to ensure nitrogen availability under optimal growing conditions. In a yield reserve program using enhanced nutrient management, the farmer would reduce the nitrogen application rate by 15%. An incentive or crop insurance is used to cover the risk of yield loss. This BMP effectiveness estimate is based on a reduction in nitrogen loss resulting from nutrient application to cropland 15% lower than the nutrient management recommendation. The effectiveness estimate is based on conservativeness and data from a program run by American Farmland Trust.

CNMPs are recorded in acres. The BMP acres are coded as Enhanced Nutrient Management and will be carried over and applied to the Conservation Plan (67) BMP.

Conservation Plans (67)
Farm conservation plans are a combination of agronomic, management and engineered practices that protect and improve soil productivity and water quality, and to prevent deterioration of natural resources on all or part of a farm. Plans may be prepared by staff working in conservation districts, natural resource conservation field offices or a certified private consultant. In all cases the plan must meet technical standards.

This BMP is recorded in acres and can be entered alone or carried over from CNMPs recorded in acres.

Conservation Tillage (69)
Conservation tillage requires a minimum 30% residue coverage at the time of planting, and a non-inversion tillage method. Each segment in the Bay Model is assigned a default amount of conservation tillage based on historical data from the Conservation Technology Information Center. Specifying acres under this BMP adds the specified acres to the historical amount. The model treats this as conventional tilled acres converted to conservation till acres.

This BMP is recorded in acres.

Pasture Stream Exclusion Practices
The suite of practices used to fence livestock out of riparian pasture areas. In the Bay Model manure deposited within the riparian pasture area will be simulated as a direct depositional load to a nearby simulated stream, much like a point source discharging directly to a simulated stream in the current model. States can submit stream exclusion practices to deal with the simulated manure deposition based upon the dimensions of the practice (length, or length and width, or acres) and the number of animal units excluded from streams as a result of this practice.

When dealing with dimensions and animal units for each practice, a proxy for livestock stocking rates on pasture are needed to accurately estimate the amount of manure to move back to pasture acres for each acre of exclusion fencing. In the future NYS will estimate their own animal units/acre of exclusion conversion rate, but for now, it is recommended that average rates estimated by VA be used. These rates are:

Beef – 22.2 animal units/acre excluded
Dairy – 43.6 animal units/acre excluded
Livestock – 22.9 animal units/acre excluded

Animal units are not required to be submitted for each practice. NEIEN is set up to require dimensions of each practice (length X width). The dimensions will then be converted to animal units based upon the default conversion rates listed above. Submission of animal units for each practice along with dimensions is an option. By submitting both the

dimensions and animal units, Scenario Builder will have the most accurate numbers to simulate each practice. The animal type, will be determined using the AEM farm type that is recorded in the database. If no type is recorded then the default of Livestock will be used.

Exclusion Fence with Grass Buffer (951, 952, 954)
This BMP should be submitted for any fencing project along pastured streams that creates grass or herbaceous areas at least 35 feet in width. The BMP will convert pasture to agricultural open space (Phase 6 equivalent of hay without nutrients), and will fence livestock out of streams, moving the streamside depositional load back to pasture acres. The BMP will also receive an upslope, grass buffer efficiency benefit.

This BMP will be recorded in length of the exclusion fencing and width of the buffer. If known, the number of ANIMAL UNITS excluded by the project can also be entered. If animal units are not provided default conversions from acres excluded to animal units will be applied.

Exclusion Fence with Narrow Grass Buffer (961, 962, 964)
This BMP should be submitted for any fencing project along pastured streams that creates grass or herbaceous areas less than 35 feet in width. The BMP will convert pasture to agricultural open space, and will fence livestock out of streams, moving the streamside depositional load back to pasture acres, but will NOT receive an upslope, grass buffer efficiency benefit.

This BMP will be recorded in length of the exclusion fencing and width of the buffer. If known, the number of ANIMAL UNITS excluded by the project can also be entered. If animal units are not provided default conversions from acres excluded to animal units will be applied.

Exclusion Fence with Forest Buffer (956, 957, 959)
This BMP should be submitted for any fencing project along pastured streams that includes tree plantings to create a forest buffer area at least 35 feet in width. The BMP will convert pasture to forest, and will fence livestock out of streams, moving the streamside depositional load back to pasture acres. The BMP will also receive an upslope, forest buffer efficiency benefit.

This BMP will be recorded in length of the exclusion fencing and width of the buffer. If known, the number of ANIMAL UNITS excluded by the project can also be entered. If animal units are not provided default conversions from acres excluded to animal units will be applied.

Exclusion Fence with Narrow Forest Buffer (966, 967, 969)
This BMP should be submitted for any fencing project along pastured streams that includes tree plantings to create a forest buffer area less than 35 feet in width. The BMP will convert pasture to forest, and will fence livestock out of streams, moving the streamside depositional load back to pasture acres, but will NOT receive an upslope, grass buffer efficiency benefit.

This BMP will be recorded in length of the exclusion fencing and width of the buffer. If known, the number of ANIMAL UNITS excluded by the project can also be entered. If animal units are not provided default conversions from acres excluded to animal units will be applied.

Cropland Buffers
Agricultural riparian grass and forest buffers are linear strips of grass or other non-woody vegetation or wooded areas maintained between the edge of fields and streams, rivers or tidal waters that help filter nutrients, sediment and other pollutants from runoff. The recommended buffer width for riparian forest and grass buffers (agriculture) is 100 feet, with a 35 feet minimum width required.

The benefit for both grass and forest buffers on cropland is a 4:1 reduction for TN and 2:1 reduction for TP and TSS. That means that for every acre of forest or grass buffer, the land is converted to forest or grass, which represents a lower loading rate since no manure or fertilizer is applied. In addition, four acres of other agricultural land in that modeling segment receive a reduction of 48.31% applied to TN for forest buffers. The forest buffer TP reduction is 39.52% and TSS is 52.69% and are applied to two acres. For grass buffers the TN reduction is 33.76%, TP is 39.52%, and TSS is 52.69%.

Cropland Grass Buffer (994, 995)
Linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams that measure 35 feet in width or greater. Recorded in length of buffer and average width.

Narrow Cropland Grass Buffer (661, 662)
Linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams that measure 10 to 34 feet in width. Recorded in length of buffer and average width.

Cropland Forest Buffer (991, 992)
Linear strips of woody vegetation or wooded areas maintained between the edge of fields and streams that measure 35 feet in width or greater. Recorded in length of buffer and average width.

Narrow Cropland Forest Buffer (659, 660)
Linear strips of woody vegetation or wooded areas maintained between the edge of fields and streams that measure 10 to 34 feet in width. Recorded in length of buffer and average width.

Prescribed Grazing (684)
This practice utilizes a range of pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and reduce the impact of animal travel lanes, animal concentration areas or other degraded areas. Prescribed grazing can be applied to pastures intersected by streams or upland pastures outside of the degraded stream corridor (35 feet width from top of bank). The modeled benefits of prescribed grazing practices can be applied to pasture acres in association with or without alternative watering facilities. They can also be applied in conjunction with or without stream access control. Pastures under the PG systems are defined as having a vegetative cover of 60% or greater.

Prescribed grazing is measured in acres

Horse Pasture Management (609)
Horse Pasture Management is defined as maintaining a 50% pasture cover with managed species (desirable, inherent) and managing high traffic areas.

Horse pasture management is measured in acres.

Ag Land Retirement (694)
Agricultural land retirement takes marginal and highly erosive cropland (HEL) out of production by planting permanent vegetative cover such as shrubs, grasses, and/or trees. Agricultural agencies have a program to assist farmers in land retirement procedures. Converts land area to hay without nutrients.

Ag land retirement is measured in acres.

Cover Crops

This BMP refers to (non-harvested) cereal cover crops specifically designed for nutrient removal. A standard date of planting for cover crops is from 2 weeks prior to average frost date up to average frost date. If any manure or fertilizer is applied to the field then the designation of Commodity Cover Crops is used.

All data recorded in acres.

Cover Crops Standard Drilled Wheat With No Manure (257)
A winter wheat crop planted no more than 2 weeks prior to the average frost date with a drilled seeding method. The crop may be neither fertilized nor harvested.
There is no Scenario Builder BMP called CoverCropSDW so at this time NYS will use a placeholder of CoverCropSOW. NYS needs to ask the Bay Program to create this BMP.

Cover Crops Standard Drilled Rye With No Manure (253)
A winter rye crop planted no more than 2 weeks prior to the average frost date with a drilled seeding method. The crop may be neither fertilized nor harvested.

Cover Crops Standard Other Wheat With No Manure (257)
A winter wheat crop planted no more than 2 weeks prior to the average frost date with a seeding method that is neither drilled nor aerial (e.g. surface broadcast or with stalk chopping or light disking). The crop may be neither fertilized nor harvested.

Cover Crops Standard Other Rye With No Manure (256)
A winter rye crop planted no more than 2 weeks prior to the average frost date with a seeding method that is neither drilled nor aerial (e.g. surface broadcast or with stalk chopping or light disking). A commodity cover crop may receive nutrient applications after March 1 of the following year after establishment.

Cover Crops Standard Drilled Wheat With Manure (220)
A winter wheat crop planted no more than 2 weeks prior to the average frost date with a drilled seeding method. A commodity cover crop may receive nutrient applications after March 1 of the following year after establishment.

Cover Crops Standard Drilled Rye With Manure (291)
A winter rye crop planted no more than 2 weeks prior to the average frost date with a drilled seeding method. A commodity cover crop may receive nutrient applications after March 1 of the following year after establishment.
There is no Scenario Builder BMP called ComCovCropSDR so at this time NYS will use a placeholder of ComCovCropSOR. NYS needs to ask the Bay Program to create this BMP.

Cover Crops Standard Other Wheat With Manure (223)
A winter wheat crop planted no more than 2 weeks prior to the average frost date with a seeding method that is neither drilled nor aerial (e.g. surface broadcast or with stalk chopping or light disking). A commodity cover crop may receive nutrient applications after March 1 of the following year after establishment.

Cover Crops Standard Other Rye With Manure (222)
A winter rye crop planted no more than 2 weeks prior to the average frost date with a seeding method that is neither drilled nor aerial (e.g. surface broadcast or with stalk chopping or light disking). A commodity cover crop may receive nutrient applications after March 1 of the following year after establishment.

Wetland Restoration
Agricultural wetland restoration activities re-establish the natural hydraulic condition in a field that existed prior to the installation of subsurface or surface drainage or in a place where no wetland exists currently. Projects may include restoration, creation and enhancement acreage. Restored wetlands may be any wetland classification including forested, scrub-shrub or emergent marsh.

Wetland work can be accomplished on most existing landuses, but is predominantly targeted to Agricultural – Cropland, Hay/Alfalfa, Pastureland and Non-production Cropland, Forest, Old Field and Other landuse categories. Because many

partners are involved in wetland work, broad categories are needed to encompass all ongoing efforts. The duration of BMP effectiveness is another source of variability, but most programs have a minimum easement length of 15 years, with 30 years or permanently eased also common options. We do not track wetland work by accomplished cover type (i.e. emergent, forested, scrub shrub or other), as the different cover types do not appear to produce different model results, and simplifying data categories makes sense where possible. The two categories of wetland work we will divide projects into are:

Wetland Functional Gains – Enhancement ("enhance") (912)
Manipulation of the physical, chemical, or biological characteristics of an existing wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or for a purpose such as water quality improvement, flood water retention, or wildlife habitat. Results in gain in functional wetland acres.

Recorded in acres on various SB landuse type (CROP, PASTUREHAY, PASTURE, Grasslands/Herbaceous, FOREST)

Wetland Gains – Re-establishment and Establishment ("restore") (922)
Manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland, and/or developing a wetland that did not previously exist on an upland or deepwater site.

Recorded in acres on various SB landuse type (CROP, PASTUREHAY, PASTURE, Grasslands/Herbaceous, FOREST)

Stream Restoration (DRAFT)

# USC BMP to Scenario Builder BMP Mapping using NEIEN_NPS_BMP_CBP_Data_Flow_P6Appendix_06252015.xlsx

| USC BMP Code | USC BMP Name (NEW MAPPING) | ID | BMP Name | DefaultSBLandUse | Measurement Name | Unit Name | Scenario Builder BMP | Status | Comments | ID | Credit Duration |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AWMS | Animal Waste Management Systems | 23 | Animal Waste Management Systems (All Types) | Livestock | No. of systems | COUNT | AWMS | Release | | 23 | 15 |
| MS | Waste Storage Facility | 840 | Waste Storage Facility | dairy | DAIRY_AU | COUNT | AWMS | Release | | 840 | 15 |
| MT | Manure Transport | 644 | Manure Transport | N/A | County To | NA | ManureTransport | Release | Optional | 644 | 1 |
| BRC-Animals | Barnyard Runoff Controls | 27 | Barnyard Runoff Controls | Feed | Dairy Animals | COUNT | BarnRunoffCont | Release | adding 3/15/2012 | 27 | 10 |
| BRC-Systems | Barnyard Runoff Controls | 28 | Barnyard Runoff Controls | Feed | Systems | COUNT | BarnRunoffCont | Release | 7/17 changing conversion factor to 1 since target unit is now systems. | 28 | 10 |
| LLC-Systems | Loafing Lot Management System | 638 | Loafing Lot Management System | Feed | Systems | COUNT | LoafLot | Release | VA plans NOT to submit | 638 | 10 |
| LLM-Aus | Loafing Lot Management System | 639 | Loafing Lot Management System | Feed | AU | COUNT | LoafLot | Release | 145 Aus=1 acre | 639 | 10 |
| CNMP | Comprehensive Nutrient Management Plans | 542 | Enhanced Nutrient Management | CROPFERT | Acres | ACRE | EffNutManEnhance | Release | | 542 | 1 |
| CP | Conservation Plans | 67 | Conservation Plans | AG | Acres | ACRE | ConPlan | Release | BMP Acres, not acres treated. | 67 | 10 |
| CST | Conservation Tillage | 69 | Conservation Tillage | ROW | Total Acres | ACRE | ConserveTillTotAcres | Release | a number of acres are specified and the default is ignored altogether | 69 | 1 |
| ALR | Ag Land Retirement | 694 | Retirement of Highly Erodible Land | ROW | acres | ACRE | LandRetireOpen | Release | | 694 | 10 |
| PFM | Precision Feed Management Dairy | 552 | Feed Management | dairy | AU | COUNT | DairyPrecFeed | Release | Does 1 AU of poultry submitted mean 250 counts of birds? | 552 | 1 |
| CCC-DW | Cover Crops Standard Drilled Wheat With Manure | 220 | Cover Crops | ROW | Commodity Cover Crop Standard Drilled Wheat | ACRE | ComCovCropSDW | Release | de | 220 | 1 |
| CCC-DR | Cover Crops Standard Drilled Rye With Manure | 291 | Cover Crops | ROW | RYE Normal NO TILL Commodity | ACRE | ComCovCropSOR | Release | Mod by J.Keppler 8/11- NOT CURRENTLY IN SB | 291 | 1 |
| CCC-OW | Cover Crops Standard Other Wheat With Manure | 223 | Cover Crops | ROW | Commodity Cover Crop Standard Other Wheat | ACRE | ComCovCropSOW | Release | de | 223 | 1 |
| CCC-OR | Cover Crops Standard Other Rye With Manure | 222 | Cover Crops | ROW | Commodity Cover Crop Standard Other Rye | ACRE | ComCovCropSOR | Release | de | 222 | 1 |
| CC-DW | Cover Crops Standard Drilled Wheat With No Manure | 257 | Cover Crops | ROW | Cover Crop Standard Other Wheat | ACRE | CoverCropSOW | Release | DE | 257 | 1 |
| CC-DR | Cover Crops Standard Drilled Rye With No Manure | 253 | Cover Crops | ROW | Cover Crop Standard Drilled Rye | ACRE | CoverCropSDR | Release | de- NOT CURRENTLY IN SB | 253 | 1 |
| CC-OW | Cover Crops Standard Other Wheat With No Manure | 257 | Cover Crops | ROW | Cover Crop Standard Other Wheat | ACRE | CoverCropSOW | Release | DE | 257 | 1 |
| CC-OR | Cover Crops Standard Other Rye With No Manure | 256 | Cover Crops | ROW | Cover Crop Standard Other Rye | ACRE | CoverCropSOR | Release | DE | 256 | 1 |
| RGB-L | Exclusion Fence with Grass Buffer (Length) | 951 | Exclusion Fence with Grass Buffer | Pasture | Length | FEET | GrassBuffExcl | Release | Assumes 22.9 AU/Acre Fenced | 951 | 5 |
| RGB-W | Exclusion Fence with Grass Buffer (Width) | 952 | Exclusion Fence with Grass Buffer | Pasture | Width | FEET | GrassBuffExcl | Release | Assumes 22.9 AU/Acre Fenced | 952 | 5 |
| RGB-AU | Exclusion Fence with Grass Buffer (AUs) | 954 | Exclusion Fence with Grass Buffer | Livestock | Livestock | AU | GrassBuffExcl | Release | Submit with dimensions if known. | 954 | 5 |
| RGB-NARL | Exclusion Fence with Narrow Grass Buffer (Length) | 961 | Exclusion Fence with Narrow Grass Buffer | Pasture | Length | FEET | GrassBuffExclNar | Release | Assumes 22.9 AU/Acre Fenced | 961 | 5 |
| RGB-NARW | Exclusion Fence with Narrow Grass Buffer (Width) | 962 | Exclusion Fence with Narrow Grass Buffer | Pasture | Width | FEET | GrassBuffExclNar | Release | Assumes 22.9 AU/Acre Fenced | 962 | 5 |
| RGB-NARAU | Exclusion Fence with Narrow Grass Buffer (AUs) | 964 | Exclusion Fence with Narrow Grass Buffer | Livestock | Livestock | AU | GrassBuffExclNar | Release | Submit with dimensions if known. | 964 | 5 |
| RFB-L | Exclusion Fence with Forest Buffer (Length) | 956 | Exclusion Fence with Forest Buffer | Pasture | Length | FEET | ForestBuffExcl | Release | Assumes 22.9 AU/Acre Fenced | 956 | 5 |
| RFB-W | Exclusion Fence with Forest Buffer (Width) | 957 | Exclusion Fence with Forest Buffer | Pasture | Width | FEET | ForestBuffExcl | Release | Assumes 22.9 AU/Acre Fenced | 957 | 5 |
| RFB-AU | Exclusion Fence with Forest Buffer (AUs) | 959 | Exclusion Fence with Forest Buffer | Livestock | Livestock | AU | ForestBuffExcl | Release | Submit with dimensions if known. | 959 | 5 |
| RFB-NARL | Exclusion Fence with Narrow Forest Buffer (Length) | 966 | Exclusion Fence with Narrow Forest Buffer | Pasture | Length | FEET | ForestBuffExclNar | Release | Assumes 22.9 AU/Acre Fenced | 966 | 5 |
| RFB-NARW | Exclusion Fence with Narrow Forest Buffer (Width) | 967 | Exclusion Fence with Narrow Forest Buffer | Pasture | Width | FEET | ForestBuffExclNar | Release | Assumes 22.9 AU/Acre Fenced | 967 | 5 |
| RFB-NARAU | Exclusion Fence with Narrow Forest Buffer (AUs) | 969 | Exclusion Fence with Narrow Forest Buffer | Livestock | Livestock | AU | ForestBuffExclNar | Release | Submit with dimensions if known. | 969 | 5 |
| RGBC-L | Cropland Grass Buffer (Length) | 994 | Grass Buffers | CROP | Length | FEET | GrassBuffers | Release | added 6/25/15 | 994 | 10 |
| RGBC-W | Cropland Grass Buffer (Width) | 995 | Grass Buffers | CROP | Width | FEET | GrassBuffers | Release | added 6/25/15 | 995 | 10 |
| RGBC-NARL | Narrow Cropland Grass Buffer (Length) | 661 | Narrow Grass Buffers | CROP | Length | FEET | grassbuffnarrow | Release | 10-34 ft width; also submit Width | 661 | 10 |
| RGBC-NARW | Narrow Cropland Grass Buffer (Width) | 662 | Narrow Grass Buffers | CROP | Width | FEET | grassbuffnarrow | Release | 10-34 ft width; also submit Length | 662 | 10 |
| RFBC-L | Cropland Forest Buffer (Length) | 991 | Forest Buffers | CROP | Length | FEET | ForestBuffers | Release | added 6/25/15 | 991 | 10 |
| RFBC-W | Cropland Forest Buffer (Width) | 992 | Forest Buffers | CROP | Width | FEET | ForestBuffers | Release | added 6/25/15 | 992 | 10 |
| RFBC-NARL | Narrow Cropland Forest Buffer (Length) | 659 | Narrow Forest Buffers | CROP | Length | FEET | forestbuffnarrow | Release | 10-34 ft width; also submit Width | 659 | 10 |
| RFBC-NARW | Narrow Cropland Forest Buffer (Width) | 660 | Narrow Forest Buffers | CROP | Width | FEET | forestbuffnarrow | Release | 10-34 ft width; also submit Length | 660 | 10 |
| PG | Prescribed Grazing | 684 | Prescribed Grazing | PASTURE | Acres | ACRE | PrecRotGrazing | Release | | 684 | 10 |
| HPM | Horse Pasture Management | 609 | Horse Pasture Management | PASTURE | Acres | ACRE | HorsePasMan | Release | | 609 | 10 |
| WE-C | Wetland Enhancement (Crop) | 912 | Wetland Functional Gains - Enhanced | CROP | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 912 | 15 |
| WE-H | Wetland Enhancement (Hay) | 912 | Wetland Functional Gains - Enhanced | PASTUREHAY | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 912 | 15 |
| WE-P | Wetland Enhancement (Pasture) | 912 | Wetland Functional Gains - Enhanced | PASTURE | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 912 | 15 |
| WE-G | Wetland Enhancement (Grass/Shrub) | 912 | Wetland Functional Gains - Enhanced | Grasslands/Herbaceous | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 912 | 15 |
| WE-F | Wetland Enhancement (Forest) | 912 | Wetland Functional Gains - Enhanced | FOREST | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 912 | 15 |
| WR-C | Wetland Restoration (Crop) | 922 | Wetland Gains - Reestablished | CROP | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 922 | 15 |
| WR-H | Wetland Restoration (Hay) | 922 | Wetland Gains - Reestablished | PASTUREHAY | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 922 | 15 |
| WR-P | Wetland Restoration (Pasture) | 922 | Wetland Gains - Reestablished | PASTURE | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 922 | 15 |
| WR-G | Wetland Restoration (Grass/Shrub) | 922 | Wetland Gains - Reestablished | Grasslands/Herbaceous | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 922 | 15 |
| WR-F | Wetland Restoration (Forest) | 922 | Wetland Gains - Reestablished | FOREST | Non-Tidal Emergent Area | ACRE | WetlandRestore | Release | | 922 | 15 |

Yellow highlighted rows are BMPs that the USC needs to request a new Scenario Builder BMP for.

# AGRICULTURAL ENVIRONMENTAL MANAGEMENT

**Tier 1** *AEM Identification Number:*

_____ County SWCD Date: ____/____/____

| | |
|---|---|
| Evaluator Name: | Evaluating Agency: |
| Watershed Identification: | |
| Farm Name: | |
| Owner's Name: | Operator's Name: |
| Address: | Address: |
| Phone:<br><br>Fax: | Phone:<br><br>Fax: |
| Email: | Email: |

Preferred Contact Point? (please check only one)
☐ Owner ☐ Operator

1) **Future Status of the Farm**

A) Do you anticipate any major modifications on your farm within the next 5 years? ☐ **Yes** ☐ **No**

**If yes**, please check the condition(s) that best describes the modification(s):

☐ Business Structure ☐ Expansion ☐ Retirement
☐ Operation Type ☐ Diversification of Farm Business ☐ Sale of Farm

B) Do you plan to subdivide any portion of your farm in the next 5 years? ☐ **Yes** ☐ **No**

2) **Basic Farm Information**

A) What **Primary** Farm Enterprise best describes your operation?

☐ Dairy ☐ Beef ☐ Horses ☐ Fruit/Vegetables
☐ Poultry ☐ Swine ☐ Vineyard ☐ Greenhouse
☐ Cash Crop: (**Please Define**) _____ ☐ Sheep/Goats
☐ Other: (**Please Define**) _____

B) Please indicate the following number of acres:

| | **Owned** | **Rented** |
|---|---|---|
| Cropland Acres | | |
| Grazed Land Acres | | |
| Permanent Hay Land Acres | | |
| Woodland Acres | | |
| **Total Acres** | _____ | _____ |

C) Does your operation qualify for Ag Value Assessment? ☐ **Yes** ☐ **No**

3) **Animal Numbers for your <u>Primary</u> Farm Type**

Average Weight: _____ Number: _____ Average Weight: _____ Number: _____

Average Weight: _____ Number: _____ Average Weight: _____ Number: _____

4) **Management Questions** (Please check Yes or No)

| | Yes | No |
|---|---|---|
| Do you spread manure? | ☐ | ☐ |
| Do you have a manure storage facility? | ☐ | ☐ |
| Do you generate process washwater from the cleaning of product or facilities? (i.e. milkcenter, egg wash, washing of produce) | ☐ | ☐ |
| Is there a barnyard or outdoor feedlot on your farm? | ☐ | ☐ |
| Do you store silage or other high moisture feeds on the farm? | ☐ | ☐ |
| Do you utilize pastureland on your farm? | ☐ | ☐ |
| Do you use commercial fertilizer? | ☐ | ☐ |
| Do you use pesticides (herbicides, insecticides, fungicides) on your farm? | ☐ | ☐ |
| Do you store and/or mix pesticides (herbicides, insecticides, fungicides) on your farm? | ☐ | ☐ |
| Does your operation utilize cropland for row crop production? | ☐ | ☐ |
| Is the water supply on your farm from a well or a spring? | ☐ | ☐ |
| Is there a waterbody within or adjacent to your farm? | ☐ | ☐ |
| Do you presently or do you plan to harvest timber on your farm? | ☐ | ☐ |
| Do you store fuel or other bulk petroleum products on your farm? | ☐ | ☐ |
| Have you received odor complaints or do you believe your farm has an odor concern? | ☐ | ☐ |

## **NYS Agricultural Interest Assessment** – check all that are of interest

- ☐ Agricultural Tax Relief
- ☐ Agri-Tourism
- ☐ Air Quality
- ☐ Biofuels
- ☐ Biosecurity
- ☐ Conservation Easements
- ☐ Energy Conservation/Generation
- ☐ Environmental Management Systems
- ☐ Farmland Protection
- ☐ Feed Management
- ☐ Fisheries Habitat Management
- ☐ Forest Management/Timber Harvest
- ☐ Grasslands Farming
- ☐ Integrated Pest Management
- ☐ Irrigation Management
- ☐ Manure Treatment Options
- ☐ Neighbor-Farm Relations
- ☐ Nuisance Wildlife Control
- ☐ Organic Farming
- ☐ Pollution Credit Trading
- ☐ Right To Farm
- ☐ Stream Management
- ☐ Water Conservation/Management
- ☐ Wellhead Protection
- ☐ Wetland Conservation
- ☐ Wildlife Habitat Improvement

Would you like to receive a copy of the AEM Guide to Conservation Funding? ☐ Yes ☐ No
This document is also online at www.nys-soilandwater.org/aem/aemoutreach.html

(***OPTIONAL***)

Producer Questions & Comments:

_____

# UPPER SUSQUEHANNA COALITION - CHESAPEAKE BAY PROGRAM
## AGRICULTURAL ENVIRONMENTAL MANAGEMENT AG BMP DATA ENTRY SHEET

Farm Name _____ AEM ID ☐☐☐ - ☐☐☐☐

Evaluator _____ Date ☐☐ / ☐☐ / ☐☐☐☐

### *Farmstead BMPs*

| | | | Cost Shared? (✔ if yes) | NRCS Standard? (✔ if yes) |
|---|---|---|---|---|
| Animal Waste Management Systems | # Animals _____ | ☐ CAFO | | |
| ☐ Manure Storage ☐ Covered | Date _____ | | ☐ | ☐ |
| ☐ Manure Transfer | Date _____ | | ☐ | ☐ |
| ☐ Silage Leachate | Date _____ | | ☐ | ☐ |
| ☐ Milkhouse Waste | Date _____ | | ☐ | ☐ |
| ☐ Mortality Composting | Date _____ | | ☐ | ☐ |
| ☐ Manure Processing Tech | Date _____ | | ☐ | ☐ |
| Liquid Manure Injection | Acres _____ | Date _____ | ☐ | ☐ |
| Liquid Manure Incorporation | Acres _____ | Date _____ | ☐ | ☐ |
| Barnyard Runoff Control | # Animals _____ | Date _____ | ☐ | ☐ |
| ☐ Loafing Lot Management | | | | |

### *Precision Feeding (Dairy) BMPs*

| | Meet N? # Animals | Meet P? # Animals | | | |
|---|---|---|---|---|---|
| NYS Precision Feed Management (For the lactating part of the herd) | _____ | _____ | Date _____ | ☐ | ☐ |

### *Cropland BMPs*

| | | | | |
|---|---|---|---|---|
| CNMP | Acres _____ | Date _____ | ☐ | ☐ |
| Nutrient Management Plan | Acres _____ | Date _____ | ☐ | ☐ |
| Soil Conservation Plan | Acres _____ | Date _____ | ☐ | ☐ |
| Conservation Till | Acres _____ | Date _____ | ☐ | ☐ |
| Continuous No-Till | Acres _____ | Date _____ | ☐ | ☐ |

| Cover Crops | | | | Planting Date ---------- SEPT | OCT | | |
|---|---|---|---|---|---|---|---|
| With Fall or Winter Manure | ☐ Wheat | ☐ Rye | Acres _____ | ☐ | ☐ | ☐ | ☐ |
| With Spring Manure or Fertilizer | ☐ Wheat | ☐ Rye | Acres _____ | ☐ | ☐ | ☐ | ☐ |
| No Manure | ☐ Wheat | ☐ Rye | Acres _____ | ☐ | ☐ | ☐ | ☐ |

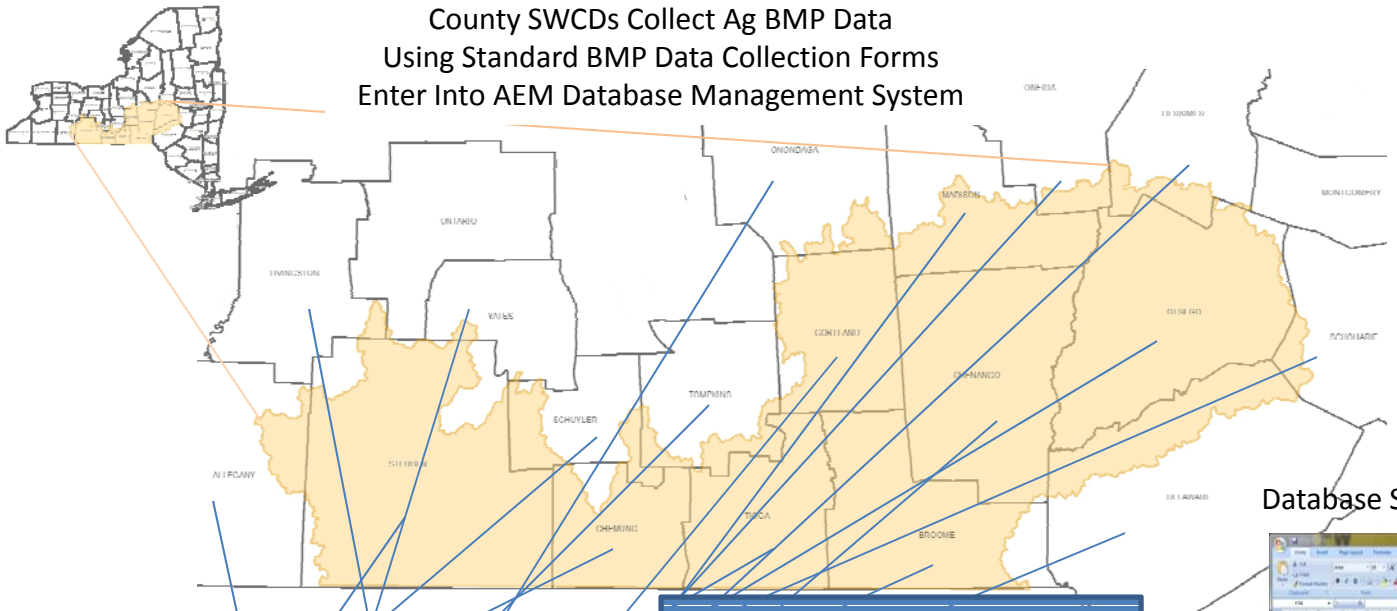
### *Pasture and Buffer BMPs*

| | | | | | | |
|---|---|---|---|---|---|---|
| Prescribed Grazing | Acres _____ | | Date _____ | | ☐ | ☐ |
| ☐ Stream Present in Pasture | | | | | | |
| ☐ Stream Fenced (No Cow Access) | Stream Fence Length _____ | | Date _____ | | | |
| Pasture Buffers | | | | | | |
| Grass Buffer | Length _____ | Width _____ | Date _____ | | ☐ | ☐ |
| Forest Buffer | Length _____ | Width _____ | Date _____ | | ☐ | ☐ |
| Cropland Buffers | | | | | | |
| Grass Buffer | Length _____ | Width _____ | Date _____ | | ☐ | ☐ |
| Forest Buffer | Length _____ | Width _____ | Date _____ | | ☐ | ☐ |
| Horse Pasture Management | Acres _____ | | Date _____ | | ☐ | ☐ |

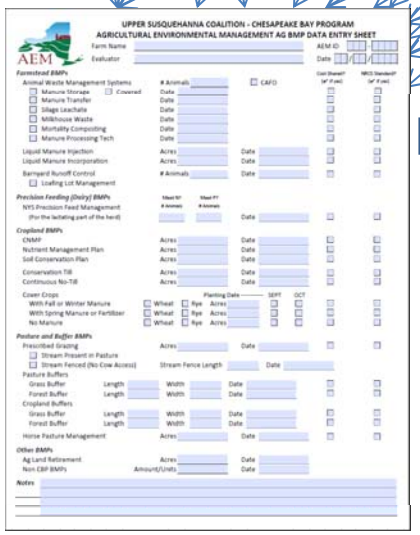
### *Other BMPs*

| | | | |
|---|---|---|---|
| Ag Land Retirement | Acres _____ | Date _____ | |
| Non CBP BMPs | Amount/Units _____ | Date _____ | |

***Notes*** _____

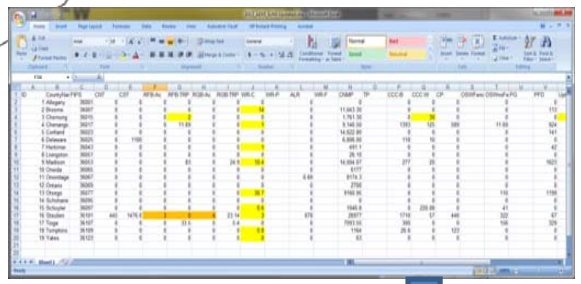



County SWCDs Collect Ag BMP Data
Using Standard BMP Data Collection Forms
Enter Into AEM Database Management System

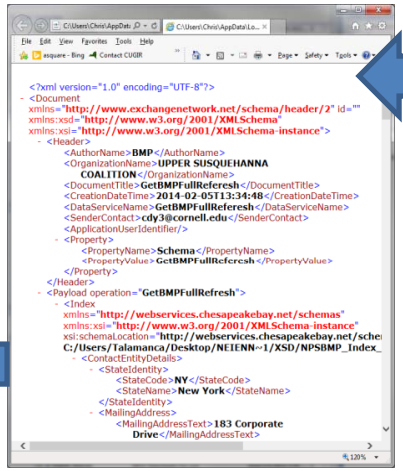



AEM Database System

Database System Aggregates BMPs by County



XML Generator Software




Individual County XMLs
Are Created Using
Bay Schema

USC sends to NYSDEC
NYSDEC uploads the XML
files to the NEIEN Node

NYS DEC

Agricultural
Environmental
Management

# Tier 5B BMP Evaluation Requirements Checklist for AEM Base Program

This checklist will help determine if all required tasks and documentation have been completed for the Tier 5B Evaluation of an existing BMP system or conservation practice. Also consult "Participating in AEM Tier 5B" when completing this checklist.

## Please complete the following information on the farm & BMP evaluated.

**County:** **Date:** **AEM YEAR:**

**AEM Farm Identification Number:**

**12-digit HUC of the predominant watershed in which the farm is located:**

**Type of BMP System/conservation practice(s) evaluated:**

**Date of BMP installation:**

**ID the source of cost share for original installation** (if applicable)**:** ☐ **Ag NPS** ☐ **Farm Bill** ☐ **Both**

**Type or Farm:** **Acres:**

**Animal Units on the farm:**

**Please check each item addressed and documented in the plan and/or the farm's case file.**

- **If an item does not apply please explain why in the notes section of this form.**

1. ☐ The NRCS Conservation Practice Standard(s), the design, and "as-built" of the conservation practice(s) to be evaluated have been found and reviewed. The design and "as-built" was signed by an individual(s) with the appropriate Job Approval Authority.

2. ☐ An on-site evaluation of the practice(s) was conducted noting the condition of the practice, the status of operation & maintenance, and if the practice is properly functioning including a check of the capacity if appropriate. You have utilized the assistance, if needed, of an individual with Job Approval Authority or a Professional Engineer.

3. ☐ Determination was made on whether or not the practice is addressing the concern for which it was installed. The "Criteria" and "Considerations" sections of the appropriate NRCS Conservation Practice Standard were utilized to help make this determination.

4. ☐ You have met with the farmer to discuss if the practice is meeting expectations, and to review operation and maintenance activities.

5. ☐ The farmer has been provided a written report on the condition of the practice that identifies any changes and/or improvements needed, and provides any additional information required to properly operate and maintain the practice. Recommendations on new or additional BMPs have been made if needed. The report was reviewed on-site.

6. ☐ The evaluation of the practice and review with the farmer has been documented in the conservation plan or case file. A copy of the report has also been filed. Accomplishments were documented in any data management system maintained by the District.

7. Comments:

Agricultural
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Management

# Tier 5B Conservation Plan Evaluation Requirements Checklist for AEM Base Program

**Check only ONE box per form.**

3A Plan ☐ Completed Year ____

3B CNMP ☐ Completed Year ____

3C Whole Farm ☐ Completed year ____

This checklist will help determine if all required tasks and documentation have been completed for the Tier 5B Evaluation of an AEM Tier 3 Plan. Also consult "*Participating in AEM Tier 5B*" when completing this checklist.

## Please complete the following information on the farm planned.

**County:** ____ **Date:** ____ **AEM YEAR:** ____

**AEM Farm Identification Number:** ____

**12-digit HUC of the predominant watershed in which the farm is located:** ____

**Primary type of farm evaluated:** ____ **Acres:** ____

**Animal Units on the farm:** ____

**Date of the original plan:** ____

**Existing planned component(s):** ☐Farmstead ☐Cropland ☐Nutrient Mgmt. ☐Pasture ☐Pest

**Additional components planned:** ☐Farmstead ☐Cropland ☐Nutrient Mgmt. ☐Pasture ☐Pest ☐NA

**Additional acres planned:** ____

**Please check each item addressed and documented in the plan and/or the farm's case file.**

- **If an item does not apply please explain why in the notes section of this form.**

1. ☐ Identify the land units planned and review the natural resource issues & opportunities, decisions, and recommendations in the plan.

2. ☐ Meet with the farmer to review and discuss their plan noting any progress made in implementing decisions from the plan by documenting on the *Record of Decisions and Progress* form. Also, note any changes made to the farming operation that necessitate a plan update/revision. Note that AEM Tier 1 and 2 can be used to help identify changes and assess the need for additional planning.

3. ☐ Check that the existing plan covers all natural resource issues & opportunities and identify any missing high priority issues that should be progressively planned in the updated plan.

4. ☐ Discuss with the farmer the decisions/recommendations not implemented from the existing plan then update the plan to reflect any new high priority issues & opportunities, or adjustments to the timetable to implement already planned practices in the *Record of Decisions and Progress* form.

5. ☐ Plan any additional high priority issues or components the farmer is now willing to address (progressively plan). Utilize the *Participating in AEM Tier 3* document and the *Tier 3 Plan Requirements Checklist* to help guide the planning.

6. ☐ Tier 3B or C plans must be evaluated by or under the supervision of a Certified Planner.

7. ☐ Complete the update, review with the farmer and gain their approval. Note the process in the *Assistance Notes* in the farmer's case file and in any data management system maintained by the District.

8. ☐ Provide a copy of the revised plan to the farmer.

9. Comments: